Originally Processed With FOIA(s): S

FOIA Number: S

FOIA MARKER

This is not a textual record. This is used as an administrative marker by the George Bush Presidential Library Staff.

Record Group/Collection:	George H.W. Bush Presidential Records
Collection/Office of Origin:	Speechwriting, White House Office of
Series:	Speech File Backup Files
Subseries:	Chron File, 1989-1993

OA/ID Number:	13717
Folder ID Number:	13717-008

Folder Title:
Oklahoma State University 5/4/90 [**OA** 6898] [1]

Stack:	Row:	Section:	Shelf:	Position:
G	26	20	5	5

COMMENCEMENT, OKLAHOMA STATE UNIVERSITY
LEWIS STADIUM
FRIDAY, MAY 4, 1990
2:00 P.M.

REFLECTIONS ON DEMOCRATIC CHANGE:
THE UNITED STATES AND NATO IN A NEW AGE OF FREEDOM

[[THANK YOU, GOVERNOR BELLMON. PRESIDENT CAMPBELL, SENATOR DON NICKLES; CONGRESSMEN WES WATKINS; CHIEF MANKILLER, MR. DONNELLY; REGENTS AND ADMINISTRATORS, FACULTY, PARENTS, AND MOST OF ALL -- O.S.U.'S CENTENNIAL GRADUATING CLASS OF 1990 ! \\

I'M SORRY BARBARA COULDN'T BE HERE. BUT SHE DID TELL ME TO GET A BEER AND SOME CHEESE FRIES OVER AT ESKIMO JOE'S... \\

HOPE THEY HAVE ENOUGH T-SHIRTS FOR ALL THE GRANDKIDS... \\

YOU KNOW, WHEN GRADUATES OF MY VINTAGE WERE SITTING THROUGH CEREMONIES LIKE THIS, RIGHT AFTER THE SECOND WORLD WAR, WE FACED A WORLD OF CHANGES -- FULL OF POTENTIAL AND NEW POSSIBILITIES.

BARBARA AND I GOT INTO A RED TWO-DOOR STUDEBAKER -- YOU STILL DRIVE THOSE, RIGHT? -- IN THE SUMMER OF 1948. DROVE DOWN TO WEST TEXAS. [[OF COURSE, WHO KNOWS HOW FAR WE COULD'VE GONE IN LIFE IF WE'D MADE IT ON UP TO OKLAHOMA...]]

POST-WAR AMERICA WAS READY FOR PEACE AND PROSPERITY. BUT WHILE THE FREE WORLD WAS RECOVERING, THE NATIONS OF EASTERN EUROPE WERE BEING "CONSOLIDATED" BEHIND AN IRON CURTAIN. SO BEGAN FOUR DECADES OF DIVISION IN EUROPE -- AND 40 LONG YEARS OF SUSPICION BETWEEN SUPERPOWERS.

TODAY, YOU ALSO GRADUATE AT THE END OF AN ERA OF CONFLICT -- BUT A CONTEST OF A DIFFERENT KIND -- A COLD AND ABSTRACT WAR OF WORDS AND WALLS. NOW EUROPE, AND THE WORLD, HAVE ENTERED A NEW ERA -- THE AGE OF FREEDOM. \\

I HOPE YOU'LL FORGIVE ME IF I USE THIS GREAT FORUM, AT YOUR GREAT UNIVERSITY, TO HANDLE A SUBJECT OF A VERY SERIOUS NATURE.

I'LL BE REFLECTING ON THE POWER AND POTENTIAL OF DEMOCRATIC CHANGE IN EACH OF THE COMMENCEMENT ADDRESSES I MAKE THIS YEAR.

I BEGIN TODAY WITH AMERICA'S PLACE IN THE NEW EUROPE.

A FEW OF YOU MAY BE WONDERING WHAT A CONTINENT 4000 MILES AWAY HAS TO DO WITH YOU. THROUGHOUT OUR HISTORY, GREAT UPHEAVALS IN EUROPE HAVE FORCED THE AMERICAN PEOPLE TO RESPOND, TO MAKE DEEP JUDGMENTS ABOUT THE PART WE SHOULD PLAY IN EUROPEAN AFFAIRS. THIS HAS BEEN TRUE FROM THE TIME OF THE FRENCH REVOLUTION AND THE WARS WHICH FOLLOWED IT, TO WORLD WAR I AND THE FLAWED PEACE WHICH ENDED IT, TO THE SECOND WORLD WAR AND THE CREATION OF THE POSTWAR ORDER. I BELIEVE THAT, NOW, WE ARE POISED AT ANOTHER SUCH MOMENT -- A CRITICAL TIME IN OUR STRATEGIC RELATIONSHIP WITH OUR NEIGHBORS ACROSS THE ATLANTIC.

MANY OF THE GRADUATES OF AMERICA'S CLASS OF 1916 MAY HAVE WONDERED WHY THE FARAWAY WAR MAKING HEADLINES IN THEIR NEWSPAPERS WOULD HAVE ANYTHING TO DO WITH THEM. THEY MIGHT HAVE AGREED WITH PRESIDENT WILSON, WHO THAT YEAR SAID "WE ARE NOT INTERESTED" IN THE CAUSES OF THE WAR, IN "THE OBSCURE FOUNDATIONS FROM WHICH ITS STUPENDOUS FLOOD HAS BURST FORTH." BUT A YEAR LATER THOSE CLASSMATES, AND THEIR COUNTRY, WERE SWEPT UP IN THE TORRENT, CARRYING THEM TO THE HORROR OF THE TRENCHES IN FRANCE.

YET AFTER THE WAR, WE AGAIN TURNED AWAY FROM ACTIVE INVOLVEMENT IN EUROPEAN AFFAIRS. INSTEAD, WE SPONSORED A TREATY TO OUTLAW WAR AND THEN, AS THE OUTLAWS GAINED STRENGTH, THE UNITED STATES PASSED NEW NEUTRALITY LAWS. ANOTHER GENERATION OF AMERICANS SAT IN THE BRIGHT SUN OF COMMENCEMENT CEREMONIES AT COLLEGES ACROSS THE COUNTRY, THINKING WAR IN EUROPE WOULD PASS THEM BY. BUT WHEN WAR CAME, THEY PAID AN AWFUL PRICE FOR AMERICA'S ISOLATION.

WHEN THAT WAR ENDED, THOSE STUDENTS NO LONGER QUESTIONED OUR ROLE IN THE FUTURE OF EUROPE. THEY NO LONGER ASKED WHAT EUROPE HAD TO DO WITH THEM, BECAUSE THEY KNEW THE ANSWER // EVERYTHING. ABOUT A YEAR AGO, IN GERMANY, I DEFINED THE KIND OF EUROPE OUR COUNTRY IS COMMITTED TO: A PEACEFUL, STABLE EUROPE -- A EUROPE WHOLE AND FREE. TODAY THAT GOAL IS WITHIN OUR REACH.

WE ARE ENTERING A NEW AGE OF FREEDOM IN A TIME OF UNCERTAINTY, BUT GREAT HOPE. EMERGING DEMOCRACIES IN EASTERN EUROPE ARE GOING THROUGH SOCIAL, POLITICAL, AND ECONOMIC TRANSFORMATIONS SHAKING LOOSE STAGNANT, CENTRALIZED BUREAUCRACIES THAT HAVE SMOTHERED INITIATIVE FOR GENERATIONS.

IN THIS TIME OF TRANSITION, MOVING AWAY FROM THE POSTWAR ERA AND BEYOND CONTAINMENT, WE CANNOT KNOW WHAT CHOICES THE PEOPLE OF EASTERN EUROPE WILL MAKE FOR THEIR FUTURE. THE PROCESS OF CHANGE IN THE SOVIET UNION IS ALSO STILL UNFINISHED. IT WILL BE CRUCIAL TO SEE, FOR EXAMPLE, WHETHER MOSCOW CHOOSES COERCION OR PEACEFUL DIALOGUE IN RESPONDING TO THE ASPIRATIONS OF THE LITHUANIAN PEOPLE, AND NATIONALITIES WITHIN THE SOVIET UNION. THE ONLY NOBLE ANSWER LIES IN A DIALOGUE THAT RESULTS IN UNENCUMBERED SELF-DETERMINATION FOR LITHUANIA.

PRESIDENT GORBACHEV HAS MADE PROFOUND PROGRESS IN HIS COUNTRY. REFORMS SO FUNDAMENTAL THAT THE CLOCK CANNOT BE TURNED BACK. YET NEITHER CAN WE TURN THE CLOCK AHEAD, TO KNOW FOR SURE WHAT KIND OF COUNTRY THE SOVIET UNION WILL BE IN YEARS TO COME.

FOR THE SAKE OF THE FUTURE WE SHARE WITH EUROPE, OUR POLICIES AND PRESENCE MUST BE APPROPRIATE FOR THIS PERIOD OF TRANSITION -- WITH A CONSTANCY AND RELIABILITY THAT WILL REASSURE OUR FRIENDS, BOTH OLD AND NEW.

MY EUROPEAN COLLEAGUES WANT THE UNITED STATES TO BE A PART OF EUROPE'S FUTURE. I BELIEVE THEY ARE RIGHT. THE UNITED STATES SHOULD REMAIN A EUROPEAN POWER IN THE BROADEST SENSE -- POLITICALLY, MILITARILY, AND ECONOMICALLY. AND AS PART OF OUR GLOBAL RESPONSIBILITIES, THE FOUNDATION FOR AMERICA'S PEACEFUL ENGAGEMENT IN EUROPE HAS BEEN, AND WILL CONTINUE TO BE, NATO.

RECOGNIZING IN PEACE WHAT WE HAD LEARNED FROM WAR, WE JOINED WITH THE FREE NATIONS OF EUROPE TO FORM AN ATLANTIC COMMUNITY, AN ENDURING POLITICAL COMPACT. OUR ENGAGEMENT IN EUROPE HAS MEANT THAT THE EUROPEANS ACCEPT AMERICA AS PART OF THEIR CONTINENT'S FUTURE, TAKING OUR INTERESTS INTO ACCOUNT ACROSS THE BOARD. OUR COMMITMENT IS NOT JUST IN DEFENSE; IT MUST BE A WELL-BALANCED MIX OF INVOLVEMENT IN ALL DIMENSIONS OF EUROPEAN AFFAIRS.

BECAUSE OF OUR POLITICAL COMMITMENT TO PEACE IN EUROPE, THERE HASN'T BEEN A WAR ON THAT CONTINENT IN 45 YEARS. THIS "LONG PEACE" SHOULD BE VIEWED THROUGH THE LONG LENS OF HISTORY: EUROPE HAS NOW EXPERIENCED THE LONGEST UNINTERRUPTED PERIOD OF INTERNATIONAL PEACE IN THE RECORDED HISTORY OF THAT CONTINENT. THE ALLIANCE IS NOW READY TO BUILD ON THAT HISTORIC ACHIEVEMENT AND DEFINE ITS OBJECTIVES FOR THE NEXT CENTURY. SO THE ALLIANCE MUST JOIN TOGETHER TO CRAFT A NEW WESTERN STRATEGY FOR NEW AND CHANGING TIMES.

HAVING CONSULTED INTENSIVELY WITH PRIME MINISTER THATCHER IN BERMUDA, PRESIDENT MITTERRAND IN FLORIDA, CHANCELLOR KOHL AT CAMP DAVID, AND BY TELEPHONE OR CABLE WITH NATO SECRETARY GENERAL WOERNER AND ALL OF MY OTHER ALLIED COLLEAGUES, I AM CALLING FOR AN EARLY SUMMIT MEETING OF ALL NATO LEADERS. MARGARET THATCHER, ONE OF FREEDOM'S GREATEST CHAMPIONS OF THE LAST DECADE, TOLD ME THAT WHILE NATO HAS BEEN FANTASTICALLY SUCCESSFUL, WE SHOULD BE READY NOW TO FACE NEW CHALLENGES. THE TIME IS RIGHT FOR THE ALLIANCE TO ACT.

THE FUNDAMENTAL PURPOSE OF THIS SUMMIT SHOULD BE TO LAUNCH A WIDE-RANGING NATO STRATEGY REVIEW FOR THE TRANSFORMED EUROPE OF THE 1990'S. TO MY NATO COLLEAGUES, I SUGGEST THAT OUR SUMMIT DIRECT THIS REVIEW BY ADDRESSING FOUR CRITICAL POINTS:

ONE, THE POLITICAL ROLE NATO CAN PLAY IN THE NEW EUROPE.

TWO, THE CONVENTIONAL FORCES THE ALLIANCE WILL NEED IN THE TIME AHEAD, AND NATO'S GOALS FOR CONVENTIONAL ARMS CONTROL.

THREE, THE ROLE OF NUCLEAR WEAPONS BASED IN EUROPE -- AND WESTERN OBJECTIVES IN NEW NUCLEAR ARMS CONTROL NEGOTIATIONS BETWEEN THE U.S. AND THE SOVIET UNION.

FOUR, STRENGTHENING THE CONFERENCE ON SECURITY AND COOPERATION IN EUROPE -- THE CSCE -- TO REINFORCE NATO AND HELP PROTECT DEMOCRATIC VALUES, IN A EUROPE WHOLE AND FREE.

THE FIRST TASK THE NATO SUMMIT SHOULD CONSIDER IS THE FUTURE POLITICAL MISSION OF THE ALLIANCE. AS MILITARY THREATS FADE, THE POLITICAL DIMENSION OF NATO'S WORK -- ALWAYS THERE BUT SELDOM NOTICED -- BECOMES MORE PROMINENT. SO AT THE NATO SUMMIT WE SHOULD LOOK FOR WAYS TO HELP OUR GERMAN FRIENDS SUSTAIN FREEDOM AND ACHIEVE UNITY -- SOMETHING WHICH WE AND OUR ALLIES HAVE SUPPORTED FOR OVER 40 YEARS. AND WE SHOULD REAFFIRM THE IMPORTANCE OF KEEPING A UNITED GERMANY A FULL MEMBER OF NATO.

THE ALLIANCE NEEDS TO FIND WAYS TO WORK MORE CLOSELY WITH A VIGOROUS EUROPEAN COMMUNITY THAT IS RIGHTLY ASSERTING ITS OWN DISTINCT VIEWS. AND IN EASTERN EUROPE, GOVERNMENTS ONCE OUR ADVERSARIES ARE NOW OUR PARTNERS IN BUILDING A NEW CONTINENT. SO WE MUST ALSO TALK ABOUT HOW TO ENCOURAGE FURTHER PEACEFUL DEMOCRATIC CHANGE IN EASTERN EUROPE AND IN THE SOVIET UNION.

BUT EVEN AS NATO GIVES MORE EMPHASIS TO ITS POLITICAL MISSION, ITS GUARANTEE OF EUROPEAN SECURITY MUST REMAIN FIRM. OUR ENEMY TODAY IS UNCERTAINTY, AND INSTABILITY. SO THE ALLIANCE WILL NEED TO MAINTAIN A SOUND, COLLECTIVE MILITARY STRUCTURE WITH FORCES IN THE FIELD, BACKED BY LARGER FORCES THAT CAN BE CALLED UPON IN A CRISIS.

WHICH BRINGS ME TO THE SECOND TASK FOR THE NATO SUMMIT -- A REVIEW OF HOW THE ALLIANCE SHOULD PLAN ITS CONVENTIONAL DEFENSES. WHILE WE NEED TO RECOGNIZE THAT IT WILL TAKE SOME TIME BEFORE THE SOVIET MILITARY PRESENCE IS GONE FROM EASTERN EUROPE -- AND BEFORE THE MAJOR REDUCTIONS CONTEMPLATED BY BOTH SIDES CAN BE IMPLEMENTED -- WE NEED TO DEVELOP OUR STRATEGY FOR THAT WORLD NOW.

OBVIOUSLY, SOVIET ACTIONS WILL BE CRITICAL. YET EVEN AFTER ALL THE PLANNED REDUCTIONS IN ITS FORCES ARE COMPLETE, EVEN IF OUR CURRENT ARMS CONTROL PROPOSALS ARE AGREED TO AND IMPLEMENTED, THE SOVIET MILITARY WILL STILL FIELD FORCES DWARFING THOSE OF ANY OTHER SINGLE EUROPEAN STATE -- ARMED WITH THOUSANDS OF NUCLEAR WEAPONS. MILITARILY SIGNIFICANT U.S. FORCES MUST REMAIN ON THE OTHER SIDE OF THE ATLANTIC FOR AS LONG AS OUR ALLIES WANT AND NEED THEM. THESE FORCES DEMONSTRATE, AS NO WORDS CAN, THE ENDURING POLITICAL COMPACT THAT BINDS AMERICA'S FATE WITH EUROPE'S DEMOCRACIES.

IF THE SOVIET WITHDRAWAL CONTINUES AND OUR ARMS CONTROL EFFORTS ARE SUCCESSFUL, WE MUST PLAN FOR A DIFFERENT KIND OF MILITARY PRESENCE FOCUSED LESS ON THE DANGER OF AN IMMEDIATE OUTBREAK OF WAR. WE MUST PROMOTE LONG-TERM STABILITY AND PREVENT CRISES FROM ESCALATING BY RELYING ON REDUCED FORCES THAT SHOW OUR CAPABILITY -- AND READINESS -- TO RESPOND TO WHATEVER MAY ARISE.

THE CONVENTIONAL FORCES IN EUROPE TREATY, WE HAVE PROPOSED, WOULD BE THE MOST AMBITIOUS CONVENTIONAL ARMS CONTROL AGREEMENT EVER CONCLUDED. WE MUST FINISH THE WORK ON THIS TREATY SOON, AND PLAN TO SIGN IT AT A CSCE SUMMIT THIS FALL. BUT AT THE NATO SUMMIT WE NEED TO LOOK FURTHER AHEAD, PREPARING FOR FOLLOW-ON NEGOTIATIONS AFTER THE CONCLUSION OF A CFE TREATY. THE NATO SUMMIT SHOULD DEVELOP THE ALLIANCE'S OBJECTIVES FOR THESE TALKS.

THIRD, THE NATO SUMMIT SHOULD ALSO ASSESS THE FUTURE OF U.S. NUCLEAR FORCES IN EUROPE. AS DEMOCRACY BLOOMS IN EASTERN EUROPE, AS SOVIET TROOPS RETURN HOME AND TANKS ARE DISMANTLED, THERE IS LESS NEED FOR NUCLEAR SYSTEMS OF THE SHORTEST RANGE. THE NATO SUMMIT SHOULD ACCELERATE ONGOING WORK WITHIN THE ALLIANCE TO DETERMINE THE MINIMUM NUMBER AND TYPES OF WEAPONS THAT WILL BE NEEDED TO DETER WAR -- CREDIBLY AND EFFECTIVELY.

IN LIGHT OF THESE NEW POLITICAL CONDITIONS, AND THE LIMITED RANGE AND FLEXIBILITY OF SHORT-RANGE NUCLEAR MISSILE FORCES BASED IN EUROPE, I'VE REVIEWED OUR PLAN TO PRODUCE AND DEPLOY NEWER, MORE MODERN, SHORT-RANGE NUCLEAR MISSILES TO REPLACE THE LANCE SYSTEM NOW IN EUROPE. WE'VE ALMOST FINISHED THE RESEARCH AND DEVELOPMENT WORK FOR THESE NEW MISSILES. BUT I'VE DECIDED, AFTER CONSULTING WITH OUR ALLIES, TO TERMINATE THE FOLLOW-ON TO LANCE PROGRAM. I HAVE ALSO DECIDED TO CANCEL ANY FURTHER MODERNIZATION OF U.S. NUCLEAR ARTILLERY SHELLS DEPLOYED IN EUROPE.

THERE ARE STILL SHORT-RANGE U.S. -- AND MANY MORE SOVIET -- NUCLEAR MISSILE SYSTEMS DEPLOYED IN EUROPE. WE'RE PREPARED TO NEGOTIATE THE REDUCTION OF THESE FORCES AS WELL, IN A NEW SET OF ARMS CONTROL TALKS. AT THE NATO SUMMIT, I WILL URGE MY COLLEAGUES TO AGREE ON THE BROAD OBJECTIVES FOR THESE FUTURE U.S.-SOVIET NEGOTIATIONS AND BEGIN PREPARATIONS WITHIN THE ALLIANCE FOR THESE TALKS. I WOULD ALSO LIKE TO SUGGEST THAT THESE NEW U.S.-SOVIET ARMS CONTROL TALKS BEGIN SHORTLY AFTER A CFE TREATY ON CONVENTIONAL FORCES HAS BEEN SIGNED.

IN TAKING THESE STEPS, THE UNITED STATES IS NOT GOING TO ALLOW EUROPE TO BECOME "SAFE FOR CONVENTIONAL WAR." THERE ARE FEW LESSONS SO CLEAR IN HISTORY AS THIS: ONLY THE COMBINATION OF CONVENTIONAL FORCES AND NUCLEAR FORCES HAVE ENSURED PEACE IN EUROPE.

BUT EVERY ASPECT OF AMERICA'S ENGAGEMENT IN EUROPE -- MILITARY, POLITICAL, AND ECONOMIC -- MUST BE COMPLEMENTARY. AND ONE PLACE WHERE THEY ALL COME TOGETHER IS IN THE CONFERENCE ON SECURITY AND COOPERATION IN EUROPE -- AN ORGANIZATION OF 35 STATES OF EUROPE AND NORTH AMERICA. THE CSC IS ALREADY A BEACON FOR HUMAN RIGHTS AND INDIVIDUAL FREEDOMS. NOW, IT MUST TAKE ON A BROADER ROLE.

SO THE FOURTH TASK FOR A NATO SUMMIT IS TO REACH COMMON ALLIED OBJECTIVES FOR THE FUTURE OF THE CSCE. IT CAN HELP THE VICTORIOUS FORCES OF DEMOCRACY IN EASTERN EUROPE SECURE THEIR REVOLUTIONS, AND -- AS THEY JOIN THE COMMONWEALTH OF FREE NATIONS -- BE ASSURED A VOICE IN THE NEW EUROPE.

THE CSCE SHOULD OFFER NEW GUIDELINES FOR BUILDING FREE SOCIETIES -- INCLUDING SETTING STANDARDS FOR TRULY FREE ELECTIONS, ADOPTING MEASURES TO STRENGTHEN THE RULE OF LAW, AND POINTING THE WAY IN THE NEEDED BUT PAINFUL TRANSITION FROM CENTRALIZED, COMMAND ECONOMIES TO FREE MARKETS.

THE CSCE CAN ALSO PROVIDE A FORUM FOR POLITICAL DIALOGUE IN A MORE UNITED EUROPE. I AGREE WITH THOSE WHO HAVE CALLED FOR REGULAR CONSULTATIONS AMONG SENIOR REPRESENTATIVES OF THE CSCE COUNTRIES. WE SHOULD CONSIDER WHETHER NEW CSCE MECHANISMS CAN HELP MEDIATE AND SETTLE DISPUTES IN EUROPE. I BELIEVE MY ALLIED COLLEAGUES AND I SHOULD AGREE TO TAKE UP THESE NEW IDEAS AT A CSCE SUMMIT LATER THIS YEAR, IN CONJUNCTION WITH THE SIGNING OF A CFE TREATY.

IN EASTERN EUROPE, IN THIS HEMISPHERE, THE TRIUMPH OF DEMOCRACY HAS CAST ITS WARM LIGHT ON THE FACE OF THE WORLD LIKE A MIRACULOUS DAWN. BUT THE OUTCOME OF THIS STRUGGLE FOR FREEDOM IS <u>NOT</u> ORDAINED, AND IT WILL NOT BE THE WORK OF MIRACLES.

ALL OF YOU WHO GRADUATE HERE TODAY ARE PART OF A HISTORIC DECISION FOR AMERICA'S ENGAGEMENT IN THE FUTURE OF EUROPE. I AM CONVINCED THAT OUR WORK TO PROTECT FREEDOM, TO BUILD FREE SOCIETIES, WILL SAFEGUARD OUR OWN PEACE, AND PROSPERITY.

THE SECURITY OF EUROPE AND THE WORLD HAS BECOME VERY COMPLEX IN THIS CENTURY. BUT AMERICA'S COMMITMENT TO STABILITY AND PEACE IS PROFOUNDLY CLEAR. ITS MOTIVATION DERIVES FROM THE STRENGTH OF OUR FOREFATHERS -- FROM THE BLOOD OF THOSE WHO HAVE DIED FOR FREEDOM -- AND FOR THE SAKE OF ALL WHO WOULD LIVE IN PEACE.

EVERY VOICE, EVERY HEART'S COMMITMENT TO FREEDOM, IS IMPORTANT. THERE'S A STORY, ABOUT A MAN TRYING TO CONVINCE HIS SON THAT IN THE STRUGGLE FOR FREEDOM, EVERY VOICE COUNTS.

THEY STOOD IN A VALLEY, WATCHING THE SNOW FALL ON A DISTANT MOUNTAIN. "TELL ME THE WEIGHT OF A SNOWFLAKE," THE MAN SAID.

"ALMOST NOTHING," ANSWERED THE BOY.

AS THE SNOW SWIRLED AROUND THEM, UP ON THE MOUNTAIN THEY SAW AN AVALANCHE WHOSE THUNDER SHOOK THE EARTH. "DO YOU KNOW WHICH SNOWFLAKE CAUSED THAT?" THE OLD MAN ASKED. "I DON'T," ANSWERED THE BOY.

"MAYBE," SAID THE MAN, "LIKE THE LAST SNOWFLAKE THAT MOVES A MOUNTAIN \\ IN THE STRUGGLE FOR FREEDOM, A SINGLE VOICE MAKES A WORLD OF DIFFERENCE."

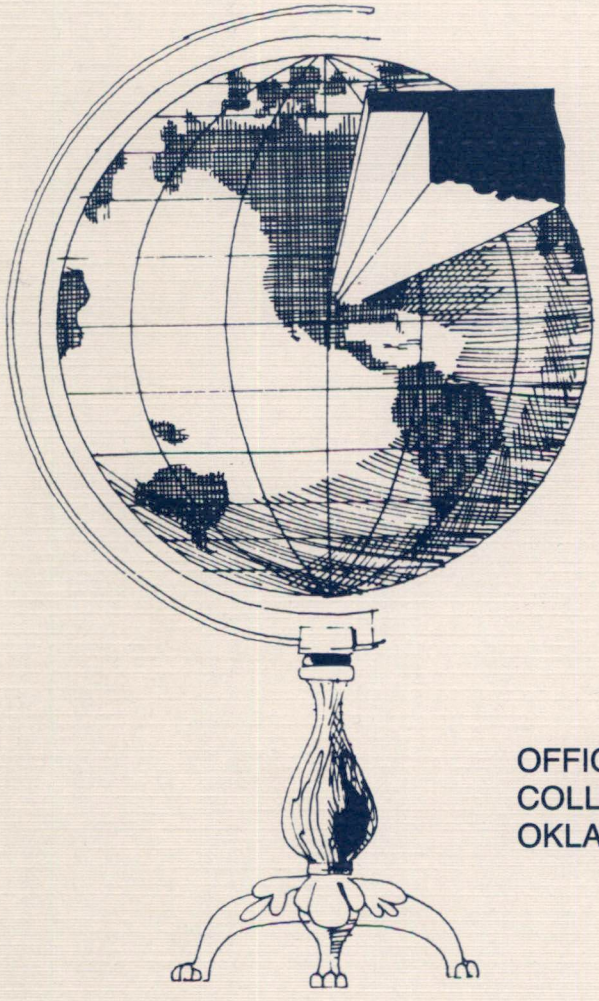
AMERICA'S MISSION IN EUROPE, LIKE MILLIONS OF INDIVIDUAL DECISIONS MADE FOR FREEDOM, CAN MAKE A WORLD OF DIFFERENCE.

THE CRY FOR FREEDOM -- IN EASTERN EUROPE, IN SOUTH AFRICA, IN THIS HEMISPHERE -- WAS HEARD AROUND THE WORLD IN THE REVOLUTION OF '89. TODAY, IN THIS NEW AGE OF FREEDOM, ADD YOUR VOICE TO THE THUNDERING CHORUS.

THANK YOU. GOD BLESS YOU. AND GOD BLESS THE UNITED STATES OF AMERICA.

# # #

OSU's Centennial Year



1990 OKLAHOMA ECONOMIC OUTLOOK

OFFICE OF BUSINESS AND ECONOMIC RESEARCH
COLLEGE OF BUSINESS ADMINISTRATION
OKLAHOMA STATE UNIVERSITY

CENTENNIAL
1890 • 1990

Contents

BUSINESS AND UNIVERSITY MESSAGE	1
1990 FORECAST HIGHLIGHTS	2
1990 FORECAST OVERVIEW	3
OUTPUT	4
EMPLOYMENT	6
PERSONAL INCOME	8
STATE GOVERNMENT FINANCE	10
FINANCE	12
ENERGY	14
1990 ACCENT--EDUCATION AND ECONOMIC GROWTH	16
APPENDIX	20
DATA SOURCES	27

Acknowledgments

The *1990 Oklahoma Economic Outlook* marks the eleventh issue of an annual series published by the Office of Business and Economic Research in the College of Business Administration of Oklahoma State University. The publication is the result of the efforts of many individuals. Robert L. Sandmeyer, Dean of the College of Business Administration, provided overall support and continued direction for the project. Robert C. Dauffenbach, Director of the Office of Business and Economic Research, coordinated the project, was responsible for the analyses contained in and the content of the publication, and is principal author. He was assisted in this effort by Rudy Greer. Tariq Jangda and Ahmed Abo-Basha developed the forecasts contained in the *Outlook*. Tabitha Doescher's knowledge of the structure of the state's economy played an important role in the analysis of the forecasts. Several faculty members of the College of Business Administration, including W. Gary Simpson, Kent Olson, and Larkin Warner, were consulted on individual sections of the *Outlook*. Cindy Conway and Beverlee Dunham provided assistance with the graphics. The continuing support of sponsors of the *Outlook* series makes all these efforts possible.

The forecasts, analyses, and comments contained in the *1990 Oklahoma Economic Outlook* are those of the research team and do not necessarily reflect the opinions of any official of Oklahoma State University, of individuals who serve as advisors to the model or their employers, or of the sponsoring organizations.

BUSINESS AND UNIVERSITY MESSAGE



Robert L. Sandmeyer, Dean
College of Business Administration
Oklahoma State University

This edition of the *Oklahoma Economic Outlook* marks the eleventh year for this annual publication. It also marks the one hundredth year of Oklahoma State University. The College of Business Administration is pleased to be a partner with a number of committed Oklahoma organizations to bring the *1990 Oklahoma Economic Outlook* to Oklahoma citizens. Sponsors of the *1990 Oklahoma Economic Outlook* are:

- **American Fidelity Corporation**
- **AT&T**
- **Bank of Oklahoma, n.a.**
- **Conoco, Inc.**
- **Coopers & Lybrand**
- **The Dolese Company**
- **ESM Computer Marketing, Inc.**
- **First Interstate Bank of Oklahoma**
- **First National Bank and Trust Company of Tulsa**
- **Fourth National Bank of Tulsa**
- **Kerr-McGee Corporation**
- **Liberty National Bank and Trust Company**
- **Oklahoma Department of Commerce**
- **Oklahoma Gas and Electric Company**
- **Oklahoma Natural Gas Company**
- **Oklahoma State University Foundation**
- **Phillips Petroleum Company**
- **Southwestern Bell Telephone**
- **WestStar Bank, n.a.**

Enhancing economic opportunities in Oklahoma is the business of all Oklahoma citizens. When the forecasts and analyses contained in the *1990 Oklahoma Economic Outlook* supplement the experience, knowledge, and judgment of state decision makers to improve economic opportunities in the state, the goal of the joint business/university effort will be met. Organizations and private citizens are invited to join this year's sponsors and become a part of this joint effort. Those interested are encouraged to contact Robert L. Sandmeyer at 405/744/5064 for more information.

OKLAHOMA HIGHLIGHTS

Troubled though it may be, Oklahoma's economy will at least end the decade of the 1980s on a positive note. This conclusion is based on a review of performance statistics on the Oklahoma economy in 1989. Inflation-adjusted output of goods and services, or real output, is up over the previous year. Employment growth has been positive, although 1989 was hardly a banner year. Personal income gains are beginning to exceed inflation. The population base is showing signs of stabilizing, and out-migration is declining. In addition, state tax receipts provide evidence that the real pace of economic activity in the state is beginning to show signs of increasing vitality.

The good news can be easily overstated. The challenge for Oklahoma to remain a viable economy in the 1990s will not be easily achieved. Nevertheless, it needs to be acknowledged that the decade of the 1980s, although turbulent, was positive for the state. From the close of the 1970s to the present, real gross state product (GSP) rose from $43.5 to $47.2 billion, an 8.5 percent gain. Stated in average annual terms, employment in nonagricultural establishments rose from 1.087 million in 1979 to 1.139 million in 1989. This is a gain of 52 thousand workers, or 4.8 percent. Similarly, personal income, again adjusted for inflation, was up from $31.8 billion at the end of the 1970s to $35.3 in 1989, an 11.0 percent gain. Also, estimates of Oklahoma's population in 1989 place it about 280,000 higher than in 1979, a 9.4 percent gain.

Growth in the 1980s is disappointing relative to the experience in the 1970s. During that decade, for example, real GSP expanded by about one-third and establishment employment grew by almost 50 percent. Also, growth in the state economy was anemic in comparison to achievements in the national economy in the 1980s. Real GNP in the 1980s grew by 30.0 percent, establishment employment by 20.9 percent, real personal income by 31.5 percent, and population by 10.5 percent.

It is clear that Oklahoma's growth rates bear faint resemblance to national achievements. Only on the population measure are the decennial growth rates somewhat comparable. Nevertheless, given the extent of the energy bust, the collapse of Oklahoma's financial sector, low agricultural prices, and the locational disadvantages Oklahoma faces in a world of increasing international interdependence, the surprise is that the Oklahoma economy was able to grow at all. As has frequently been noted in *Outlook* publications, the Oklahoma economy has been able to hold on to some of the large gains it achieved in the late 1970s and early 1980s.

It is certainly an understatement to note that decennial gains have not been evenly spread throughout the decade. The state endured two recessions in the 1980s, both a result of collapsing energy prices. Recessions are defined by economists as periods of falling real output. The year 1983 was such a year for Oklahoma. It was followed by a small positive gain in 1984 and a year of essentially flat real GSP in 1985. In 1986 the other shoe dropped as energy prices took another tumble. In 1987 positive growth in GSP returned late in the year. In 1988 and 1989 significant real growth was achieved in the state economy, which is forecasted to continue into the 1990s.

The most recent year, 1989, provides convincing evidence that the Oklahoma economy is improving. Real GSP advanced at an estimated rate of 1.65 percent. Establishment employment was up by one-half a percentage point. Personal income grew by 6.2 percent in nominal dollars. Adjusted for inflation, personal income growth was still 1.8 percent. Per capita personal income is estimated to be $14,170, only 80 percent of the national average. Yet 1989 is likely to be the low water mark on this important relative measure of well-being. As predicted in previous *Outlook* publications, Oklahoma's unemployment rate continues to fall. On average, 5.9 percent of the Oklahoma labor force was unemployed in 1989. This represents a considerable decline from the peak unemployment rate of 9.0 percent in 1983.

As Oklahomans look to the coming decade, it is clear that the nature of the economic game will continue to change. The collapse of the Iron Curtain and unification of the European Economic Community will result, eventually, in a world of increasing competition for market share. It will also be a world of growing opportunity for states and nations that are prepared to meet the challenge. It will be a time when the increasingly diversified economic base of the state begins to pay some dividends. The state should begin to grow more in concert with the nation. Unfortunately, the reduction of Oklahoma's counter-cyclical tendencies comes at a time when the national economy is in for a definite, if brief, slowdown. That, too, will pass, and Oklahoma will find itself in an even better position to benefit from national growth.

The *1990 Oklahoma Economic Outlook* presents information on the likely performance of the Oklahoma economy in the coming year based on assumed conditions nationally and internationally as forecasted in Data Resources, Inc.'s October 1989 baseline forecast. In addition, continuing a practice initiated last year, this issue compares the Oklahoma economy with six contiguous states plus Louisiana. The Accent section this year focuses on the subject of education and economic growth. The forecasts contained in the *Outlook* have been prepared using the Oklahoma State Econometric Model, developed and maintained by the Office of Business and Economic Research in the College of Business Administration of Oklahoma State University.

1990 FORECAST OVERVIEW

The 1990s will initiate a new era for the Oklahoma economy. The pronounced counter-cyclical nature of the state's economy in relation to national trends will subside. The state will begin to grow more in tandem with the nation. With the collapse of the energy sector in 1982, Oklahoma's distribution of industrial output began to look more like the nation's. Now that employment is beginning to increase, the Oklahoma economy can truly be said to be more diversified.

For the national economy in 1989, the soft-landing scenario dominated the attention of policy makers and business planners. The term *soft-landing* has been used to describe the Federal Reserve's attempt to manage money supply growth so as to guide the national economy to a lower inflationary path without instigating a recession. In both January and February of 1989 the Producer Price Index increased one percentage point. This led many analysts to believe that the Fed would prove unsuccessful and would have to begin to tighten money supply growth even further to avoid an acceleration of inflation, thereby risking a recession. Increases in producer prices were not confirmed by other inflationary measures as evidence of weakness mounted. With a slowdown confirmed, the Fed quickly shifted its focus in mid-year to avoidance of a recession.

Growth of the national economy in 1989 generally exceeded expectations. Initial forecasts were for real GNP growth in the 2.0-2.3 percent range. The 1989 growth of GNP is now expected to register in the 2.9-3.0 percent range, year-over-year. The first three quarters of 1989 have been especially strong. However, the fourth quarter is expected to be particularly weak, with real growth only in the 0.8-1.0 percent range. This basic weakness in growth of the national economy is expected to extend well into 1990.

While growth will be weaker in 1990, a majority of economic forecasters still do not expect a recession. In recent survey results the National Association of Business Economists (NABE) reports that only 38 percent of its panel of professional forecasters expect a recession in the next three years. The consensus forecast is for growth in the neighborhood of 2.0 percent. Among those who see a recession in the future, there is, however, grave concern about the short-term outlook. The period immediately at hand appears to pose the greatest risks.

Weakness in the national economy in 1990 will adversely affect investment spending, a result of deterioration in corporate profits. The composition of output is, therefore, expected to shift towards consumption goods. Inflation fears are easing, as shown by a consensus forecast of a 4.2 percent increase in the Consumer Price Index in 1990—down one-half point from the forecast in May 1989. Unemployment rates are not expected to be affected much by the slowdown. Interest rates will be lower on short-term treasury maturities and are expected to close the year at the 7.0 percent mark. The stage will then be set for above-normal growth in 1991.

Slow growth of the national economy in 1990 will have an impact on the state economy. In 1990 gross state product is forecasted to reach the $48.1 billion level, 1.9 percent above the 1989 level. Establishment employment is expected to rise to 1,147,000, a 0.75 percent increase. Personal income, in real terms, should grow by 2.0 percent to the $36.0 billion level. The expected rate of growth in per capita personal income is forecasted to exceed the national rate of growth, thereby allowing the Oklahoma-to-U.S. ratio to rise to 81 percent.

Incorporated in the forecasts for national and state economic performance in 1990 are assumptions used in Data Resources, Inc.'s, October 1989, *Review of the U.S. Economy*. The major assumptions for 1990 are:

Continuing budgetary problems, S&L financial crises, and waning corporate profits will place pressure on the overall growth rate of real GNP in 1990. Year-over-year growth is forecasted to be only 1.6 percent, down appreciably from the 3.0 percent real growth rate of 1989. Real growth will, however, return to the 2.7 percent level by the fourth quarter of 1990. Inflation trends will moderate to the 3.7-4.0 percent range.

In international exchange markets the direction of the dollar will be down. Bullish sentiments will subside once U.S. interest rates, which are expected to fall, become more in line with rates in Germany and Japan, which are expected to rise. Overall, the value of the dollar is expected to decline by 5.9 percent in 1990, in comparison to a rise of 3.7 percent in 1989.

Refiner's acquisition price of crude oil is expected to change only marginally in 1990, averaging about $17.50 per barrel. However, price weakness is expected to develop in the first half of the year, followed by gains in the latter half. The wellhead price of natural gas should rise to $1.89 per MCF, approximately 10.5 percent over the 1989 average.

These national expectations are, of course, subject to revision as events unfold. The major risk to Oklahoma is a severe national recession, which seems unlikely. Even if a recession occurs, it would in all likelihood be short-lived. The national economy seems destined for lower, but sustainable, growth with reductions in inflationary pressures. This lower growth profile is expected to last from the fourth quarter of 1989 through the third quarter of 1990. Beyond that time, forecasts for the national economy show significant improvements in real growth. That should be a time when Oklahomans begin to see that their economy not only looks better statistically, but feels better as well, directly in their pocketbooks and bank statements.

OUTPUT

In Oklahoma, nominal output in 1989 grew by an estimated 6.3 percent to $57.4 billion. After adjusting for inflation, the growth was 1.6 percent. Consequently, price increases accounted for most of the growth in nominal GSP. The forecast for 1990 places nominal GSP at $61.0 billion, 6.4 percent above the 1989 level. Real growth for 1990 is expected to be 1.9 percent A 2.9 percent real rate of growth is anticipated for 1991, which is a result of much more rapid growth in the national economy expected in that year Real output in 1991 is expected finally to surpass the peak year, 1982, which coincided with the peak of the energy boom.

Gross state product (GSP) refers to the total value of final goods and services produced in a state in one year. Theoretically, it measures the sum of the value of all physical units produced, where value is the physical amount of output multiplied by the price of each good or service. However, the pure way of computing GSP is seldom exercised. Counting the sheer volume of physical output of each good or service in a given year and determining the average price of each product is a colossal task. Instead, various techniques are applied to scale down national estimates of GNP to states and regions and, thereby, establish a benchmark series.

Estimates serve as a basis for forecasting GSP using econometric models that establish relationships with data that are more frequently updated such as personal income, employment, and productivity information. In this manner GSP can be estimated for recent years for which benchmark data are unavailable, and these estimates can be forecasted into the future.

As noted in the Oklahoma Highlights section, growth of output during the 1980s was slow in comparison to national growth in the 1980s and in comparison to Oklahoma's experience in the 1970s. This slow rate of growth for the decade masks formidable changes in the underlying structure of the economy. In 1979 the mining sector, predominantly oil and gas extraction, accounted for 13.2 percent of the dollar value of output. By 1982 this sector represented nearly 20.0 percent of total output. In 1989 it represents a still important but much smaller 8.6 percent. Manufacturing in 1979 accounted for 15.0 percent of output. Its share has risen slightly to 15.4 percent, a remarkable achievement when the fact that a substantial share of manufacturing output in Oklahoma is energy related.

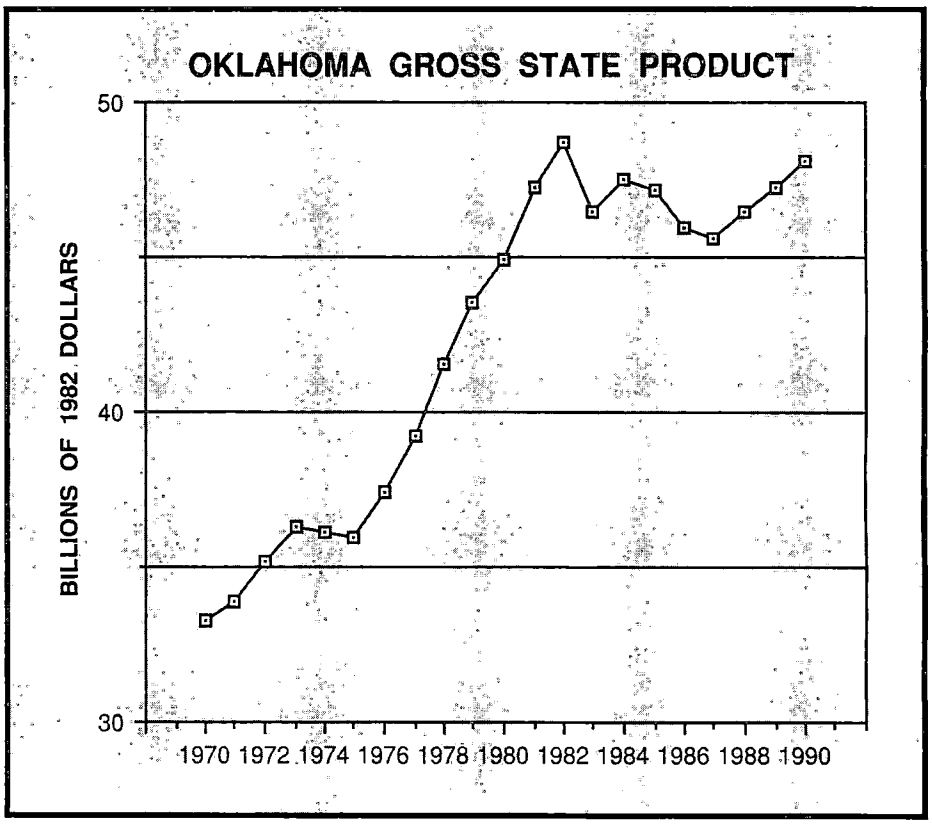
The service-producing sector includes wholesale and retail trade; transportation, communications, and utilities; finance, insurance, and real estate; other services such as health, business, engineering, and personal services; and government. The share of output represented by the service-producing sector has increased from 60.4 to 67.2 percent of the value of output during the decade of the 1980s. Oklahoma, like the nation, is becoming more and more a service-based economy.

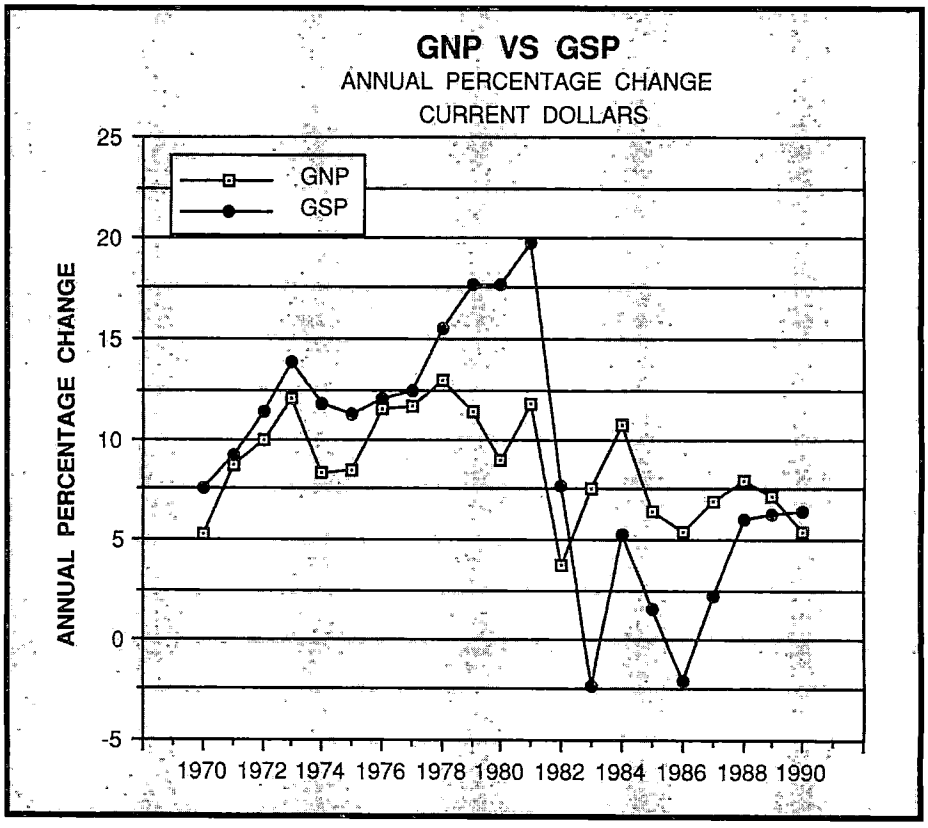
Among the major industrial divisions of the state economy, manufacturing real output grew in 1989 by 7.6 percent, and is expected to grow again in 1990, but by a lesser 5.2 percent. Weakness in overall U.S. manufacturing is a key determinant of the prognosis for Oklahoma. In particular, overproduction of automobiles is evident nationally, and the pace of production is expected to be reduced in 1990. The durable and nondurable goods sectors comprise the total manufacturing sector. Oklahoma has generally fared better in durable goods production. These are *high-dollar* items that generally are hit harder in periods of economic slowdowns.

The table below provides interesting comparisons for Oklahoma and its neighbors on manufacturing output. Oklahoma, Louisiana, and Texas were negatively impacted by the energy-intensiveness of manufacturing output during the reported period. Such factors should now be behind these states, and more rapid growth should be possible.

Comparative Output Measures
Oklahoma and Neighboring States

	OK	AR	CO	KS	LA	MO	NM	TX
Value Added by Manufacture (Million $)								
1982	8143.0	7755.3	8056.8	8436.5	11754.6	18333.8	1397.7	53357.8
1986	9002.3	9164.3	10397.2	11699.3	12641.1	24044.5	1931.5	56072.9
1982-86 Average Annual Growth (%)	2.5	4.3	6.6	8.5	1.8	7.0	8.4	1.2
Value of Shipments (Million $)								
1982	23116.1	19746.5	17963.1	26753.4	57058.1	41459.4	3815.4	171674.3
1986	22393.4	22131.3	20014.9	30392.7	43861.3	58247.7	3776.4	148931.8
1982-86 Average Annual Growth (%)	-0.8	2.9	2.7	3.2	-6.4	8.9	-0.3	-3.5
Exports, 1986 (Million $)								
Direct Exports	1084.6	1065.4	1477.7	1835.0	3020.3	4267.9	177.7	10981.5
Supporting Exports	1133.7	1278.4	963.0	1026.3	2957.0	2354.8	273.4	10241.5
Total Export Related	2218.3	2343.8	2440.7	2861.3	5977.3	6622.7	451.1	21223.0
Total Export Related as a Percent of Total Shipments	9.9	10.6	12.2	9.4	13.6	11.4	11.9	14.3





1990 FORECAST

Output of the Oklahoma economy will reach **$61.0 BILLION** in current dollars or **$48.1 BILLION** in 1982 dollars

	Millions of Current Dollars	Growth Rate
Gross State Product	$61,007	6.4%
Industrial Components		
Agriculture	2,894	9.3
Mining	5,073	2.3
Contract Construction	2,459	5.0
Manufacturing		
Durables	5,670	6.6
Nondurables	3,695	4.4
Wholesale and Retail Trade	9,200	7.0
Finance, Insurance, and Real Estate	9,630	7.0
Transportation, Communications, and Public Utilities	5,429	5.5
Services	8,422	7.8
Government		
Federal	3,296	4.8
State and Local	5,240	8.3

EMPLOYMENT

On an average annual basis, Oklahoma wage and salary employment in nonagricultural establishments (frequently referred to as establishment employment) remained stable in 1989. Overall, this important indicator of state economic performance was up about 6,000 workers to 1,139,000, or about one-half percentage point. Establishment employment has been on the defensive since mid-1982. The largest declines occurred in 1983 and 1986 and were, of course, associated with the two rounds of collapsing energy prices the state suffered.

Establishment employment also decreased as a result of revisions of statistical benchmarks in 1988 by the Oklahoma Employment Security Commission. These revisions resulted in a downward adjustment of about 25,000 workers. Officials of the OESC again revised the benchmarks in January 1989, this time adjusting establishment employment upwards by about 23,000 workers. Consequently, the two adjustments approximately balance out. The adjustments have been carried back to 1988 data and reveal that employment changed only marginally between 1988 and 1989, which was forecasted last year.

Unemployment rates measure the fraction of people in the labor force who currently do not hold jobs and are looking for work. It is measured from surveys of individual households. There are only about 850 households in Oklahoma in the national Current Population Survey, which leads to considerable volatility in measuring unemployment rates. Because of this volatility, the OESC is now reporting a three-month moving average of the unemployment rate, which is an appropriate strategy. An even more reliable measure of the extent of unemployment can be made on an annual basis. Unemployment rates declined appreciably in 1989 from 6.7 to 5.9 percent.

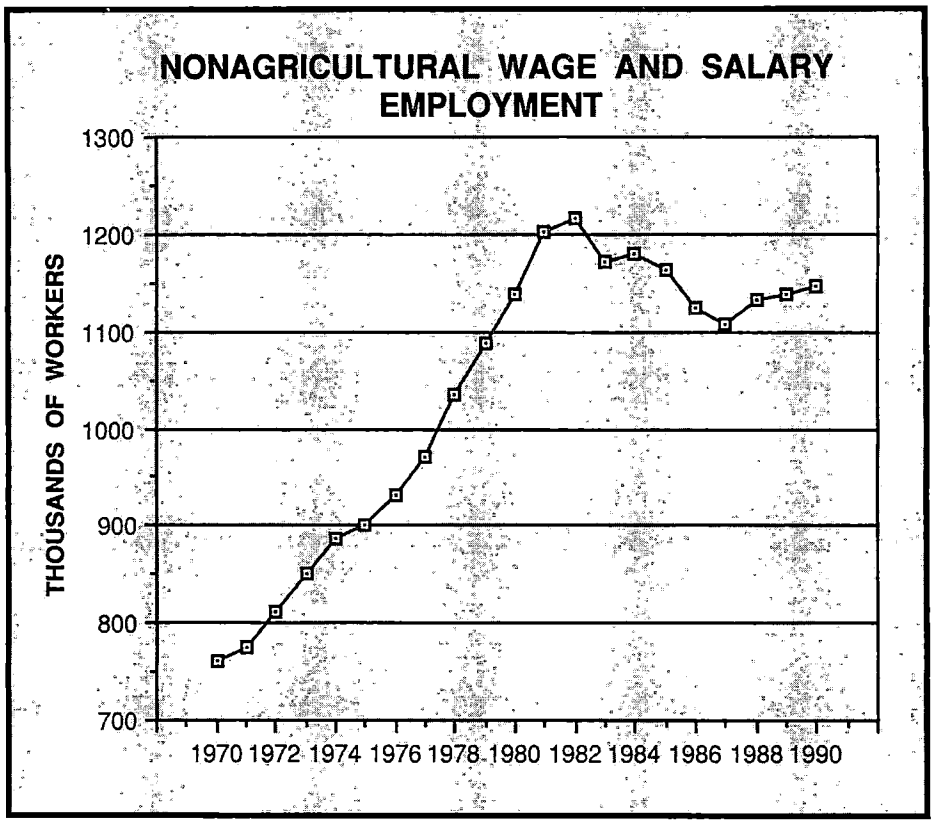
In 1989 the total labor force in Oklahoma began to show increasing signs of stability. This is probably the best current indicator available on out-migration in the state, assuming that labor force participation rates and populations are relatively constant. Until recently, the predominant reason for the decline in unemployment rates was unemployed workers leaving the state. Now that the labor force has stabilized, the predominant reason for additional improvements will be better utilization of the labor force.

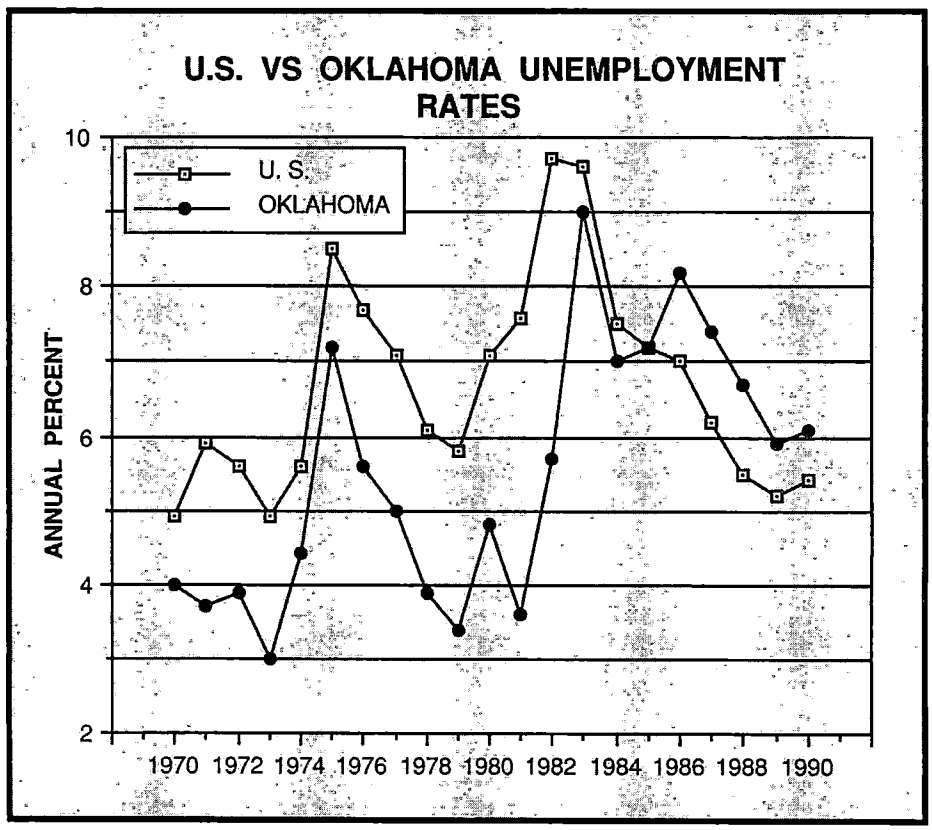
Hopeful signs are apparent in the state's industrial sectors. Oklahomans can take heart that manufacturing employment has stayed relatively even in 1989 in the face of national manufacturing employment problems. Oklahoma employment in this category rose to 164,000 in 1989, a gain of less than 1,000 workers over 1988. Losses in contract construction employment are still occurring. There are definite signs that this sector has reached its low point. Another loss of employment in the mining sector was reported in 1989, but only about 1,000 workers from a 45,000 base. The current base of mining sector employment appears stable, and minor growth is forecasted for future years.

The statistics in the table below for the 1980-88 period indicate that Oklahoma compares unfavorably with its neighbors in establishment employment growth. Oklahoma and Louisiana stand apart from the remaining states in the eight-state region with negative growth. Yet the results are more favorable for these two states in comparison to results reported last year. The energy bust appears to have had only a limited impact on employment in the Texas economy. The principal use of these results is in revealing potential employment growth rates for Oklahoma. There is little reason to suspect that Oklahoma cannot attain future rates of employment growth commensurate with its neighbors.

Comparative Sectorial Employment Growth
Average Annual Rates of Change
1980-1988 (In Percent)

INDUSTRIES	OK	AR	CO	KS	LA	MO	NM	TX
Total Nonagricultural Employment	-0.1	1.8	1.4	1.0	-0.6	1.5	1.9	1.5
Mining	-6.2	-2.7	-6.7	-4.4	-5.9	-4.1	-7.8	-3.5
Construction	-6.1	-1.3	-3.1	-1.3	-6.4	2.4	-0.8	-3.4
Manufacturing	-2.0	1.1	0.5	-0.7	-2.9	-0.4	2.0	-1.3
Durable	-2.5	0.8	0.2	-1.6	-3.9	0.0	3.5	-1.6
Nondurable	-1.1	1.5	1.3	1.0	-1.9	-0.5	-0.7	-0.6
Transportation, Communication, & Public Utilities	-1.2	2.3	0.7	-0.4	-2.3	0.4	0.1	0.8
Wholesale Trade	-2.0	0.9	0.3	0.6	-2.7	0.0	1.0	-0.2
Retail Trade	1.1	2.9	2.2	2.1	1.0	3.1	3.4	2.5
Finance, Insurance, & Real Estate	0.5	2.4	3.0	2.5	1.4	2.9	3.4	3.5
Services	3.1	4.3	3.6	2.9	2.3	3.4	4.1	4.9
Federal, State, & Local Government	1.0	0.7	1.1	1.0	0.4	0.3	1.5	2.3





1990 FORECAST

Nonagricultural wage and salary employment will reach **1.147 MILLION** workers

	Thousands of Workers	Growth Rate
Civilian Labor Force	1,541	0.3
Nonagricultural Wage and Salary Employment	1,147	0.7
Industrial Components		
Mining	44	1.0
Contract Construction	34	0.4
Manufacturing		
Durables	104	1.9
Nondurables	62	0.6
Wholesale and Retail Trade	277	0.5
Finance, Insurance, and Real Estate	59	0.3
Transportation, Communications, and Public Utilities	63	0.8
Services	256	1.3
Government		
Federal (Civilian)	51	-0.8
State & Local	198	0.2

PERSONAL INCOME

Personal income in a state or nation is a primary measure of economic well-being. It is, in a broad sense, a direct measure of the purchasing power of households, including purchases of government services. In a national income accounting sense, households can do three things with their money: consume (buy private goods), pay taxes (buy government goods), or save. Personal income is the sum of household consumption expenditures, personal taxes (excluding social security contributions), and household savings. Adjustments to this aggregate measure improve its relevance as a measure of economic welfare. As is the case with many nominal variables stated in current-dollar terms, it is necessary to adjust for inflation to arrive at real values for comparisons between time periods. Additionally, by dividing by population, a measure of economic well-being on a per capita basis is established.

Until recently, rates of personal income growth have failed to exceed the rate of inflation. That is to say that real purchasing power in Oklahoma was declining. Happily, that is no longer the case. In 1988 personal income growth in the state exceeded inflation by about 0.9 percentage points. In 1989 the difference between personal income growth and inflation is 1.75 percentage points. However, in real terms Oklahoma still remains about $1.4 billion short of the peak value of real personal income achieved in 1982.

Over the period 1982 to 1989, the personal income of Oklahomans has risen by 25.0 percent to $45.9 billion. However, the personal consumption deflator has expanded by 30.0 percent. As a result real purchasing power in Oklahoma has declined by about 5.0 percent, which represents a loss of $1.4 billion in 1982 dollars. If personal income growth in Oklahoma had maintained a rate of growth equal to inflation, 1989 personal income would have been $47.7 billion, and per capita personal income would have been $14,740, or 83 percent of the national level. The state ratio of per capita income relative to the nation is only about 80 percent. Thus the failure of personal income in Oklahoma to keep pace with inflation has resulted in a 3.0 percentage-point reduction in the state-to-national ratio from what it otherwise would have been.

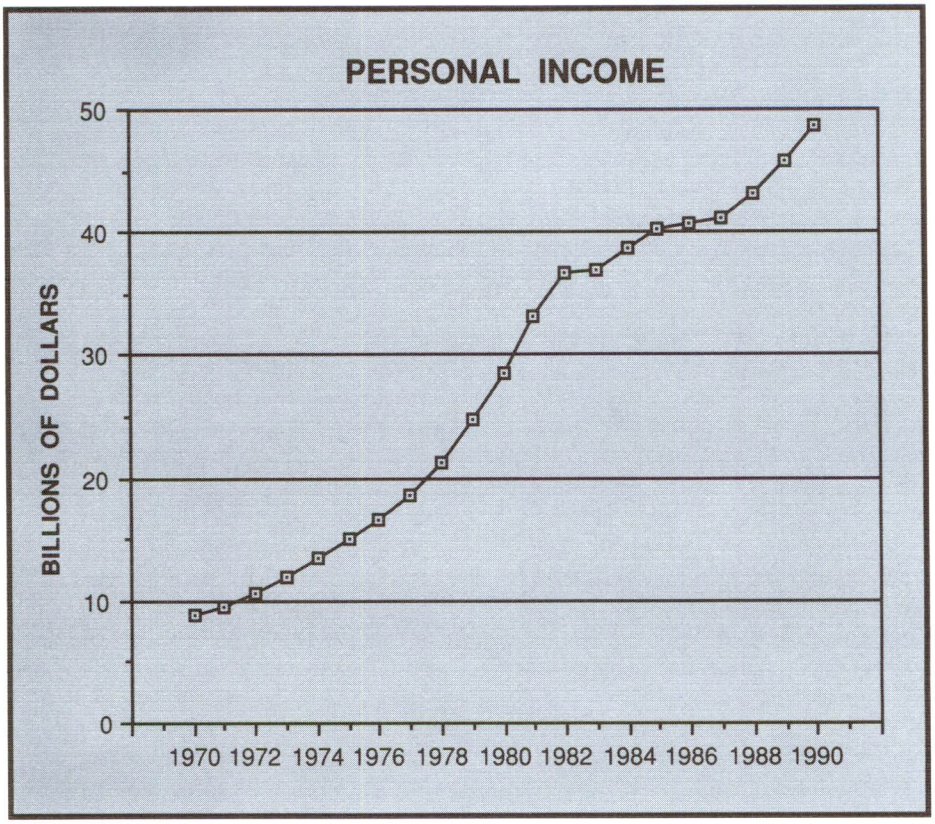
The forecast is for Oklahoma personal income to grow by 6.2 percent in 1990 and expand by 7.4 percent in 1991. These rates are sufficient to overcome expected inflation, thereby yielding real growth rates of 2.0 and 2.6 percent for 1990 and 1991. Real personal income rose about 1.8 percent in 1989 to $35.3 billion. There is hope that the state is staging a turnaround in the seven-year decline in the state-to-national ratio of per capita personal income. At 80 percent, this ratio is at a 30-year low.

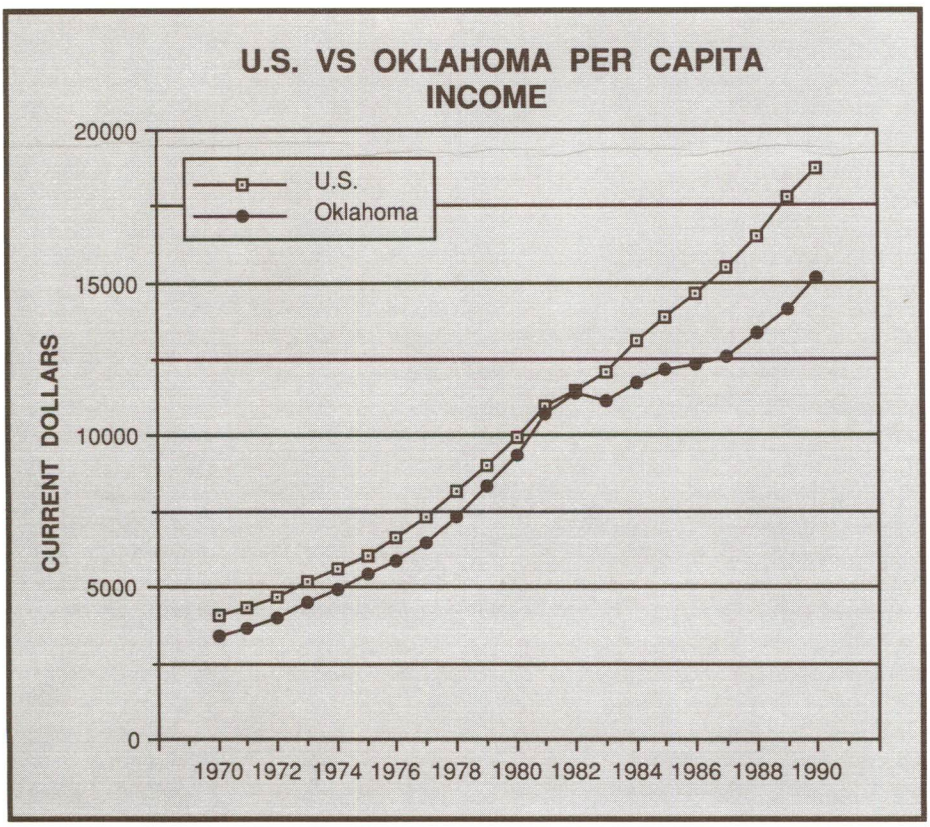
As seen in the eight-state comparisons below, personal income growth in Oklahoma during the 1980-88 period was second lowest at 5.3 percent. Louisiana, which also has severe energy sector problems, grew at a compounded rate of 5.0 percent. Personal income expanded at rates near or above 7.0 percent in the remaining states, including Texas which has had energy sector problems of its own. Consequently, there are reasons to suspect that in time Oklahoma's rate of growth will rise to the regional average.

In per capita terms, Oklahoma is about $750 lower than the regional average of $14,073. A rather wide gap of $900-$1100 exists between Oklahoma and the three states in the region that have lower per capita incomes. However, if the reported average annual growth rates remain in effect into the future, Arkansas will surpass Oklahoma in only six years.

Comparative Personal Income and Related Statistics
Oklahoma and Neighboring States

	OK	AR	CO	KS	LA	MO	NM	TX
1988 Total Personal Income (In Billions of Dollars)	43.2	29.3	54.4	39.3	54.2	79.4	18.8	245.6
1980-88 Average Annual Growth in Total Personal Income (Percent)	5.3	6.9	7.3	6.6	5.0	7.1	7.3	7.2
1988 Per Capita Personal Income (In Dollars)	13,323	12,219	16,463	15,759	12,292	15,452	12,488	14,586
1988 Farm Income Share (Percent)	2.5	5.1	1.3	3.5	1.4	1.0	1.5	1.4





1990 FORECAST

Total personal income will exceed
$48.7 BILLION

	Millions of Dollars	Growth Rate
Personal Income (Current Dollars)	$48,721	6.2%
(1982 Dollars)	36,003	2.0
Components of Personal Income		
Wages and Salaries	25,435	7.1
Other Labor Income	2,561	6.3
Nonfarm Proprietors' Income	4,037	2.7
Dividends, Interest, and Rent	8,349	3.1
Transfer Payments	8,708	7.4
Farm Proprietors' Income	1,279	6.6
Residence Adjustment Factor	386	8.3
(Less) Personal Contributions to Social Insurance	2,035	3.3
Per Capita Personal Income	$15,109	6.6

STATE GOVERNMENT FINANCE

Oklahoma state government received $3.272 billion in tax revenues in the fiscal year ending June 30, 1989, according to the Schedule II summary of revenues issued by the Executive Department. This compares with $3.077 billion in FY-88, a 6.3 percent gain. Since the percentage gain exceeds the national rate of inflation, real tax receipts increased in FY-89.

Five major sources dominate tax collections at the state level: personal and corporate income taxes at 32.7 percent of total tax receipts; sales and use taxes at 23.7 percent; severance or gross production taxes (including conservation and petroleum excise) at 11.3 percent; tag agent remittance (motor vehicle taxes) at 11.0 percent; and motor fuels taxes (including fuels, gasoline, and diesel as well as special fuel use tax and decals) at 9.5 percent. Together these five sources accounted for 88.2 percent of total state tax receipts in FY-89.

The shares represented by the principal sources have varied substantially over time. In FY-82 personal and corporate income taxes represented 29.0 percent of total tax receipts; sales and use, 18.6 percent; severance, 28.8 percent; tag agent remittance, 8.7 percent; and, motor fuels, 5.4 percent. These five sources represented 90.5 percent of total tax receipts in that year.

It is quite evident that the state has become more reliant on income, sales, motor vehicle, and fuels taxes in order to compensate for significant revenue losses that resulted from collapsing energy prices. Severance tax collections fell from $744 million in FY-82 to an amount sightly less than one-half that level in FY-89, or $369 million.

While the state is no longer confronted with the nightmare of revenue shortfalls, it is increasingly clear that without tax rate increases, the state will have to depend on real economic growth in order to expand existing service levels. Windfalls, like those associated with federal tax reform that led to a higher adjusted gross income basis and subsequently higher income tax receipts in Oklahoma, are few and far between. Comparisons of percentage revenue gains with inflation rates, after adjusting for tax rate increases, provide a rule-of-thumb basis for determining whether the gains result from higher real economic activity levels or simply from higher prices and wages.

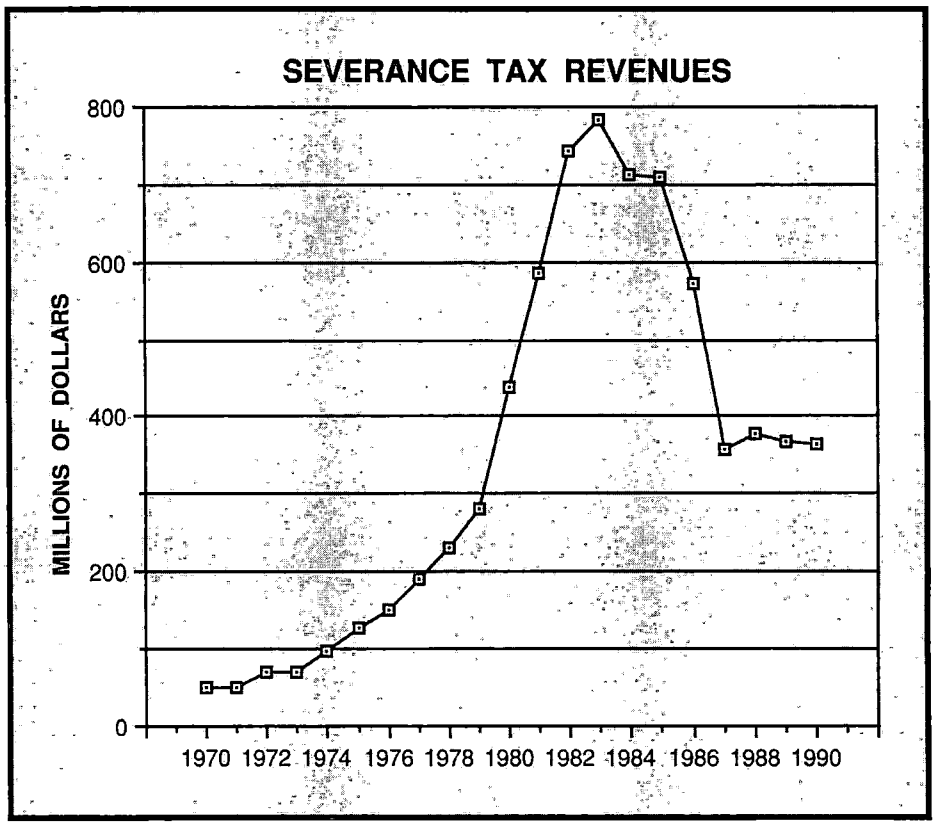
Recent evidence from the Monthly Report of Gross Oklahoma Tax Commission Receipts indicates that tax receipts in Oklahoma are beginning to increase at rates beyond those which can be attributed to inflation. That is, real economic growth is beginning to play a role in the Oklahoma revenue picture. During the first five months of FY-90 total tax receipts were up 7.1 percent over the same months the previous year. Sales taxes were up 5.5 percent, individual income taxes were up 8.7 percent, and motor vehicle taxes were up 9.2 percent.

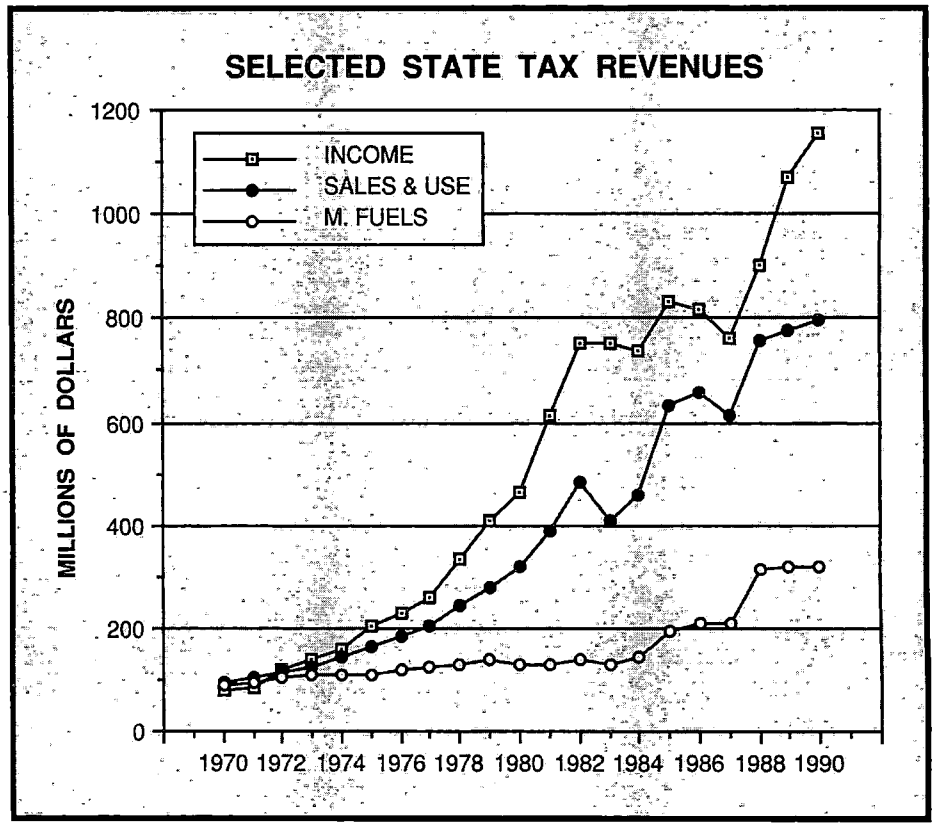
These rates of increase for the first five months are clearly in excess of current inflation rates. The past two years' increases in individual income taxes could largely be attributed to the phasing in of federal tax reforms. This is no longer the case. The results of federal tax reform should be fully phased in by now. Thus the increases in overall tax collections during the first five months of the fiscal year are heartening and provide a clear indication that the state is finally moving ahead in real terms.

While encouraging, these gains will not prove sufficient to take the state forward in needed directions. Rate increases are clearly needed to fund Oklahoma's infrastructure and educational system needs. The forecast for FY-90 is for roughly no change in severance and motor fuels taxes, about a $20 million gain in sales taxes, and an $86 million increase in income taxes. Given the competition for funds among government agencies, $106 million simply does not go very far. In order to do more, increases in tax rates seem unavoidable. The data in the table below provide evidence that Oklahoma can raise taxes without becoming uncompetitive with neighboring states.

Comparative State Finances
Oklahoma and Neighboring States

	OK	AR	CO	KS	LA	MO	NM	TX
FY 1980-87 Average Annual Growth In State and Local Taxes	6.9	7.5	9.2	7.9	6.4	7.9	8.0	10.0
% of FY 1987 State & Local Tax Collections:								
From General Sales Tax and Gross Receipts	41.7	48.1	37.4	35.1	55.4	45.4	54.5	43.7
From Income Tax	19.1	26.3	21.9	20.7	11.5	26.0	17.4	0.0
From Property Tax	20.1	19.0	35.7	37.4	16.1	21.8	11.7	41.3
From Other Taxes	19.0	6.6	5.0	6.9	17.0	6.8	16.4	15.0





1990 FORECAST

Selected state tax sources will yield **$2.6 BILLION**

	Millions of Dollars	Growth Rate
Selected Tax Revenues		
Income	$1156	8.0%
Severance	365	-1.2
Sales and Use	797	2.5
Motor Fuels	318	-1.0

FINANCE

Since the failure of Penn Square Bank in July 1982, 102 commercial banks have failed or have been merged in Oklahoma. Yet after peaking in 1987 at 31 bank failures, the trend is definitely down. In 1988 a total of 23 banks were declared insolvent or merged. As of mid-November 1989, only 10 banking institutions failed and only one or two additional mergers/ failures are expected by the Oklahoma Bank Commissioner by year's end. Not only is the failure rate down, but earnings are up for Oklahoma banks. Over the first nine months of 1989, Oklahoma's 443 operating banks earned $77 million in net income compared with a $2 million loss during the same period in 1988.

On the negative side, Oklahoma's largest thrift institution was declared insolvent in November. Reported losses of the state's S&Ls in the second quarter were three times first quarter losses, but were largely attributable to only two institutions. Oklahoma now has 12 S&Ls, almost one-third of its thrift institutions, under some form of government control.

Problems nationally with banks and particularly savings and loan institutions continue to dominate financial news. The first loss in two years was reported by the nation's 12,824 commercial banks in the third quarter of 1989. This follows profits of $7.3 and $7.0 billion in the first and second quarters and record profits in 1988. The loss in the third quarter was the result of Third World debt and rising real estate investment problems in the Northeast and Arizona and was concentrated in several large banks. The total number of U.S. banks declined by 415 in a single one-year period, which may be more indicative of current national banking difficulties.

The Resolution Trust Corporation was founded in 1989 by the federal government and infused with $50 billion to rescue failing S&Ls. It will not be enough. The nation's S&Ls lost $9.7 billion in the first three quarters of 1989 in comparison to a 1988 full-year loss of $13.4 billion, indicating that the financial stress is continuing. The government has established new capitalization requirements that are forcing many S&Ls to find new investors, sell assets, merge, or become candidates for government takeover.

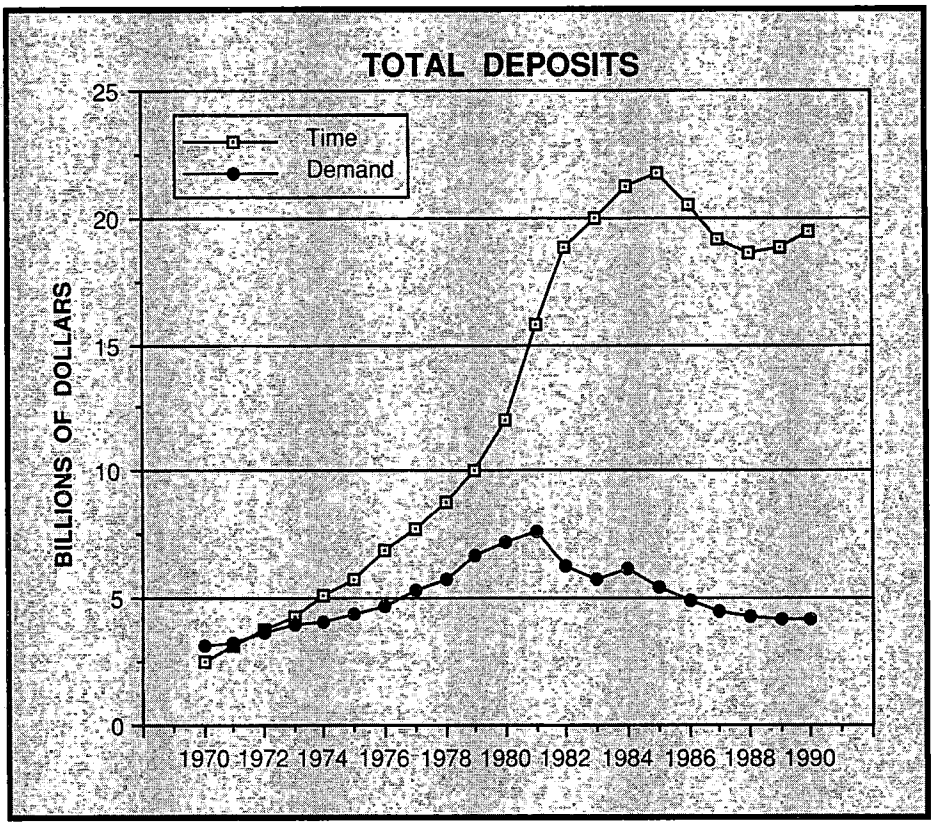
Analysts estimate that 800 of 2,600 solvent S&Ls will have trouble meeting the new capitalization requirements. Of these 800, about 300 are expected to survive through new capital infusions and asset sales, 300 will likely choose the merger option, and about 200 are likely candidates for government takeover. Thrifts that fail to meet the new capital requirements by the end of 1994 are subject to closure. Under new regulations the S&Ls are required to devote 70 percent of their investment portfolios to mortgage lending, as opposed to the current 60 percent requirement.

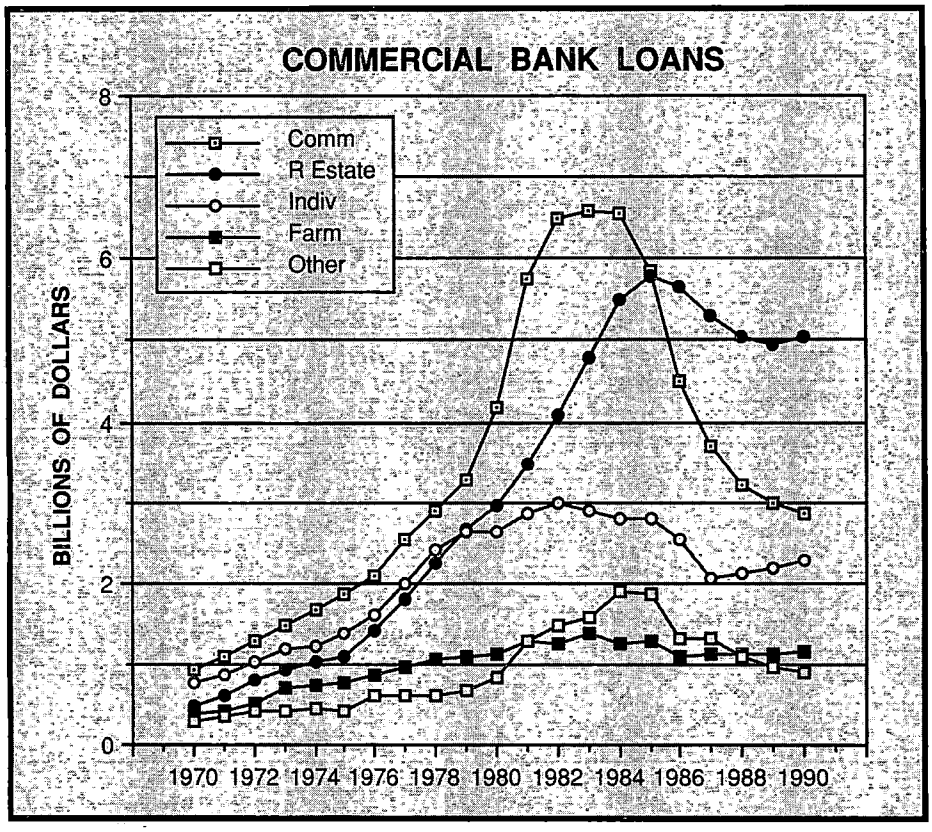
The environment seems to be improving on the commercial banking side. Oklahoma reduced its nonperforming loan ratio from 6.1 percent in June 1988 to 4.6 percent in June 1989. Total loans decreased only slightly; therefore, nonperforming loans fell by about one-fourth. Among its neighbors, Texas was able to reduce its nonperforming loans by almost 40 percent, but at a cost of sizable direct write-offs. Total loans in Texas dropped by about $17 billion or 17 percent of total loans. Other neighbors seem to be more prosperous: Oklahoma and Texas are the only two states in the eight-state region with negative changes in total assets and loans.

The forecast is for Oklahoma commercial bank deposits to rise by about 2.7 percent in 1990. This will take commercial bank deposits to about the $23.7 billion level. Loan activity should expand as well. Commercial and industrial loans are expected to decline, but will be roughly offset by increased real estate loans. This is representative of national trends in which commercial banks are becoming increasingly more active in real estate markets.

Comparative Finances
Oklahoma and Neighboring States

June 30, 1989	OK	AR	CO	KS	LA	MO	NM	TX
Total Assets (In Billions of Dollars)	26.0	18.6	25.1	25.6	35.5	55.5	10.2	167.8
Total Loans (In Billions of Dollars)	12.1	10.0	14.2	13.5	19.8	33.4	5.8	84.5
Nonperforming Loans as % of Gross Loans	4.6	2.1	3.8	1.8	4.4	1.8	3.6	6.7
Loans as % of Assets	46.5	53.8	56.6	52.7	55.8	60.2	56.9	50.4
Percent Change, 1988-89								
Total Assets	-1.5	3.9	2.0	4.5	0.6	5.5	4.1	-7.5
Total Loans	-3.2	3.1	2.2	3.8	1.5	6.7	1.8	-16.8
Nonperforming Loans	-26.6	-21.1	-12.9	-8.1	-20.5	-16.1	1.0	-38.8





1990 FORECAST

Total bank deposits will exceed **$23.6 BILLION,** and total bank loans will exceed **$12.2 BILLION**

	Millions of Dollars	Growth Rate
Deposits		
Commercial Bank Deposits	$23,659	2.7%
Demand Deposits	4,195	1.0
Time Deposits	19,464	3.1
Loans		
Commercial Bank Loans	12,237	0.1
Commercial and Industrial	2,874	-4.2
Real Estate	5,055	2.0
Individual	2,267	4.2
Farm	1,154	2.3
Other	888	-8.0

ENERGY

The year 1989 proved to be one of generally higher and somewhat steadier oil prices, especially in comparison to the uncertainty and volatility present in 1988. Prices received support in the third quarter of the year based upon demand strength in the rapidly expanding economies of Far-Eastern countries. The refiner's acquisition composite price of crude oil ranged from $15.70 per barrel in January 1989 to a high of $19.22 in April. Price weakness developed in late July, dropping the composite price to $17.20. Spot markets have risen rather steadily since August, and the West Texas Intermediate benchmark is currently in the low $20.00 range. Composite prices have ranged narrowly under $18.00 since August. Unseasonably cold weather has spurred future market prices lately.

Such behavior contrasts dramatically with 1988 when it was highly uncertain whether the OPEC cartel would survive as an effective market force. Composite prices of crude oil averaged $14.72 per barrel, a full $3.00 less than the expected average price for 1989. As late as November 1988 the composite price reached a low of $12.58 per barrel. Cheating on established quotas is almost obligatory for OPEC's 13 members. Last year's agreement, however, can generally be viewed as successful in that it forestalled a Saudi threat to double production. That agreement hinged on cooperation by two previously warring nations, Iran and Iraq. Iran wanted maintenance of its 14.3 percent share of OPEC total production. Iraq wanted parity. Recognizing the costs of disagreement, other members were willing to accommodate these requests.

Problems in reaching agreement this year centered on demands by Kuwait and the United Arab Emirates for a larger share of the quotas. In December's full ministerial meeting, OPEC members agreed to raise the production ceiling for the first half of 1990 from the current 20.5 million barrels a day to 22 million. All that was accomplished by this increase was to narrow the gap between the published quota limits and actual production. Still, it should help trim production by about 1.5 million barrels if members adhere. Members also hope to establish the target price of $18 as a minimum reference price. Initial reaction to the accord among analysts has been positive with hope that the agreement would help to stem expected oil price weakness in the spring.

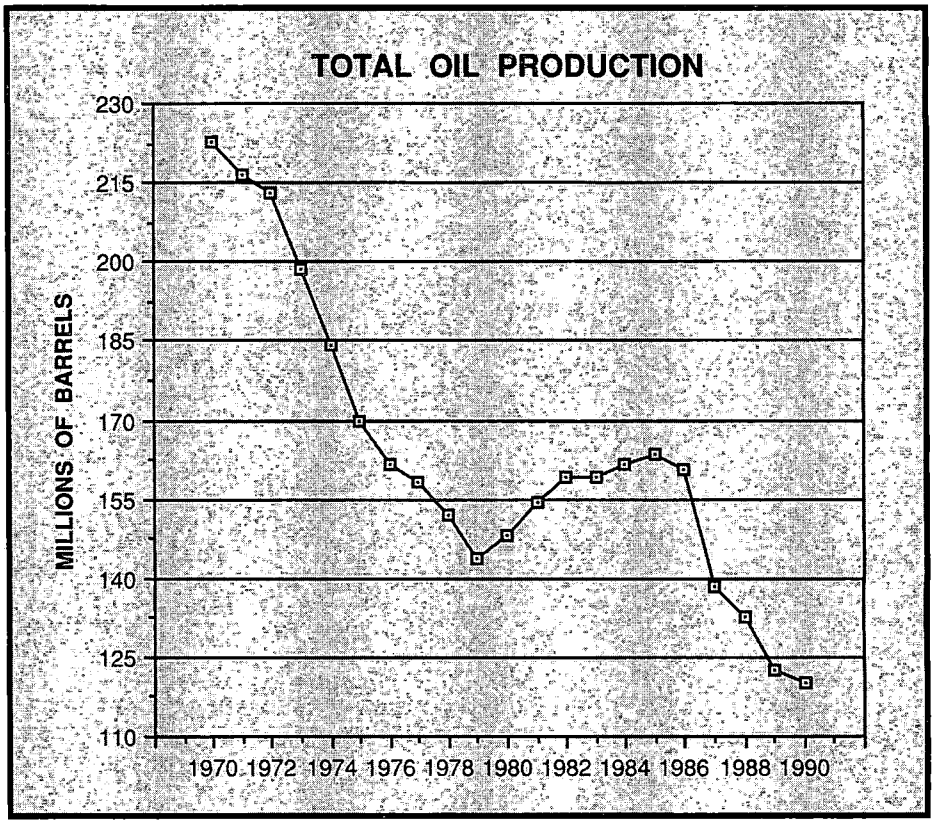
Assuming normal weather patterns and no major production outages, Data Resources, Inc. (DRI) is predicting that crude oil prices will drop by $2 to $3 per barrel through May 1990 on spot markets. This is a consequence of slower economic growth in the fourth quarter of 1989 and the first quarter of 1990. Noncommunist demand for OPEC oil is approximately 21 million barrels per day. In the face of falling demand, any cheating beyond the current high quota levels will obviously have price consequences. Oil prices are expected to pick up in the latter half of the year yielding an average composite price of $17.54 for the year, which is only slightly lower than the 1989 average.

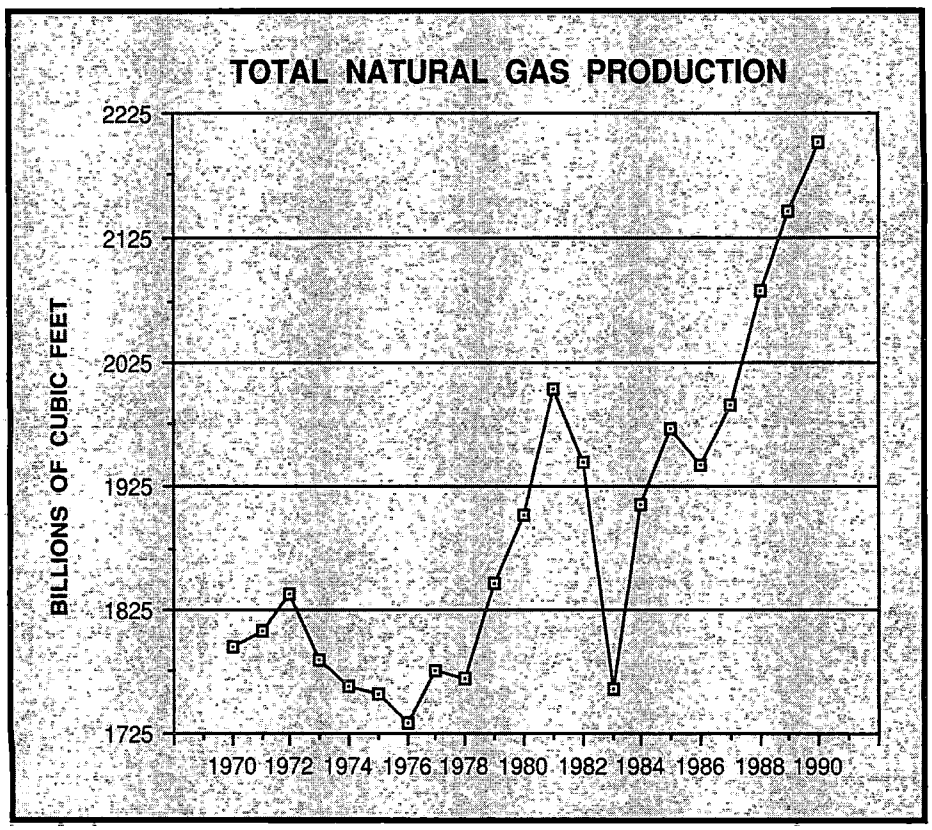
Analysts are focusing on natural gas as the fuel of choice for the 1990s. The Bush administration's proposed amendments to the Clean Air Act emphasize natural gas because it burns cleaner than any other fuel. These markets have recently been fully deregulated, thereby establishing a more competitive environment. The tone of the market for natural gas is changing from a buyer's market to one of relative balance. Excess production capacities now seem to have passed. At current production levels, the U.S. has a 34-year supply of natural gas compared to only a 26-year supply of oil. Furthermore, advances in drilling technology have made it possible to produce gas from unconventional, deep-well sources.

It will take higher prices than those which currently exist to stimulate natural gas drilling activity greatly. Indications are that higher prices will prevail in the 1990s. DRI forecasts wellhead prices of $1.91 per MCF in 1990, $2.00 in 1991, and $2.08 in 1992. In constant 1988 dollars the U.S. Department of Energy forecasts a 1995 price of $2.76 per MCF, rising to $3.90 in the year 2000. (Their oil price forecast is $28 per barrel in 2000.) Oklahoma and its neighbors, including Louisiana, have over 50 percent of U.S. natural gas reserves. Consequently, this region of the country will benefit nicely from increased demand for natural gas.

Energy Comparisons
Oklahoma and Neighboring States

	OK	AR	CO	KS	LA	MO	NM	TX
Energy Production								
Daily Oil Production, 1988 (000 Barrels)	353	37	84	158	1201	N/A	192	2065
Annual Growth Rate, Oil Production, 1980-88 (%)	-1.9	-3.7	0.5	-0.5	-0.8	N/A	-0.9	-3.6
Daily Natural Gas Production, 1988 (MCF)	5470	419	539	1454	13990	N/A	2286	17090
Annual Growth Rate, Natural Gas Production, 1980-88 (%)	0.7	4.0	0.4	-4.0	-3.8	N/A	-3.9	-1.9
Energy Consumption								
Total Energy Consumption, 1987 (Trillions of Btu)	1254.4	709.6	882.9	1009.9	3410	1438.6	501.3	9151
Annual Growth Rate, Total Energy Consumption, 1980-87 (%)	0.6	-2.1	0.7	-0.1	-0.7	-0.1	0.7	0.3





1990 FORECAST

Total oil production will reach **120 MILLION** barrels, and total natural gas production will exceed **2.20 TRILLION** cubic feet

Energy Production

Total Oil Production	120 million barrels
(Growth Rate)	-2.0%
Total Natural Gas Production	2,201 billion cubic feet
(Growth Rate)	2.5%

Energy Consumption	**Trillions of BTUs**	**Growth Rate**
Natural Gas Sales		
Residential	67	0.3
Commercial	35	0.5
Industrial	283	1.2
	Millions of KWHs	**Growth Rate**
Electricity Sales		
Residential	14,250	-0.3
Commercial	9,826	0.3
Industrial	10,500	0.6

1990 ACCENT - EDUCATION & ECONOMIC GROWTH

Through training workers, generating ideas, and providing research facilities, a state's educational system plays a vital role in economic growth and development. At the elementary and secondary levels, the educational system provides students with a set of basic skills and thus prepares them for either additional education or for the world of work. At higher levels, the colleges and universities develop the students' cognitive abilities, training them in specialized fields of study. Industry relies on both systems to supply it with qualified workers. These workers, or more specifically their knowledge and skills, are a state's income-generating assets. They are a necessary ingredient for a state to grow and prosper.

In addition, a state's educational system serves as a source of ideas. Theoretical concepts developed by university researchers may eventually result in either new products or in improvements in existing production techniques. The new products create new businesses and jobs; the new techniques make businesses more competitive. Both fuel economic growth. The university community also provides businesses with a pool of experts to draw upon for business and technical advice. This type of interaction between industry and universities enables a state's businesses to compete more effectively with businesses in other states and other countries, thereby contributing to state economic development.

Finally, the presence of high-quality university facilities may contribute to the economic growth and development of areas surrounding the university. University research libraries and scientific research laboratories may facilitate commercial innovations, and these may stimulate growth in area businesses.

All three of these factors--the training of workers, the generation of ideas, and the presence of research facilities--represent contributions of the educational system to economic development. All three stimulate growth though the attraction of new industry, the development of home-grown businesses, and the retention and expansion of existing firms.

There is considerable casual evidence indicating the importance of the educational system to business. For example, companies involved in industrial location decisions usually inquire about the quality of education. There is also a great deal of interest in industry-university interaction. It is commonly accepted that research centers such as Silicon Valley in California and the area around Route 128 in Boston owe at least part of their success to the proximity of major research universities.

Economists are just beginning to document empirically the connection between education and economic development. A recent article in the *American Economic Review* shows a positive correlation between spending on research at state universities and the number of corporate patents issued for that state. The article also suggests that through inducing industrial R&D spending, university research may have an indirect effect on local innovation. Moreover, it appears that "states that concentrate their higher education resources in a small number of institutions (relative to population) have better institutions and hence attract more research money than those that spread their resources over a larger number of campuses" [Jaffe, p. 967].

As states continue to vie with each other in the area of economic development, it becomes increasingly important for Oklahoma to have a strong educational system. This year the Accent section focuses on the link between education and economic development. It first documents the increasing importance of education in the work place through an analysis of job growth. Then it examines Oklahoma's educational system, focusing on how spending per student (at the elementary and secondary level and for institutions of higher learning) has changed over time. These changes are compared to those in other states.

Analysis of Job Growth

This section examines the education and earnings implications of job growth in the U.S. economy. It reveals that employment growth favors occupations that require more than a high school education. Furthermore, it shows that in future years this trend will continue at a faster pace. Jobs that require post-secondary trained personnel are forecasted to account for 38 percent of new jobs over the years 1986-2000, in contrast to only 28 percent in the preceding 14-year period. In terms of implied earnings growth, the bias towards post-secondary trained personnel is even sharper. This 38 percent of new jobs held by the more educated will represent 55 percent of total growth in earnings.

Table 1 shows the actual and projected U.S. employment by occupation for 1972, 1986, and 2000. The forecast was provided by the Bureau of Labor Statistics, U.S. Department of Labor. Also shown are median years of education and mean earnings in 1986. National employment rose from 78 million in 1972 to 111.5 million in 1986. By the year 2000 employment is expected to rise to 133 million. Thus, total jobs grew by 43 percent from 1972 to 1986 but are expected to grow by less than one-half that rate from 1986 to 2000.

The median education and average earnings measures can be used to explore the implications of growth and changes in the distribution of jobs. For this analysis occupations are divided into three groups according to median years of education: (1) high school; (2) post-high school; and (3) college. Those occupations with less than 12.9 years median education are classified in the high school group, those occupations with median education levels of more than 12.9 years but less than 16.0 years were classified in the post-high school group, and those occupations with education levels equal to or greater than 16.0 were classified as college. (The only occupation that presented considerable problems in classification, because of wide

variation in educational attainment, was the managerial and administrative category. This is a large category with a large proportion of college-trained workers. Based on empirical evidence, 40 percent of this occupation's employment was classified as college while 60 percent was allocated to the post-high school category. Therefore, employment and earnings in this occupation were distributed across the second and third groups.)

Table 2 shows that between 1972 and 1986 jobs with predominantly high school incumbents increased from about 60 million to 84 million, which was a 40 percent gain. These jobs are expected to rise by only 16 percent by the year 2000. College-level jobs increased by 57 percent in the earlier period and are expected to grow by about 29 percent in the forecast period. In addition, the post-high school category is expected to increase by 30 percent in the forecast period. Thus, it is apparent that the distribution of jobs is shifting towards the post-secondary categories.

Also shown in Table 2 are the changes in jobs for the two 14-year periods and the share of jobs represented by each educational group. In the earlier period predominantly high school occupations accounted for 72 percent of the total change in jobs. The share of new jobs represented by this category in the latter period is expected to be 62 percent. In contrast, the shares of new jobs in the two post-secondary categories increase rather dramatically. College-level jobs are expected to represent almost three-fifths of new jobs.

Table 3 shows the implications of differential job growth on aggregate earnings. Data on average earnings in 1986 are used in this analysis, and the analysis holds earnings levels constant. Aggregate earnings are computed by multiplying the number of jobs by earnings for occupations in each educational category and summing the results.

Table 1
U.S. Employment, Occupations, and Earnings

	Employment (Millions)			Median Years of Education	1986 Avg. Earnings (1000)
	1972	1986	2000		
Managerial and Administrative	6.95	7.37	9.44	14.8	$32.2
Management Support	1.39	3.21	4.18	16.1	27.3
Engineers, Architects, and Surveyors	1.10	1.57	2.06	16.9	36.4
Natural, Computer and Mathematical Scientists	0.46	0.74	1.08	17.0	34.2
Teachers, College and University	0.46	0.75	0.72	18.5	24.9
Other Teachers and Librarians	3.00	4.07	4.85	17.3	19.3
Health Diagnosing	0.50	0.80	1.10	18.9	66.5
Health Assessment and Treatment	1.08	1.80	2.57	16.0	23.2
Lawyers and Judges	0.32	0.57	0.77	18.8	50.3
Other Professional	1.79	3.13	3.90	16.0	20.2
Health Technicians	0.32	1.60	2.26	14.1	15.6
Engineering and Science Technicians	0.76	1.26	1.55	14.0	24.4
Other Technicians	0.15	0.79	1.24	16.1	24.4
Marketing and Sales	5.30	12.61	16.33	12.9	17.6
Administrative Support	12.57	19.85	22.11	12.8	13.7
Health Service	1.51	1.82	2.55	12.6	8.6
Protective Service	1.14	2.06	2.70	12.9	19.3
Other Service	8.32	13.66	17.67	12.5	6.7
Agriculture, Forestry, and Fishing	3.27	3.56	3.39	12.3	8.8
Blue-collar Supervisors	1.41	1.82	1.97	12.5	27.8
Construction Trades	3.18	3.90	4.60	12.5	18.6
Extractive Workers	0.14	0.11	0.11	12.4	26.6
Mechanics, Installers, and Repairers	3.28	4.68	5.37	12.5	21.6
Precision Production and Plant System	2.26	3.07	3.20	12.6	21.2
Machine Operators, Assemblers, and Inspectors	9.11	7.67	7.36	12.3	14.8
Transportation and Vehicle Operators	3.95	4.79	5.29	12.4	18.4
Helpers and Laborers	4.28	4.27	4.52	12.3	10.2
Total	77.97	111.50	132.88	—	—

Changes in aggregate earnings shown in Table 3 are solely the result of job growth and changes in the distribution of jobs. Therefore, even if real earnings do not rise above the 1986 level, job growth alone will generate a 21-percent higher level of aggregate earnings in the year 2000. Total earnings would rise from $1.975 trillion to $2.386 trillion.

By educational group there is wide disparity in the growth in earnings. For example, while earnings in the high school group rose by 41 percent from 1972 to 1986, they would rise by only 15 percent from 1986 to 2000. Growth in total earnings in the two post-secondary categories is around 30 percent, almost double the growth rate of the high school category. In addition, 42 percent of total earnings growth in the forecast period is represented by the college-level category. The share of earnings growth attributable to the post-high school category doubles from 6.8 percent to 13.9 percent in comparisons of 1972-1986 with 1986-2000 growth. The two post-secondary categories represent more than 55.6 percent of total growth even though in the year 2000 these two categories are expected to represent only 41.7 percent of total jobs.

This analysis assumes that relative earnings by occupation will remain constant, which will clearly not be the case. In recent years there has been a marked tendency for the gap between the earnings of high school and college graduates to widen. For example, an article by Jonathan Rauch reports that between 1979 and 1986 the earnings of males 25-34 years of age actually fell by 10 percentage points in real terms. Earnings of

female high school graduates in the same age category rose by only 1 percent. Male college graduates in the 25-34 age group enjoyed a 9 percentage point gain in real earnings; females, a 16 percent gain. Thus, the results reported above are conservative; they are likely to understate the shares of earnings growth attributable to the college-educated work force.

Oklahoma's Educational System

This section of the *Outlook* examines Oklahoma's support for elementary and secondary education and for higher education over the past decade and compares this support with that in other states. Of particular interest is the pattern of financial support.

As shown in Table 4, Oklahoma currently (1987-88 school year) spends $3266 for each of its elementary and secondary school students. This is well below per-pupil expenditures in Colorado and Kansas, and moderately below those in Missouri, New Mexico, and Texas. In the region, only Arkansas and Louisiana spend less. Compared to other states across the country, Oklahoma ranks 39th in terms of per-pupil expenditure.

Although Oklahoma has increased per-student expenditures by $1680 (an increase of 106 percent) over the past nine years, the state has not been able to make significant relative gains in funding for elementary and secondary education. During the 1978-79 school year, Oklahoma ranked 41st in per-pupil expenditure. However, other states have also been increasing their per-student funding, and Oklahoma's efforts have resulted in only a slight improvement in its relative status.

Per-student expenditures are, of course, only indicators of a state's support for education; they are not indicators of quality. One measure of quality is student performance on standardized tests, and it is interesting to see how Oklahoma compares with other states along this dimension.

As part of the process of applying to college, students take either the SAT or the ACT; in some states the SAT is the norm, while in other states it is the ACT. The fifth column of Table 4 shows an index which allows comparison of these two types of tests across states. The national average equals 100. A number above 100 thus indicates that a state's students are performing better than the national average on these tests, and a number below 100 indicates a poorer-than-average performance. As can be seen from the table, the index for Oklahoma equals 95.6.

This is important because these are the students that will be entering Oklahoma's colleges and universities. If they are not as well prepared as students from other states, then Oklahoma higher education will require above-average resources to produce graduates that can effectively compete with graduates from other states.

Table 2
Analysis of Job Growth by Educational Group
(millions)

HIGH SCHOOL	1972	1986	2000		1972-1986	1986-2000
Employment	59.7	83.8	97.2	Change	24.1	13.3
Percent Change	—	40.4	15.9	% Total	72.0	62.3
POST HIGH SCHOOL						
Employment	5.2	7.3	9.5	Change	2.0	2.2
Percent Change	—	39.0	30.1	% Total	6.1	10.2
COLLEGE						
Employment	13.0	20.4	26.2	Change	7.4	5.9
Percent Change	—	56.5	28.8	% Total	21.9	27.5
TOTAL						
Employment	78.0	111.5	132.9	Change	33.5	21.4
Percent Change	—	43.0	19.2	% Total	100.0	100.0

Table 3
Analysis of Implied Earnings Growth by Educational Group
($billions)

HIGH SCHOOL	1972	1986	2000		1972-1986	1986-2000
Earnings	856.9	1208.6	1391.1	Change	351.7	182.5
Percent Change	—	41.0	15.1	% Total	59.2	44.3
POST HIGH SCHOOL						
Earnings	157.6	198.2	255.6	Change	40.6	57.4
Percent Change	—	25.8	28.9	% Total	6.8	13.9
COLLEGE						
Earnings	366.3	567.6	739.5	Change	201.3	171.9
Percent Change	—	55.0	30.3	% Total	33.9	41.7
TOTAL						
Earnings	1380.9	1974.5	2386.2	Change	593.6	411.7
Percent Change	—	43.0	20.9		100.0	100.0

The last four columns of Table 4 show how expenditures per student in Oklahoma's public higher education institutions compare with those in other states. In the 1987-88 academic year, Oklahoma spent $5230 on each student enrolled in a state-supported college or university. This placed Oklahoma 45th in the country in terms of its per-student expenditures on higher education. Oklahoma ranked last in its eight-state region (Oklahoma, the six states bordering on Oklahoma, and Louisiana).

This represents a significant deterioration in state support for higher education. In the 1978-79 academic year, Oklahoma ranked 35th in the nation with respect to per-student expenditures on higher education. Although increased funding for higher education resulted in a $1761 increase in expenditures per student between 1978-79 and 1987-88, other states placed more emphasis on higher education, and Oklahoma fell in the rankings.

Table 4
Expenditure and Achievement Comparisons

	Elem. & Second. Exp. per Student 1987	Rank	Elem. & Second. Change 1978-87	Rank	ACT/SAT Index 1989	Rank	Pub.Higher Ed. Exp. per Student 1987	Rank	Pub.Higher Ed. Exp. Change 1978-87	Rank
Alabama	2357	50	906	49	96	39	5796	36	1713	44
Alaska	9055	1	4108	1	98	36	8144	5	4013	2
Arizona	4131	19	2077	18	103	11	5166	46	2155	35
Arkansas	2918	43	1554	40	95	44	6964	14	3197	14
California	3960	21	1812	26	102	15	5290	42	2843	22
Colorado	4278	13	2182	13	105	8	5869	33	1697	45
Connecticut	4702	5	2705	5	102	16	5262	44	2492	27
Delaware	4435	8	2442	7	101	24	8220	4	3360	9
Florida	4140	18	2222	12	100	30	4158	50	1055	49
Georgia	3487	30	1964	21	95	43	6985	13	2562	26
Hawaii	3100	42	1315	43	100	32	6774	18	2474	28
Idaho	2359	49	915	48	103	12	8056	7	4117	1
Illinois	3743	27	1733	31	100	26	5010	48	2231	33
Indiana	3297	38	1701	33	98	37	7658	9	3169	16
Iowa	3449	35	1375	41	108	1	9833	1	3659	5
Kansas	3746	26	1743	30	101	19	5582	39	1769	42
Kentucky	2567	45	1033	46	97	38	6795	17	2084	37
Louisiana	2899	44	1288	44	91	48	6280	28	2306	32
Maine	3480	31	1921	23	101	25	6825	16	3238	12
Maryland	4180	17	2027	19	102	17	5867	34	2442	30
Massachusetts	4507	7	2109	16	102	18	5690	38	3248	11
Michigan	4203	14	2109	17	100	29	6454	24	2801	23
Minnesota	4421	9	2321	10	106	3	7608	10	3467	8
Mississippi	2460	48	1017	47	86	49	6313	26	2037	38
Missouri	3465	33	1775	28	101	20	6382	25	3224	13
Montana	4190	15	1999	20	106	4	6128	31	2349	31
Nebraska	3835	23	1836	25	105	5	5860	35	1790	41
Nevada	3466	32	1671	37	101	23	4163	49	1405	47
New Hampshire	3843	22	2249	11	105	7	6309	27	1907	39
New Jersey	5306	4	2899	4	100	28	6763	19	3899	3
New Mexico	3541	29	1629	39	96	40	5422	41	543	50
New York	5915	2	3404	2	100	31	6760	20	3107	19
North Carolina	3378	37	1767	29	94	45	7243	12	2884	21
North Dakota	3690	28	1650	38	99	34	7578	11	3653	6
Ohio	3785	25	1919	24	103	13	6856	15	3114	18
Oklahoma	3267	39	1680	36	96	41	5230	45	1761	43
Oregon	4370	11	1942	22	104	10	6234	30	2694	24
Pennsylvania	4530	6	2461	6	99	33	5039	47	2144	36
Rhode Island	4384	10	2389	9	101	22	5512	40	1817	40
South Carolina	3162	40	1691	35	94	46	8058	6	3534	7
South Dakota	3160	41	1368	42	105	6	6756	21	1281	48
Tennessee	2546	47	1139	45	96	42	6620	22	3263	10
Texas	3453	34	1780	27	99	35	6091	32	2680	25
Utah	2561	46	699	50	100	27	8663	3	3180	15
Vermont	4185	16	2408	8	102	14	9301	2	3670	4
Virginia	3821	24	2147	14	101	21	5790	37	2467	29
Washington	3980	20	1691	34	NA		6263	29	3153	17
West Virginia	3411	36	1704	32	94	47	5290	43	1560	46
Wisconsin	4323	12	2122	15	107	2	6556	23	2181	34
Wyoming	5909	3	3378	3	104	9	7740	8	2994	20

Conclusion

The income generating capacities of a nation are closely tied to the productive capabilities of its work force. This has been true in the past, and it will be true in the future. For an economy to remain viable in a world of increasing competition for international market shares, policy makers need to pay close attention to meeting the education and training needs of present and future workers. Public policy failures in this arena will translate directly into lower economic growth potentials.

The analysis above shows that in the 1990s a disproportionate share of jobs and earnings growth will be attributable to occupations dominated by post-secondary-trained personnel. A complex economy generates a vast array of job opportunities of widely varying education requirements and skill contents. College training is not necessary for a large majority of these jobs, as the analysis above shows. Nevertheless, an educated and trained work force is more productive regardless of the occupational pursuit. Quality at all educational levels--primary, secondary, and higher education--is necessary for states to be competitive in future years.

APPENDIX

Table 1

Oklahoma Gross State Product

	Actual		Forecasts		Average Annual Growth Rate		
	1970	1980	1989	1990	1970-1980	1980-1990	1989-1990
Gross State Product							
Millions of Current Dollars	$10,856	$37,740	$57,351	$61,007	13.3%	4.9%	6.4%
Millions of Constant Dollars (1982 deflator = 100)	33,261	44,943	47,236	48,141	3.1	0.7	1.9

Table 2

Oklahoma Gross State Product by Industrial Sector

	Actual		Forecasts		Average Annual Growth Rate		
	1970	1980	1989	1990	1970-1980	1980-1990	1989-1990
Agriculture	$ 546	$ 1,470	$2,648	$2,894	10.4%	7.0%	9.3%
Mining	1,085	6,513	4,956	5,073	19.6	-2.5	2.3
Contract Construction	519	2,046	2,342	2,459	14.7	1.9	5.0
Manufacturing							
Durable	975	3,511	5,319	5,670	13.7	4.9	6.6
Nondurable	649	2,010	3,540	3,695	12.0	6.3	4.4
Wholesale and Retail Trade	1,765	5,791	8,600	9,200	12.6	4.7	7.0
Finance, Insurance, and Real Estate	1,335	4,590	9,001	9,630	13.1	7.7	7.0
Transportation, Communications, and Public Utilities	1,129	3,416	5,146	5,429	11.7	4.7	5.5
Services	1,115	4,022	7,812	8,422	13.7	7.7	7.8
Government							
Federal	909	1,823	3,146	3,296	7.2	6.1	4.8
State and Local	829	2,548	4,840	5,240	11.9	7.5	8.3

Note: Components may not add due to rounding.

Table 3

Oklahoma Civilian Labor Force

	Actual		Forecasts		Average Annual Growth Rate		
	1970	1980	1989	1990	1970-1980	1980-1990	1989-1990
Total Civilian Labor Force	1,050	1,368	1,537	1,541	2.7%	1.2%	0.3%
Unemployment	41	66	90	95	4.9	3.7	5.3
Unemployment Rate (%)	4.0	4.8	5.9	6.1	-	-	-
OK/US Unemployment Ratio (%)	81.6	67.6	113.5	113.0	-	-	-

Note: Data are in thousands of workers for all categories unless otherwise noted.
Totals are annual averages.

Table 4

Oklahoma Wage and Salary Employment by Industrial Sector

	Actual		Forecasts		Average Annual Growth Rate		
	1970	1980	1989	1990	1970-1980	1980-1990	1989-1990
Total	763	1,138	1,139	1,147	4.1%	0.1 %	0.7%
Mining	39	75	44	44	6.8	-5.1	1.0
Contract Construction	39	57	33	34	3.9	-5.2	0.4
Durable	81	124	102	104	4.4	-1.8	1.9
Nondurable	53	67	62	62	2.4	-0.7	0.6
Wholesale and Retail Trade	169	266	276	277	4.7	0.4	0.5
Finance, Insurance, and Real Estate	37	57	58	59	4.3	0.4	0.3
Transportation, Communications, and Public Utilities	52	69	63	63	2.7	-0.8	0.8
Services	116	194	253	256	5.3	2.8	1.3
Government							
Federal (Civilian)	58	49	51	51	-1.7	0.4	-0.8
State and Local	119	180	197	198	4.2	0.9	0.2

Note: Components may not add due to rounding.
Totals are in thousands.

Table 5

Oklahoma Personal Income and Components

	Actual		Forecasts		Average Annual Growth Rate		
	1970	1980	1989	1990	1970-1980	1980-1990	1989-1990
Total Personal Income	$8,819	$28,585	$45,884	$48,721	12.5%	5.5%	6.2%
Wages and Salaries	5,304	16,590	23,750	25,435	12.1	4.4	7.1
Other Labor Income	301	1,700	2,408	2,561	18.9	4.2	6.3
Nonfarm Proprietors' Income	937	2,819	3,929	4,037	11.6	3.7	2.7
Dividends, Interest, and Rent	1,071	3,879	8,100	8,349	13.7	8.0	3.1
Transfer Payments	1,109	4,067	8,109	8,708	13.9	7.9	7.4
Farm Proprietors' Income	314	433	1,200	1,279	3.3	11.4	6.6
Residence Adjustment Factor	63	166	356	386	10.2	8.8	8.3
(less) Personal Contributions to Social Insurance	280	1,069	1,969	2,035	14.3	6.6	3.3
Per Capita Personal Income	3,437	9,394	14,172	15,109	10.6	4.9	6.6
Real Personal Income	20,557	33,004	35,302	36,003	4.8	0.9	2.0
Real Per Capita Personal Income	8,010	10,850	10,904	11,165	3.1	0.3	2.4
Consumption Implicit Price Deflator (1982 = 100)	43	87	130	135	7.3	4.5	3.9

Note: Components may not add to Personal Income due to rounding.
Totals are in millions of dollars.
Real totals are in 1982 dollars.

Table 6

Oklahoma State Government Revenues

	Actual			Forecast	Average Annual Growth Rate		
	1970	1980	1989	1990	1970-1980	1980-1989	1989-1990
Selected Tax Revenues							
Income Tax	$78	$465	$1,071	$1,156	19.5%	9.5%	8.0%
Severance Tax	49	438	369	365	24.4	-1.8	-1.2
Sales and Use Tax	95	319	777	797	12.9	9.6	2.5
Motor Fuels Tax	91	132	321	318	3.8	9.2	-1.0

Note: Totals are for the fiscal year and in millions of dollars.

Table 7

Oklahoma Financial Data

	Actual		Forecasts		Average Annual Growth Rate		
	1970	1980	1989	1990	1970-1980	1980-1990	1989-1990
Insured Commercial Banks							
Demand Deposits	$3,105	$7,250	$4,155	$4,195	8.9%	-5.3%	1.0%
Time Deposits	2,503	12,043	18,881	19,464	17.0	4.9	3.1
Real Estate Loans	497	2,941	4,954	5,055	19.5	5.6	2.0
Loans to Farmers	373	1,136	1,127	1,154	11.8	0.2	2.3
Commercial and Industrial Loans	926	4,177	2,999	2,874	16.3	-3.7	-4.2
Loans to Individuals	780	2,619	2,176	2,267	12.9	-1.4	4.2
Other Loans	304	821	966	888	10.5	0.8	-8.0

Note: Totals are in millions of dollars.

Table 8

Oklahoma Energy Data

	Actual		Forecasts		Average Annual Growth Rate		
	1970	1980	1989	1990	1970-1980	1980-1990	1989-1990
Energy Production							
Total Oil Production (millions of barrels)	223	148	123	120	-4.0%	-2.1%	-2.0%
Total Natural Gas Production (billions of cubic feet)	1,796	1,902	2,147	2,201	0.6	1.5	2.5
Energy Consumption							
Total Natural Gas Sales (trillions of BTUs)							
Residential	80	77	67	67	-0.4	-1.4	0.3
Commercial	45	47	35	35	0.4	-2.9	0.5
Industrial	225	246	280	283	0.9	1.4	1.2
Total Electricity Sales (millions of KWH)							
Residential	5,834	13,050	14,300	14,250	8.4	0.9	-0.3
Commercial	4,484	9,111	9,800	9,826	7.3	0.8	0.3
Industrial	4,647	8,557	10,437	10,500	6.3	2.1	0.6

Note: Energy production data are fiscal year totals and are actual totals for 1989.
Natural gas sales are from U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, 1988. (This data does not agree with data appearing in previous *Outlooks*, which used data from American Gas Association, *Gas Facts*)

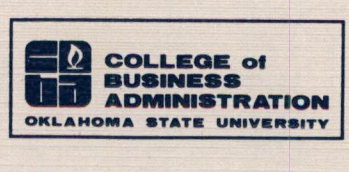
DATA SOURCES

1. Advisory Commission on Intergovernmental Relations, State-Local Government Finance Diskettes, FY 1987.
2. American Petroleum Institute, *Basic Petroleum Data Book: Petroleum Industry Statistics.*
3. DRI/McGraw-Hill, *Review of the U.S. Economy*, Lexington, Mass., October 1989.
4. Edison Electric Institute, revised unpublished data, 1970-1988.
5. Federal Deposit Insurance Corporation, *Bank Operating Statistics* and unpublished data
6. Jaffe, Adam B. "Real Effects of Academic Research." *American Economic Review 79* (Dec. 1989): 957-970.
7. *Oil & Gas Journal*, various issues.
8. Oklahoma Corporation Commission, unpublished data.
9. Oklahoma Employment Security Commission, Research Department, *Handbook of Employment Statistics*, Vols. I and II, Oklahoma City, Oklahoma.
10. *Oklahoma State Econometric Model*, College of Business Administration, Oklahoma State University, Stillwater, Oklahoma, September 1989.
11. Oklahoma Tax Commission, unpublished data.
12. Rauch, Johathan. "Downsizing the Dream". *National Journal* (Aug. 12, 1989): 2038-2043.
13. Sheshunoff Information Services, Inc., quarterly reports, Austin, Texas.
14. State of Oklahoma, Budget, annual, fiscal years 1970-1989.
15. State Policy Research, Inc. and Brizius & Foster, *State Policy Data Book '89*, Alexandria, VA.
16. The Conference Board, Inc., *Statistical Bulletin*, monthly report.
17. U.S. Department of Agriculture, *Agricultural Statistics, Economic Indicators of the Farm Sector*, and "State Farm Income Statistics," *Statistical Bulletin 609, Supp.*, Washington, D.C.
18. U.S. Department of Commerce, Bureau of the Census, *Census of Manufactures, Annual Survey of Manufactures, Analytical Report Series: Exports from Manufacturing Establishments, Government Finances,* and *Money Income of Households, Families, and Persons in the United States*: 1987, Washington, D.C.
19. U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business,* and unpublished personal income, population, employment, and gross state product tables, Washington, D.C.
29. U.S. Department of Education, National Center for Education Statistics, *Digest of Education Statistics*, 1980 and 1989, and *State Projections to 1993 for Public Elementary and Secondary Enrollment, Graduates, and Teachers*, Washington, D.C.
21. U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, 1988.
22. U.S. Department of Labor, Bureau of Labor Statistics, *CPI Detailed Reports, Employment and Earnings, Projections 2000* and unpublished employment and occupation data.

Oklahoma State University, in compliance with Title VI of the Civil Rights Act of 1964 and Title IX of the Education Amendments of 1972 (Higher Education Act), does not discriminate on the basis of race, color, national origin, sex qualified handicap or disability in any of its policies, practices, or procedures. This provision includes but is not limited to admissions, employment, financial aid, and educational services.

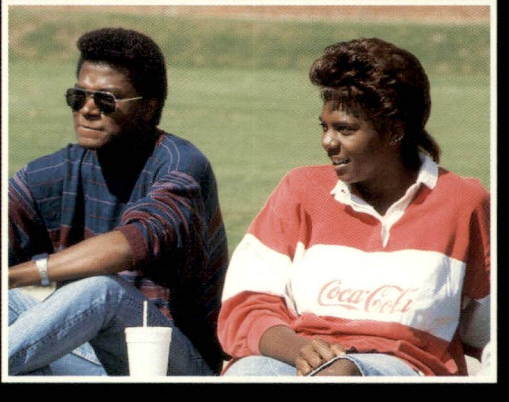
January 1990
Office of Business and Economic Research
College of Business Administration
Oklahoma State University
Stillwater, Oklahoma 74078-0555

Copyright © 1990 by Oklahoma State University. All rights reserved.


COLLEGE of
BUSINESS
ADMINISTRATION
OKLAHOMA STATE UNIVERSITY

Oklahoma State University





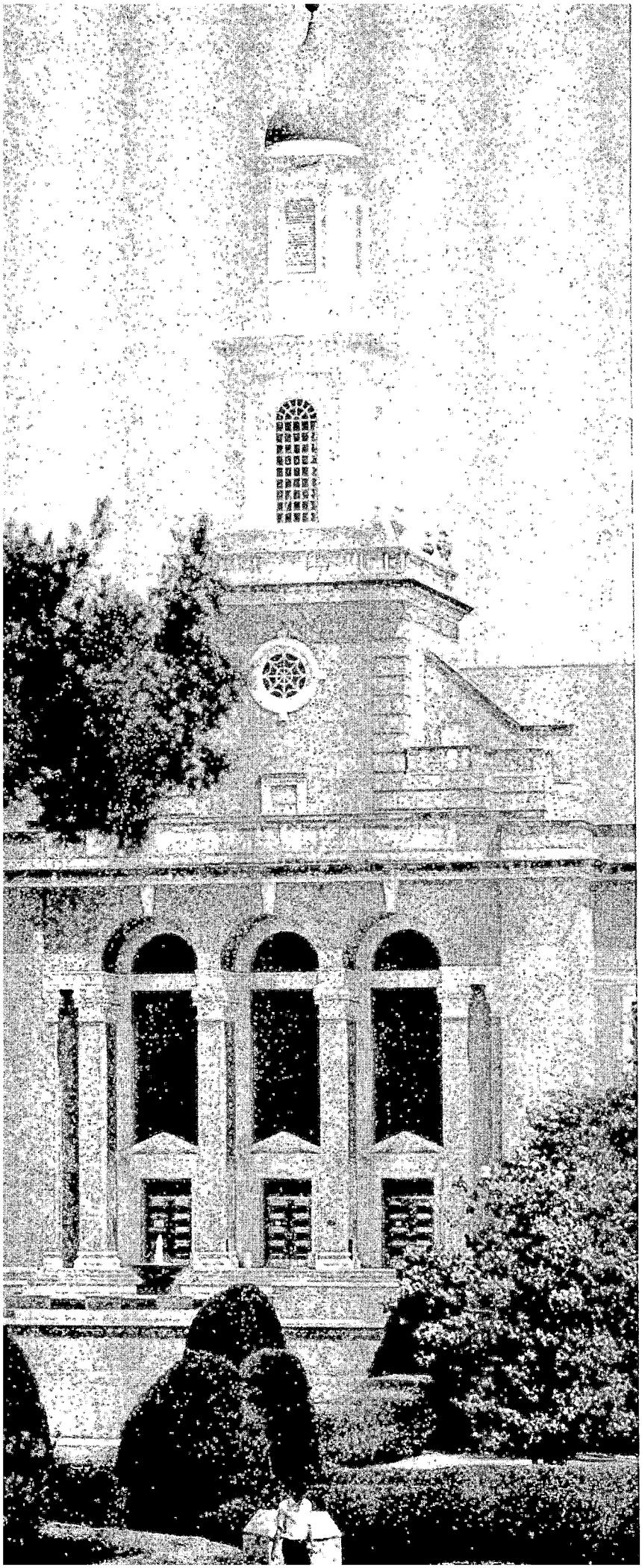


Catalog 1989 - 90

This *Catalog* offers information about the academic programs and support services of the University. This *Catalog* is as accurate as possible, but the information may not remain current for all of the academic year. Circumstances may prompt changes in courses, course content, credit, fees, regulations, semester calendar, curriculum, degrees offered, and other University matters. Such changes authorized by the University apply both to prospective students and to those previously enrolled, unless the latter are specifically exempted.

Equal Educational Opportunity Policy

Oklahoma State University in compliance with Title VI of the Civil Rights Act of 1964 and Title IX of the Education Amendments of 1972 (Higher Education Act) does not discriminate on the basis of race, color, national origin, sex, qualified handicap or disability in any of its policies, practices or procedures. This provision includes, but is not limited to, admissions, employment, financial aid and educational services.



OKLAHOMA STATE UNIVERSITY

CATALOG

1989-90

OSU

State Regents for Higher Education

J.D. HELMS, *Chairman, Oklahoma City*
JAMES E. BARNES, *Vice-Chairman, Tulsa*
GEORGE B. KAISER, *Secretary, Tulsa*
BOB F. ALLEE, *Member, Elk City*
ALAN A. BAKER, *Member, Duncan*
ED LATTA CALHOUN, *Member, Beaver*
DR. DONALD HALVERSTADT, *Member, Oklahoma City*
AVALON REECE, *Member, Muskogee*
GEORGE H. WEYERHAEUSER, JR., *Member, Valliant*
DR. HANS BRISCH, *Chancellor, Oklahoma City*

Board of Regents for Oklahoma State University

CAROLYN SAVAGE, *Chairman, Hominy*
L.E. "DEAN" STRINGER, *Vice-Chairman, Oklahoma City*
JACK D. CRAIG, *Member, Leedey*
AUSTIN KENYON, *Member, Park Hill*
EDWIN KETCHUM, *Member, Duncan*
ED MALZAHN, *Member, Perry*
DR. JOHN W. MONTGOMERY, *Member, Poteau*
ROBERT D. ROBBINS IV, *Member, Altus*
JIMMIE C. THOMAS, *Member, Ada*
H. JERRELL CHESNEY, *Chief Executive Officer, Shawnee*

University Administration

Selected administrators directly responsible for academic and service programs for students.

JOHN R. CAMPBELL, Ph.D., *President*
JAMES H. BOGGS, Ph.D., *Vice-President for Academic Affairs and Research*
JERRY B. FARLEY, Ph.D., *Vice-President for Business and Finance*
RONALD S. BEER, Ph.D., *Vice-President for Student Services*
J. O. GRANTHAM, M.S., *Interim Vice-President for University Relations and Extension*
CHARLES E. PLATT, B.S., *President, OSU Foundation*
CHARLES B. BROWNING, Ph.D, *Dean of the College of Agriculture; Director of the Agricultural Experiment Station; and Director of the Cooperative Extension Service*
SMITH L. HOLT, Ph.D., *Dean of the College of Arts and Sciences*
ROBERT L. SANDMEYER, Ph.D., *Dean of the College of Business Administration*
KENNETH L. KING, Ed.D., *Dean of the College of Education and Director of Teacher Education*
KARL N. REID, Sc.D., P.E., *Dean of the College of Engineering, Architecture and Technology*
NORMAN N. DURHAM, Ph.D., *Dean of the Graduate College*
ELAINE JORGENSON, Ed.D., *Interim Dean of the College of Home Economics*
CLYDE B. JENSEN, Ph.D., *President of the College of Osteopathic Medicine (Tulsa)*
JOSEPH W. ALEXANDER, Ph.D., D.V.M., *Dean of the College of Veterinary Medicine*
C. DAVID CURTIS, B.S., *Bursar*
ANTHONY BROWN, Ph.D., *Coordinator of Programs, University Center At Tulsa (offices are located in Tulsa)*
CHARLES BRUCE, Ph.D., *Director of Financial Aid*
J. LARRY KEEN, Ed.D., *Director of High School and College Relations*
ROBIN H. LACY, Ed.D., *Registrar and Director of Admissions*
EDWARD R. JOHNSON, Ph.D., *University Librarian*

Contents

4 Calendar
7 Entering the University
11 Enrollment and Records
12 Costs
15 Financial Aid
16 Student Services
18 Special Programs, Services and Facilities
23 Student Life
25 The Technical Branch, Oklahoma City
25 The Technical Branch, Okmulgee
25 University Academic Regulations
31 Degrees Offered
32 College of Agriculture
40 College of Arts and Sciences
61 College of Business Administration
67 College of Education
76 College of Engineering, Architecture and Technology
90 College of Home Economics
97 College of Osteopathic Medicine
99 College of Veterinary Medicine
101 Faculty
107 The Graduate College
126 Graduate Faculty
145 Course Listings
230 Index

University Calendar

Summer 1989
Regular 8-week Summer Session

May 29, Monday
University holiday

June 1, 2, Thursday, Friday
Registration

June 2, Friday
Last day to cancel enrollment

June 5, Monday
Class work begins

June 9, Friday
Last day to file a diploma application

June 9, Friday
Last day for 80% refund on withdrawal

June 9, Friday
Last day to enroll

June, 9 Friday
Last day to drop a course with no grade

June 12, Monday
Last day to add

June 16, Friday
Last day for 50% refund on drop or withdrawal

June 23, Friday
Last day to drop or withdraw with "W"

June 23, Friday
Last day for 25% refund on drop or withdrawal

July 4, Tuesday
University holiday

July 7, Friday
Last day to drop with "WP" or "WF"

July 14, Friday
Last day to withdraw with "WP" or "WF"

July 31, Monday
Class work ends (makeup exams)

August 2, Wednesday
Grades due from faculty

First Semester 1989-90, Fall

August 14-18, Monday-Friday
Registration

August 18, Friday
Last day to cancel enrollment

August 21, Monday
Class work begins

August 25, Friday
Last day to enroll

August 25, Friday
Last day to drop a course with no grade

August 28, Monday
Last day to add

September 1, Friday
Last day to file a diploma application

September 1, Friday
Last day for 80% refund on drop or withdrawal

September 4, Monday
University holiday

September 15, Friday
Last day for 50% refund on drop or withdrawal

September 29, Friday
Last day to drop or withdraw with "W"

September 29, Friday
Last day for 25% refund on drop or withdrawal

October 2-3, Monday, Tuesday
Fall break

October 4, Wednesday
"Monday" classes will meet

October 13, Friday
Progress reports for freshmen due from faculty

October 27, Friday
Last day to drop with a "WP" or "WF"

November 6, Monday
Enrollment for Spring begins

November 23, Thursday
University holiday begins

November 27, Monday
Class work resumes

December 1, Friday
Last day to withdraw with a "WP" or "WF"

December 4-8, Monday-Friday
Pre-finals week

December 11-15, Monday-Friday
Final examinations

December 15, Friday
Class work ends

December 20, Wednesday
Grades due from faculty

December 22—January 1, Friday-Monday
University holidays

Winter Intersession

December 4-8, Monday-Friday
Registration

December 18, Monday
Intersession begins

December 29, Friday
Intersession ends

Second Semester 1989-90, Spring

January 2-5, Tuesday-Friday
Registration

January 5, Friday
Last day to cancel enrollment

January 8, Monday
Class work begins

January 12, Friday
Last day to enroll

January 12, Friday
Last day to drop a course with no grade

January 15, Monday
Last day to add

January 19, Friday
Last day to file a diploma application

January 19, Friday
Last day for 80% refund on drop or withdrawal

February 2, Friday
Last day for 50% refund on drop or withdrawal

February 16, Friday
Last day to drop or withdraw with "W"

February 16, Friday
Last day for 25% refund on drop or withdrawal

March 2, Friday
Progress reports for freshmen due from faculty

March 3, Saturday
Spring break begins

March 12, Monday
Class work resumes

March 19, Monday
Enrollment for Fall begins

March 23, Friday
Last day to drop with a "WP" or "WF"

April 20, Friday
Last day to withdraw with a "WP" or "WF"

April 23-27, Monday-Friday
Pre-finals week

April 30-May 4, Monday-Friday
Final examinations

May 4, Friday
Class work ends

May 5, Saturday
Commencement

May 9, Wednesday
Grades due from faculty

Summer 1990
Regular 8-Week Summer Session

May 28, Monday
University holiday

May 31, June 1, Thursday, Friday
Registration

June 1, Friday
Last day to cancel enrollment

June 4, Monday
Class work begins

June 8, Friday
Last day to file a diploma application

June 8, Friday
Last day for 80% refund on withdrawal

June 8, Friday
Last day to enroll

June 8, Friday
Last day to drop a course with no grade

June 11, Monday
Last day to add

June 15, Friday
Last day for 50% refund on drop or withdrawal

June 22, Friday
Last day to drop or withdraw with "W"

June 22, Friday
Last day for 25% refund on drop or withdrawal

July 4, Wednesday
University holiday

July 6, Friday
Last day to drop with "WP"or "WF"

July 13, Friday
Last day to withdraw with "WP" or "WF"

July 30, Monday
Class work ends (makeup exams)

August 1, Wednesday
Grades due from faculty

First Semester 1990-91, Fall

August 20-24, Monday-Friday
Registration

August 24, Friday
Last day to cancel enrollment

August 27, Monday
Class work begins

August 31, Friday
Last day to enroll

August 31, Friday
Last day to drop a course with no grade

September 3, Monday
University holiday

September 4, Tuesday
Last day to add

September 7, Friday
Last day to file a diploma application

September 7, Friday
Last day for 80% refund on drop or withdrawal

September 21, Friday
Last day for 50% refund on drop or withdrawal

October 5, Friday
Last day to drop or withdraw with "W"

October 5, Friday
Last day for 25% refund on drop or withdrawal

October 15, 16, Monday, Tuesday
Fall break

October 17, Wednesday
"Monday" classes will meet

October 19, Friday
Progress reports for freshmen due from faculty

November 2, Friday
Last day to drop with "WP" or "WF"

November 12, Monday
Enrollment for Spring begins

November 22, Thursday
University holiday begins

November 26, Monday
Class work resumes

December 7, Friday
Last day to withdraw with a "WP" or "WF"

December 10-14, Monday-Friday
Pre-finals week

December 17-21, Monday-Friday
Final examinations

December 21, Friday
Class work ends

December 24-January 1, Friday through Tuesday
University holidays

January 4, Friday
Grades due from faculty

Winter Intersession

December 10-14, Monday-Friday
Registration

December 24, Monday
Intersession begins

January 4, Friday
Intersession ends

Second Semester 1990-91, Spring

January 7-11, Monday-Friday
Registration

January 11, Friday
Last day to cancel enrollment

January 14, Monday
Class work begins

January 18, Friday
Last day to enroll

January 18, Friday
Last day to drop a course with no grade

January 21, Monday
Last day to add

January 25, Friday
Last day to file a diploma application

January 25, Friday
Last day for 80% refund on drop or withdrawal

February 8, Friday
Last day for 50% refund on drop or withdrawal

February 22, Friday
Last day to drop or withdraw with "W"

February 22, Friday
Last day for 25% refund on drop or withdrawal

March 8, Friday
Progress reports for freshmen due from faculty

March 9, Saturday
Spring break begins

March 18, Monday
Class work resumes

March 25, Monday
Enrollment for Fall begins

March 29, Friday
Last day to drop with a "WP" or "WF"

April 26, Friday
Last day to withdraw with a "WP" or "WF"

April 29-May 3, Monday-Friday
Pre-finals week

May 6-10, Monday-Friday
Final examinations

May 10, Friday
Class work ends

May 11, Saturday
Commencement

May 15, Wednesday
Grades due from faculty



The University

Oklahoma State University was founded on December 25, 1890, as Oklahoma Agricultural and Mechanical College, just twenty months after the Land Run of 1889.

When the first students assembled for class on December 14, 1891, there were no buildings, no books, and no curriculum.

In 1894, two and one-half years after classes began in local churches, 144 students moved into the first academic building, later known as Old Central, on the southeast corner of campus.

In 1896, Oklahoma A&M held its first commencement with six male graduates.

On July 1, 1957, Oklahoma A&M College became Oklahoma State University. Technical branches were established in Okmulgee in 1946 and in Oklahoma City in 1961. In July 1988, the Oklahoma College of Osteopathic Medicine and Surgery became the College of Osteopathic Medicine of OSU.

As one of Oklahoma's land-grant institutions, OSU has three goals: instruction, research and extension.

OSU is located in north central Oklahoma in Stillwater, a town of over 42,000, which is almost equally distant from Tulsa and Oklahoma City. The University is coeducational and has an enrollment of over 26,683 students on its four campuses.

The University offers bachelor's, master's and doctor's degrees in a large number of fields, as well as the professional Doctor of Osteopathy and Doctor of Veterinary Medicine degrees. Specialist degrees are also offered in selected fields.

Although OSU is a large, comprehensive university, its size does not minimize the personal attention given to each student. The individual is more than just a number at this university. OSU encourages all students, when they first enroll, to identify the college in which they wish to major. Once the student has identified his or her major department, he or she becomes a very important individual to the faculty and advisers of that department. Because the average number of students majoring in any one department is less than 150, the student can count on personal attention in a friendly environment.

The largeness of the University has many distinct advantages. OSU's 1.5 million volume library, its vast research laboratories and equipment, excellent physical education-recreation and student union facilities, nationally-recognized residence halls programs, outstanding cultural events, and 37 nationally-affiliated fraternities sororities, all provide a stimulating educational and social experience.

The Mission

The mission of Oklahoma State University is to provide an environment in which its constituents can discover, examine, preserve, and transmit knowledge, wisdom, and values that will help ensure the survival of present and future generations, with enrichment in the quality of life.

Student Profile

OSU has a diverse student body. Students come not only from Oklahoma, but from across the nation and world. Of OSU's 26,683 students, more than 20,500 are on the Stillwater campus, 2,100 at Okmulgee and 3,500 at Oklahoma City, as well as nearly 700 students at the University Center at Tulsa and 300 students at the College of Osteopathic Medicine in Tulsa. Eighty-nine percent of the undergraduate enrollment is from Oklahoma; six percent from other states; and five percent from more than 25 foreign countries. Of the undergraduate population, 55 percent are men and 45 percent are women. Minorities make up eight percent of the undergraduate student body.

The graduate student enrollment totals 4,165. Of these students, approximately 600 enroll through the University Center at Tulsa. Seventy-one percent are from Oklahoma; 12 percent from other states; and 17 percent from foreign countries. Of the graduate population, 56 percent are men and 44 percent are women. Minorities make up eight percent of the graduate student body.

Facilities

The OSU campus is one of exceptional beauty with modified Georgian style architecture in all of the new buildings. The main campus encompasses 415 acres and 200 permanent buildings. These facilities include one of the largest libraries in the entire Southwest, a large Student Union complete with hotel facilities, the Colvin Physical Education Center, the Bartlett Center for the Studio Arts, and the Seretean Center for the Performing Arts.

The Lake Carl Blackwell area, eight miles west of Stillwater, is also owned by OSU. The area includes approximately 21,655 acres, including the 3,000-acre Lake Carl Blackwell which provides the water supply for OSU, and is also used for research activities, in addition to being a popular regional recreational area.

Additional properties include approximately 1,900 acres in farm land and facilities in Payne County, as well as 2,900 acres and various structures devoted to research stations around the state.

General Education

Oklahoma State University is committed to producing graduates who have both a depth of knowledge in their major fields of study and a breadth of knowledge outside their majors, the best graduate being one with a mastery of a specific subject matter and a solid and diversified general education. As a result of this commitment to breadth and general education, the following philosophy of general education was adopted in 1978:

The role of General Education at Oklahoma State University is to assist the student in the pursuit of general knowledge and in the development of skills and attitudes conducive to a lifetime of enlightenment. It must stimulate intellectual curiosity, original thought and expression, the capacity for critical analysis and problem solving and the ability to make conscious value judgments consistent with both personal needs and the public interest. It must be a blend of the timely and the timeless and assist the graduate to live and function in a rapidly changing, complex and cosmopolitan world.

Accreditation

Oklahoma State University has been continuously accredited by the North Central Association of Colleges and Secondary Schools as a degree-granting institution since 1916. It is also a member of the National Association of State Universities and Land-Grant Colleges, the Association of American Colleges and the American Council on Education. The University is on the approved list of colleges and universities of the American Association of University Women. All Teacher Education programs are fully accredited by the National Council for Accreditation of Teacher Education. Many of the colleges and programs are accredited through their professional organizations. These accreditations include: the American Historical Association, the Accrediting Council on Education for Journalism and Mass Communication, the National Association of Schools of Music, the American Speech-Language-Hearing Association, the American Assembly of Collegiate Schools of Business, the National Council for Accreditation of Teacher Education, the Accreditation Board for Engineering and Technology, the Associated Collegiate Schools of Architecture, the National Architectural Accrediting Board, the American Home Economics Association, and the Council on Education of the American Veterinary Medical Association. Refer to the appropriate college sections in this *Catalog* for information on accreditation of specific programs.

Affirmative Action Program

OSU's Affirmative Action Program reflects the commitment of the University to equal opportunity and outlines the procedures necessary to fulfill this commitment. OSU is committed by policy of its Board of Regents to promote equal opportunity in all phases of university life for all persons within its constituency. The Affirmative Action Program complies with the legal requirements for federal and state civil rights laws and implements directives. Members of ethnic minority groups, women, the handicapped, disabled veterans, and veterans of the Vietnam era, and the aged in society have faced many complex barriers to equal opportu-

nity in the past. OSU has devised action-oriented programs designed to remove tangible and intangible barriers to equal opportunity, thereby demonstrating through the success of these programs that the goals of equal opportunity held by American society are attainable.

To adequately meet the needs of protected groups, such as the qualified handicapped, self-identification is encouraged on enrollment forms so those eligible can be afforded every opportunity to take advantage of the services offered. All information is protected by privacy laws and used only for affirmative action purposes.

Entering the University—Admissions

Robin H. Lacy, ***Registrar and Director of Admissions***
Gordon L. Reese, ***Associate Director***
Darlene Wilson, ***Administrative Associate***
Paulette Cundiff, ***Coordinator, Admissions Operations***
Margaret Betts, ***Coordinator, Freshman Admissions and Enrollment***
Karen R. Mott, ***Coordinator, Transfer Credit Evaluations***
Farhat Iftekharuddin, ***Counselor, International Student Admissions***

Application Procedure

When to Apply

Generally, it is advisable to apply for admission several months in advance of the first semester in which enrollment is desired. Applications for Admissions are processed on a "rolling basis," which means admission decisions are usually made and applicants notified within a week or two of receipt of all necessary admission documents.

How to Apply

(Nonresidents should include a $10 nonrefundable processing fee with the "Application for Admission.")

First-time Freshmen. All applicants seeking admission must complete and submit an "Application for Admission." Students should also request that their high school counselor send to the Office of Admissions a current high school transcript that contains the most current class rank and grade-point average (6th, 7th, or 8th semester). In addition, at the time of application, a request should be made to have the results of the ACT or SAT sent to the Office of Admissions, unless such a request was made at the time of testing.

Transfers. Students who have enrolled in one or more colleges prior to applying to OSU must complete and submit an "Application for Admission," and request from the registrar at *each* college an official transcript of all work attempted be sent to the Office of Admissions at OSU. Students who have earned 23 or fewer hours of college credit should follow the procedure outlined above for first-time freshmen.

Former Students. Students who have attended OSU but did not enroll in the immediate past semester (summer sessions are not included), must complete an "Application for Readmission." Students who have enrolled in another college since attending OSU must submit official transcripts of all work attempted.

Residential Life. All freshmen (with the exception of commuting students) live on campus their first year. The University offers a variety of living and food service arrangements to satisfy most students. A Residential Hall Application is included in the "Application Packet" and should be submitted early in the senior year to insure a first-choice assignment. Opportunities abound for transfer students who desire to experience life on campus.

Beginning the Enrollment Process

Advance Fee Payment. After admission is granted, all new freshman and transfer students are required to submit an advance fee payment prior to the beginning of the enrollment process. The fall semester enrollment process for freshmen is completed during several special orientation sessions conducted on campus during the summer. Students need attend only one session and parents are encouraged to participate in this important program.

Transfer and readmission students will receive enrollment information at the appropriate time.

Physical Examination. Prior to the beginning of classes, all new students must present to the OSU Student Health Center, a physical examination report completed by a local or family physician, or a recent equivalent report from a place of employment or the Armed Forces. If the equivalent report is used, the front page of the OSU Medical History and Physical Examination Record must also be completed.

Residence Classification for Purposes of Admission and Fees

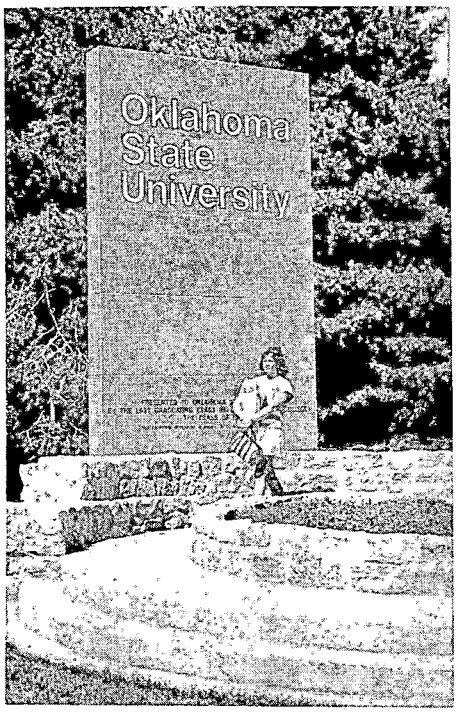
(See also "Admission-Withdrawal" section of the "Academic Regulations.")

The admission requirements to Oklahoma State University vary for residents and for nonresidents of the state; therefore, prospective students should determine their residence status before examining the admissions requirements. Although the following policy statement is not necessarily inclusive of all regulations governing the classifications of resident and nonresident students for the purpose of fee payment, it should, nevertheless be of assistance to most students in determining their residence status. Administration of the state's residency policy as it applies to Oklahoma State University students is designated to the Office of Admissions. Questions concerning interpretation of the policy should be directed to the admissions director for a ruling.

Regulations governing the residence status of students are the responsibility of the Oklahoma State Regents for Higher Education and apply to all colleges and universities of the Oklahoma State System of Higher Education.

Basic Principles Governing Residence.

1. Attendance at an educational institution is interpreted as temporary residence; therefore, a student neither gains nor loses residence status solely by such attendance.
2. A nonresident student attending an Oklahoma college or university on more than a half-time basis is presumed to be in the state primarily for educational purposes.
3. An individual is not deemed to have acquired status as a resident of Oklahoma until he or she has been in the state for at least a year primarily as a permanent resident and not merely as a student. Likewise, an individual classsified as a resident of Oklahoma shall not be reclassified as a nonresident until 12 months after having left Oklahoma to live in another state.
4. All married persons shall be treated as equal under this policy. Therefore, each spouse in a family shall establish his or her own residence status on a separate basis.
5. The burden of proof of residence status or domicile shall be upon the applicant. Students filing an appeal for reclassification of his or her residence status shall do so on forms provided or approved by the Oklahoma State Regents for Higher Education. (Some of the various types of evidence that may serve as proof of residence are year-round residence, ownership of property, registration for state general elections, an Oklahoma income tax return for the most recent calendar year, and payment of property taxes.)
6. Initial classification as a nonresident student shall not prejudice the right of a person to be reclassified thereafter for subsequent semesters or terms of enrollment as an Oklahoma resident provided proof of residence can be established.



Definition of Residence Terms.

Residents of Oklahoma: Residents of Oklahoma are those who have lived continuously in the state for at least 12 consecutive months and whose domiciles are in Oklahoma. Students' domiciles are their permanent homes—the places where they intend to remain and are expected to return. Students can have more than one residence, but only one domicile.

Independent Persons: Independent persons are those enjoying majority privileges (are legally emancipated from their parent(s) or guardian) and who are responsible for their own care, custody and support.

Dependent Persons: Dependent persons are those under the care, custody and support of their parent(s) or other legally sanctioned parental surrogates.

Full-time Students: Full-time students are those enrolled in a minimum of 12 credit hours per semester in an academic year, or a minimum of six credit hours during a summer session.

Residence Status Criteria.

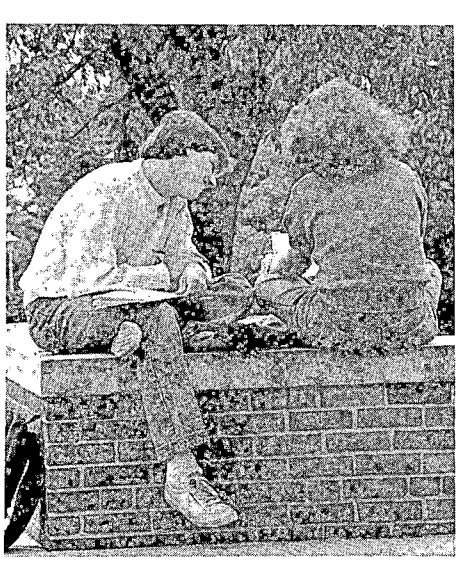
Independent Student Criteria: Students who have achieved majority privileges (are 18 years of age or older), can provide adequate proof of independence from parental or legal guardian domicile, and have come to Oklahoma with the intention of establishing domicile, may be granted residence classification at the next enrollment period after the expiration of 12 consecutive months following the establishment of domicile in Oklahoma. Spouses must establish proof of residence on a separate basis.

In addition to the aforementioned criteria, independent students seeking reclassification as residents of Oklahoma must meet the following criteria for the current and immediately preceding year:

1. The student must not have been claimed as an exemption for the state and federal tax purposes by his or her nonresident parent(s).
2. The student must prove self-support as evidenced by having provided the majority of funds for his or her own up-keep.
3. The student must have maintained a continuous residence in Oklahoma for at least 12 months.

Dependent Student Criteria: For the purpose of establishing residence status, the legal residence of dependent students is that of their parent(s) or legally-appointed guardian. Dependent students may become independent through marriage, formal court action, abandonment by parents, or positive actions demonstrating separation from the parent's domicile. Students who can provide adequate proof of complete emancipation, and have come to Oklahoma with the intention of establishing domicile may be granted residence classification at the next enrollment period after the expiration of 12 consecutive months following the establishment of domicile in Oklahoma.

International Student Criteria: Students who are not citizens of the United States may become eligible for residence status by proving their "permanent resident status" as evidenced by a valid green card. Students who have resided in Oklahoma for at least 12 consecutive months following the issuance of a green card and can provide adequate proof of residence may be eligible for classification as an Oklahoma resident.



Military Personnel: Students enrolled at Oklahoma State University while on full-time active duty in the Armed Forces are considered to be temporary residents in the state; therefore, they neither gain nor lose resident status. Members of the Armed Forces stationed in Oklahoma, their spouses, and dependent children may be admitted without payment of nonresident tuition so long as they continue to be stationed in the state in full-time military service and under military orders.

Requirements for Admission

High School Preparation

One of the goals of Oklahoma's public education system is to provide quality academic preparation for as many college-bound students as possible. In Oklahoma, each year more than 15,000 high school students make the decision to enter college.

Students with the ability to think clearly, to reason, to employ scientific method, to use language effectively, and to apply knowledge, are those who will become the masters of their destiny in tomorrow's world. These students should pursue an academically-oriented high school curriculum. Such a course of study will help develop the basic academic skills and knowledge needed for success in college. The basic skills include reading, speaking and listening, mathematics, writing, reasoning and studying. The basic high school subject areas in which these skills can be nurtured are social studies, foreign languages, the arts, English, mathematics and natural sciences.

Curriculum Requirements (Residents and Nonresidents)

All students beginning college work after July 1, 1988 must have completed the following curriculum requirements for admission:

Subjects	Years
English (grammar, composition and literature)	4
History (American history required)	2
Laboratory science	2
Mathematics (algebra I and above	3

It is also recommended that students complete at least four units (years) from the following subjects:

Computer science	Government
Economics	Psychology
Foreign language	Sociology
Geography	Speech

Oklahoma Residents

Freshman Admission. For the fall or spring semester: to be admissible, students must graduate from accredited high schools, have participated in either the American College Test (ACT) or a similar acceptable standardized test, and satisfied at least one of the following:

1. maintained a four-year high school grade-point average of 3.00 or higher on a 4.00 grading scale, or
2. ranked scholastically among the top one-half of their class; or
3. attained a composite score of 19 or higher on the ACT or a similar acceptable standardized test.

For the summer session: First-time college freshmen who do not meet the requirements listed above may begin their college enrollment during any summer session if they graduate from an accredited high school and participate in either the ACT or a similar acceptable standardized testing program. Summer admission is "probational;" however, students may be eligible to continue in the fall if they:

1. complete at least six semester hours of course work (not including activity or performance courses), and
2. earn at least a "C" or equivalent in each course.

Special Adult Admission Opportunities. Adults, 18 years of age or older, who are not high school graduates, whose high school education was interrupted before graduation may be eligible to enroll provisionally as a "special adult" student if:

1. their high school class graduated prior to the date an "Application for Admission" to Oklahoma State University is submitted, and
2. they are considered academically eligible to enroll.

Adults, 18 years of age or older, who have been out of high school for two or more years may be eligible to enroll provisionally as a "special adult" student if they meet the admission requirements for freshmen entering in the fall or spring with the exception of the criterion related to the ACT or a similar acceptable standardized test.

Students admitted as "special adult" students will be on probation for two consecutive semesters. If at the end of that period, satisfactory progress has been maintained according to the retention standards of the University, enrollment may continue as a regular student.

Concurrent Enrollment as High School Students. Senior high school students from accredited high schools may enroll at OSU provisionally as a special student if they:

1. are enrolled in less than a full-time high school load (fewer than six credit courses per semester), as attested in writing by their school principal, and
2. are eligible to complete their high school gradution requirements no later than the spring of their senior year, as attested in writing by their school principal.

Concurrently enrolled students may not enroll in a combined number of high school and college courses per semester that exceeds a full-time college load (19 semester credit hours). For purposes of calculating a work load, one high school credit course is equal to a three semester credit hour course.

High school students who are otherwise eligible to enroll under this policy, may also enroll for a maximum of nine semester hours of credit during the summer following their high school junior year, without the necessity of being concurrently enrolled in high school classes.

Admission with Advanced Standing. Many high school seniors are enrolled in accelerated courses in various fields, and others have mastered subjects in which they may wish to gain credit through examinations, such as algebra, biology, chemistry, English, foreign languages, history, physics and trigonometry. Students who wish

to apply for these examinations should write to the Office of Admissions, during the last semester of their senior year in high school, but not later than April 20. Students who participate in this testing program and who enroll at OSU will have examination papers evaluated by the department in which advanced standing is sought. If the student successfully passes the examination, college credit will be granted in the course and a grade of "P" will be recorded.

Transfer Admission. For the purpose of determining admission, a transfer student is one who has earned a minimum of six or more semester hours of college credit. Students with less than six semester hours of college credit must satisfy the criteria for first-time entering freshmen. Students may transfer to Oklahoma State University from within the state system according to the following criteria:

1. Students who would have satisfied the admission requirements for the fall or spring semester as first-time freshmen, but chose to enroll at another institution within the state, are eligible to enroll as transfer students. Students with six to 23 hours of credit must have a cumulative GPA of at least a 1.40 (on a 4.00 scale); students with 24 or more earned credits must satisfy the retention standards listed below.
2. Students who would not have satisfied the admission requirements for the fall or spring semester as first-time freshmen are eligible to enroll as transfer students after earning at least 24 semester credit hours according to the retention standards listed below.

Retention Standards. The standards pertaining to the retention of students pursuing study in undergraduate programs at OSU are:

24 to 36 semester hours	1.60
37 to 72 semester hours	1.80
73 or more semester hours	2.00

Nonresidents of Oklahoma

(All nonresidents must include a nonrefundable $10 application fee with their "Application for Admission.")



Freshman Admission. The admission requirements for students wishing to enroll at OSU from states other than Oklahoma are the same as those that apply to Oklahoma residents. (Students seeking admission must graduate from high schools accredited by the appropriate regional association or accrediting agency within their home state.) Students who do not meet the criteria for fall or spring enrollment, may be admissible through the summer probation program. (See "Oklahoma Residents Freshman Admission.")

Transfer Admission. For the purpose of determining admission, a transfer student is one who has earned a minimum of six semester hours of college credit. Students with less than six semester hours of credit must satisfy the criteria for first-time entering freshmen. Students may transfer to Oklahoma State University from outside the state according to the following criteria:

1. Transfer students seeking admission to OSU from colleges or universities accredited by the North Central Association or other regional associations will be given full recognition of their credits earned providing: (a)they are in good standing at the institution from which they are transferring, and (b) they have a cumulative grade-point average of 2.00 or higher (on a 4.00 scale) for all work attempted.
2. Transfer students seeking admission to OSU from colleges or universities not accredited by a regional association may be given full recognition for their credits earned when the credit is appropriate to the students' degree programs and after OSU has validated the courses. Applicants must meet the conditions of (1-a) and (1-b) above, as well as demonstrate satisfactory progress (a 2.00 cumulative GPA on a 4.00 scale) during their initial term of enrollment.

Alternative Admission Programs

Special Talent Waivers. As authorized by the Oklahoma State System of Higher Education, a number of first-time freshman students, not to exceed five percent of the class, may enroll, beginning with the fall semester, by meeting the following:

1. The applicants must meet all criteria contained in the regular institutional admissions policy with the exception of the prescribed academic criteria, and
2. The individual must demonstrate talent or ability in an area such as art, drama, music, etc., or
3. Be educationally or economically handicapped and show promise of being able to succeed in the program or curriculum in which enrolled.

Opportunity Admission Program. Students who have not graduated from high school but whose composite score on the ACT places them in the 99th percentile, or whose combined verbal and mathematics scores on the SAT places them at the 99th percentile, may apply for full admission. Admissibility will depend on test scores, evaluation of maturity level, and whether the experience will be in the best interest of the student.

Pre-engineering (Transfer—Nonresident of Oklahoma). Engineering is a competitive program; therefore, enrollment preference is given to Oklahoma residents. In addition to the above requirements, a nonresident of Oklahoma applying for admission to pre-engineering must meet requirements determined by the College of Engineering. These requirements may exceed those required for residents of Oklahoma. (See "College of Engineering, Architecture and Technology.")

English Proficiency Requirement. All new applicants to OSU for undergraduate study for whom English is a second language shall be required to present a score of 500 or above on the Test of English as a Foreign Language (TOEFL), regardless of the number of semesters or terms completed in other institutions.

Readmission. A nonresident or an Oklahoma resident who has attended OSU but did not attend OSU the immediate past semester must file an "Application for Readmission." A student who has attended another college or university since last attending OSU must file a transcript of all work attempted after leaving OSU. If the student's grade-point average is above "C" and his or her disciplinary record is satisfactory, he or she will be admitted to OSU.

International Admission

Application Procedure. For purposes of admission, an international student is defined as "a student who is, or will be, in the United States on a non-immigrant student visa." This specifically refers to the Student (F) and Exchange Visitor (J) visas. All international students are considered nonresident students. The University will process the International Student Application and Financial Guarantee form for undergraduate admission (freshman and transfer) only after all the following items have been submitted:

1. "Application for Admission" and a fee of U.S. $10.00 made payable to OSU.
2. One official or certified true copy of each academic record with a certified English translation. Students enrolled at U.S. institutions may have certified true copies of their foreign records sent by their current institution. Academic records may comprise one or more of the following:
   a. Yearly secondary school records
   b. Year-by-year records from each college or university attended
   c. National examination results
   d. The international student transferring from another U.S. institution with less than 24 semester credit hours needs to send both the certified true copies of his or her secondary records and official transcripts from his or her current institution in the United States.
   e. The international student transferring from another U.S. institution with more than 24 semester credit hours in the U.S. need only to have his or her official transcripts from each college or university attended forwarded directly to the Office of Admissions.
3. An official Test of English as a Foreign Language (TOEFL) score of 500 or above on the examination taken within the last two years.
4. Documented evidence of financial support. *The University has no financial aid available for international students.*
5. An international student with F visa status transferring from another U.S. institution will have his or her I-20 processed for transfer by the Office of International Student Services at OSU. The student with J Visa status should contact his or her foreign student adviser at his or her current institution and also the international student admissions counselor at the Office of Admissions at Oklahoma State University prior to making his or her transfer.

The U.S. Immigration and Naturalization Service (INS) rarely allows international students to work during the course of their studies



in the United States. *Thus, international students should not expect to support themselves through employment while attending the University.*

Freshman Admission (International Students). (See "Application Procedure" above.)

Transfer Admission (International Students). An international student is considered a transfer student under the following criteria:

1. A student who has attended a post-secondary institution in his or her own country or another international country; or
2. A student who has earned a minimum of six semester hours of college credit in any U.S. institution.

If the international student falls under criteria (1), his or her admission will be based on the work completed in his or her institution abroad only. If the international student falls under criteria (2), he or she is subject to the following requirements:

a. Meet the requirements for "Nonresidents of Oklahoma—Transfer Admission," elsewhere in this *Catalog*. The international student is eligible for academic admissibility under this criteria only if he or she were admissible as a first-time freshman based on his or her academic credentials from abroad.

b. The international student who would not have been eligible for academic admission as a first-time freshman based on his or her academic credentials from abroad, will be eligible for academic admission after earning at least 24 semester credit hours at another U.S. institution and then meeting the criteria stated for "Nonresidents of Oklahoma—Transfer Admission," elsewhere in this *Catalog*.

Engineering Program Admission (International Students). The international student intending to transfer from a U.S. institution into the engineering program at OSU must meet one of the following requirements:

1. A student with 24 or more semester credit hours will be eligible for academic admission into the engineering program if he or she has an overall 2.70 GPA on a 4.00 scale, and has a 2.50 overall GPA in engineering related courses from his or her current institution, and has a 2.00 over the immediate past semester before transferring; or
2. A student with fewer than 24 semester credit hours will be eligible for academic admission into the engineering program only if he or she is both academically admissible by virtue of his or her academic records from abroad and has a 2.70 overall GPA on a 4.00 scale, as well as an overall 2.50 in engineering related courses from his or her current institution in the United States and a 2.00 over the immediate past semester before transferring; or
3. A student with less than 24 semester credit hours who would not be admissible by virtue of his or her secondary or tertiary academic records from abroad may apply for academic admissibility into the engineering program after earning at least 24 semester credit hours at another U.S. institution and having an overall of 2.70 GPA on a 4.00 scale as well as having a 2.50 overall GPA in engineering related courses from that institution in the United States, and a 2.00 over the immediate past semester before transferring.

Transferring From Another U.S. Institution (International Students). The Immigration and Naturalization Service (INS) must be notified when an international student transfers from one U.S. institution to another. With recent changes in INS regulations, a transferring international student must process the transfer with the institution to which the student is transferring, not with the previous institution. However, if a student is out of status with INS, that student must reinstate him or herself with INS before being allowed to enroll at OSU. Questions regarding a student's immediate immigration status must be directed to the foreign student adviser.

It is entirely the student's responsibility to obtain the correct visa and to maintain the imigration status while in the United States. Refer to the conditions of the visa on the Form I-20 or on the Form IAP 66 before signing it.

Oklahoma State University has no financial assistance available for international students. INS requires that international students file a statement with the University which shows adequate financial support for their education. *OSU has its own financial guarantee form that international students need to complete as a requirement toward admission into OSU.*

Students should not plan on financing their education with employment. International students holding F-1 or J-1 visas are seldom permitted to work while they are students in the U.S. After international students have been enrolled for a semester, and if they have acceptable grades, then they are eligible to apply for part-time work at the University.

Even though eligible, many students are unable to find a job on the campus and so do not work. Students holding F-1 or J-1 visas are almost never permitted by INS to work outside of the University campus, and can be deported from the United States if they are found to be in violation of this regulation. *It is the responsibility of each international student to understand the INS regulations and to abide by them.*



Enrollment and Records

Robin H. Lacy, ***Registrar and Director of Admissions***
Glen K. Jones, ***Associate Registrar***
Darlene Wilson, ***Administrative Associate***
Joan M. Payne, ***Coordinator, Certification Services***
Vera M. Bilyeu, ***Coordinator, Enrollment Services***
Shirilyn Dehls, ***Coordinator, Student Records***
Linda J. Bentley, ***Coordinator, Publications***
Carl E. Jordan, ***Coordinator, Student Data***

Student Enrollment

Enrollment is the process whereby students are counseled by academic advisers regarding course selection and placement, and the subsequent scheduling of those courses. A student must be admitted to the University prior to the enrollment process (see "Entering the University").

First-time Students (Freshmen and Transfer)

An advance fee payment is required prior to participation in the enrollment process. The fall enrollment and orientation period for new freshmen takes place during the summer months. New students receive information about these programs after being admitted to the University. Enrollment and orientation activities include career counseling, academic advising and course selection, and an introduction to campus facilities and services. During the program, students meet with academic advisers who are available to assist in the planning of academic programs and the exploration of interest areas. Parents are encouraged to participate in these programs.

ALPHA Program

ALPHA is a voluntary program designed for all students new to Oklahoma State University. It is a combined effort of many units of the University and the local community to provide a sense of security and well being for new students. ALPHA allows new students to move into their housing units two days ahead of the upperclassmen, to become aware of the services, resources, and people available to them, and to foster peer friendship, development, and support. ALPHA usually begins four days before classes start in August. Specific information is mailed during the summer months to all new students who have applied for admission—freshmen and transfer students.

Continuing Students

Students currently enrolled at OSU may enroll for the subsequent semester during specified periods of the current semester. Prior to the specific enrollment periods, students and academic advisers consult regarding course selections. The "Trial Study" form is then completed and signed by the adviser. Alternate and substitute courses are to be listed on the form where applicable. An overdue account with the University will prevent completion of the enrollment process.

Priority Enrollment. Priority enrollment addresses the needs of students in relation to graduation proximity, with priority based on number of hours earned. Physically handicapped students are extended the option of priority enrollment. Those students currently in an OSU college honors program are extended the option of priority enrollment. Current OSU students who accept University scholarships which require that the student perform a service for the University at a regular time specified by the University, will be given priority enrolling. Working part-time for the University or outside the University does not qualify the student for priority enrollment.

Late Enrollment

A student is permitted to enroll during the first week of a semester or a summer session or on the first day of a summer short course. A student enrolling during the first week of a semester or summer session will pay a late enrollment fee. The late enrollment fee will not be charged on or prior to the first day of a summer short course.

Identification Cards

As part of the enrollment process, each new student is issued a photo identification card. This card, along with the current fee receipt, establishes the student's identify as an OSU student and authorizes access to certain University facilities. Continuing students will have their I.D. cards validated during the enrollment process. Lost or stolen identification cards will be replaced at a nominal fee with proper photo identification from the student.

Change of Schedule

Adding Courses. Approval of the student's adviser is required for adding a course. The first day of the second week of classes of a regular semester or summer session is the last day a course may be added. A short course may be added no later than the first day of the short course.

Dropping Courses. Courses may not be dropped without the approval of the student's academic adviser.

At any time prior to the end of the first week of a regular semester or summer session, or during the proportionate period for block or short courses, a student may drop a course, and no record of the course will appear on the student's academic record.

After the first week but prior to the end of the sixth week of a regular semester or the third week of a summer session, or proportionate periods for block or short courses, a student may drop a course and receive the grade of "W" (dropped).

After the sixth week of a regular semester or the third week of a summer session but prior to the end of the 10th week of a regular semester or the fifth week of a summer session, a student may drop a course with the grade of "WP" (dropped passing) or "WF" (dropped failing) as assigned by the instructor. The grade of "WF" will be calculated in the grade-point average.

After the 10th week of a regular semester, or the fifth week of a summer session, or proportionate periods for block or short courses, a student may not drop a course and shall be assigned only the grade of "A," "B," "C," "D" or "F," or, when appropriate "I," "NP," "P" or "R" by the instructor at the end of the semester. (Exceptions to this policy may be allowed by petition due to extraordinary circumstances. A petition requires the signatures of the student's instructor, adviser and dean with the grade of "WP" or "WF" assigned by the instructor.)

A student may not drop any course in which a formal charge of academic dishonesty is pending against the student. If the student is absolved of the formal charge, he or she may drop the course with a grade of "WP" (dropped passing) appearing on the academic record. If the student is found guilty, the instructor may take appropriate disciplinary action, including assigning the grade "F" for the assignment or the course.

Withdrawing from the University

The withdrawal process is initiated in the student's dean's office. The student should appear in person, request an official withdrawal, and hand carry the form to the appropriate offices to complete the process. If the student is unable to appear in person, the request for withdrawal may be initiated through the mail or by phone to the student's dean's office. A student who withdraws prior to the end of the sixth week of a regular semester or the third week of a summer session will receive a grade of "W" (withdrawn). A student who withdraws after the sixth week of a regular semester or the third week of a summer session but prior to "Pre-finals Week," will receive a grade of "WP" (withdrawn passing) or "WF" (withdrawn failing) as assigned by the instructor of each course. The grade of "WF" will be calculated in the grade-point average.

After the beginning of "Pre-finals Week" a student may not withdraw from the University and shall be assigned only the grade of "A," "B," "C," "D," or "F" or (when appropriate) "I," "NP," "P," or "R" by the instructor of each course at the end of the semester or summer session.

Vehicle Registration and Parking Regulations

Any vehicle driven in the City of Stillwater or on the campus of the University by an OSU student should be currently registered with the OSU Police Department. When a vehicle is registered, the student will be given an OSU vehicle registration decal at no cost. The decal is solely for the purpose of registration and does not afford the student on-campus parking privileges.

Each student is allowed one paid parking permit. The parking permit fee is charged to a student's OSU account. In order to obtain a parking permit, the following items should be presented to the OSU Police Department: a copy of the vehicle registration, a completed "Vehicle Registration" card, student I.D., and, if living in a residence hall, a "Residence Hall Vehicle Registration" form.

Parking permits for motorcycles, motor-propelled bicycles and scooters may be purchased, and such permit holders will be provided special parking areas.

Bicycle registration may be obtained without charge, an advantage in the event the bicycle is stolen or lost. When bicycles are recovered by the OSU Police Department, they are checked against bicycle serial numbers maintained in the registration files for return to the rightful owners.

(A copy of the OSU Parking and Traffic Regulations booklet is available from the Parking Office, 104 USDA Building, located at Orchard Street and Farm Road.)

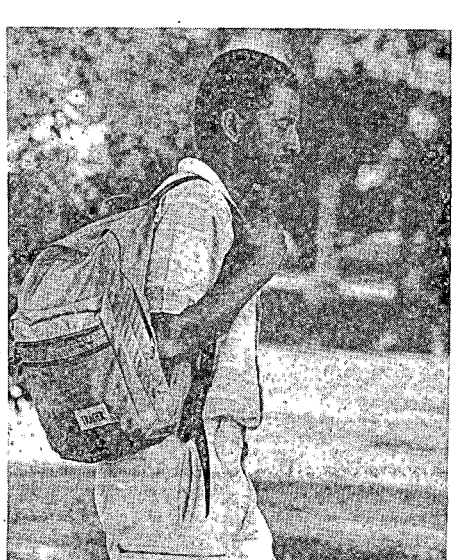
Faculty and Staff Enrollment in University Courses

The advance fee payment is waived for permanent full-time employees. These employees may audit courses after securing an audit form for a fee of one-half the general fee. Any individual 65 years or older may obtain an audit form at no charge.

Faculty. Permanent (tenure track), full-time (100%) members of the faculty may enroll for credit in one course per semester or a maximum of five hours during normally scheduled working hours and pay one-half the general and activity fees in effect at that time. Exceptions may be permitted only with approvals of the department head, dean and appropriate vice president. If enrollment does not exceed one course, only the department head's approval is needed to receive a fee waiver. If the employee is enrolled in more than one course, the employee's dean and vice president must also give approval for a fee waiver. For more information, refer to the Policy and Procedures Letters.

Administrative/Professional and Classified Staff. Permanent, full-time (100%) active status staff members who meet the academic requirements of the University may enroll for credit and pay one-half the general and activity fees in effect at that time. Enrollment in University courses which meet during the staff member's normal working hours will be limited to one course or a maximum of five hours. There is no limit on the number of courses a staff member may enroll in after normal working hours. If enrollment does not exceed one course, only the department head's approval is needed to receive a fee waiver. If the staff member is enrolled in more than one course, his or her dean and vice president must also give approval for a fee waiver. For more information, refer to the Policy and Procedures Letters.

Early enrollment. Full-time employees of the University who have approval for enrollment may turn in their Trial Study forms to the Office of the Registrar any time after the class schedule book is available. An effort will be made to schedule classes of full-time employees to minimize conflict with their University employment.



Official Records

Freshmen Progress Reports

The faculty will report grades for all freshmen on the dates as printed in the official University calendar. The dates will normally be prior to mid-semester. Progress reports are made available to freshman students shortly afterward. Copies are made available to the students' advisers and the students' deans.

Grade Reports

Reports of the grades of all students are compiled and released shortly after the end of each semester by the Office of the Registrar. These reports are made available to the students, the students' advisers and the students' deans.

Official Transcripts

All official transcripts of students' academic records at OSU are prepared and released by the Office of the Registrar. The official transcript includes the academic record, both undergraduate and graduate. It contains the signature of a University official and the official, imprinted seal of the University. Primary usage of the official transcript is for application for transfer to other academic institutions and for employment purposes.

Transcripts of academic records at the University may be ordered in person or by mail from the Office of the Registrar, Transcripts Section, Whitehurst 103, Oklahoma State University, Stillwater, Oklahoma 74078-0102. Official transcripts will not be available until approximately three weeks after final examinations. Requests should include the following:

1. Student's full name (include maiden or other name if applicable).
2. Student I.D. number.
3. Birthdate.
4. The last semester the student attended.
5. Whether the current semester grades are to be included when a transcript is ordered near the end of a semester.
6. Full names of the recipients of the transcripts, whether they are agencies, colleges, or individuals. Complete mailing addresses should also be included.
7. Student's signature. (This is the student's authorization to release the records to the designee.)

A student having delinquent financial obligations to the University will not be granted a transcript.

Copies of transcripts from other institutions cannot be furnished.

Students' Rights to Privacy

The Family Educational Rights and Privacy Act of 1974 (Buckley Amendment) was designed to protect the privacy of educational records, to establish the right of students to inspect and review their educational records in all offices, and to provide guidelines for the correction of inaccurate or misleading data through informal and formal hearings.

An OSU student has the right to:

1. Inspect and review information contained in his or her educational records.
2. Challenge the contents of the educational record.
3. Have a hearing if the outcome of a challenge is unsatisfactory.
4. Submit an explanatory statement for inclusion in the educational record, if the outcome of the hearing is unsatisfactory.
5. Secure a copy of the institutional policy, which includes the location of all educational records.
6. Prevent disclosure, with certain exceptions, of personally identifiable information from the educational record.

Withholding Disclosure of Information. Currently enrolled students may withhold disclosure of directory information. During the first two weeks of the fall semester a student may file with the Office of the Registrar a written request not to release directory information. The University assumes that failure on the part of any student to specifically request the withholding of directory information indicates individual approval for disclosure.

Access to Records. No other information regarding students' educational records may be disclosed to anyone without written consent of students, except to "school officials" who have a "legitimate educational interest" in the student.

Students, or parents of dependent students, may inspect and review their educational records. Some form of photo identification must be displayed before access to educational records will be allowed. Parents of a dependent student may challenge denial of access by producing the most current copy of Internal Revenue Form 1040.

Definitions. "Educational Record" refers to those records which are directly related to a student and are maintained by an educational institution.

"Directory Information" includes: student's name, local and permanent address; telephone number; date and place of birth; major field of study; weight and height of student participating in officially recognized sports; dates and attendance at Oklahoma State University; degrees, honors, and awards granted or received; academic classification such as freshman, sophomore, junior, senior, etc.; sex; class schedule; educational institutions previously attended; degree(s) held, date(s) granted, and institution(s) granting such degree(s); dissertation or thesis title; adviser or thesis adviser; participation in officially recognized organizations, activities, and sports; parents' names and addresses.

"School official" is defined as an individual currently serving as a member of the Oklahoma State University Board of Regents or classified as faculty, administrative, or professional, and the staff such school officials supervise. "Legitimate educational interest" is defined as an interest which results from the duties officially assigned to a school official and which are related to such a school official's responsibility for facilitating the student's development.

Costs

Fees and Tuition

It is extremely important that students carefully consider the total financing of their education, from the entering term to the completion of the degree. If financial help will be needed beyond those funds which the student or the family is able to provide, the student should make the necessary applications for financial assistance well in advance of enrollment. Students should pay particular atten-

tion to early deadlines for application for grants, scholarships, work-study, and Perkins Loans. While the needs and resources of each student differ, the University can provide a general list of fees and expenses normally encountered. *Students should note that fees are subject to change without notice. The figures which follow are for the 1989-90 academic year.*

Students are given information at the time they complete their enrollment on the procedures and deadlines for payment of tuition and fees. (See "Financial Obligations" elsewhere in this *Catalog.*)

The required fees and nonresident tuition for Oklahoma State University are listed below. General fees and nonresident tuition are based on level of course. All course offerings are listed by four-digit numbers with the first digit indicating level of course. Lower-division courses are all courses with the first digit 0 through 2. Upper-division courses are all courses with the first digit 3 or 4. Graduate-division courses are all courses with the first digit 5 or above.

Oklahoma Residents

Lower-division courses

$	41.30	General fee
	2.15	Required student activity fee
	3.60	Required facility fee
$	47.05	Total per credit hour
$	36.00	Required Student Health Center fee per semester*

Upper-division courses

$	44.30	General fee
	2.15	Required student activity fee
	3.60	Required facility fee
$	50.05	Total per credit hour
$	36.00	Required Student Health Center fee per semester*

Graduate-division courses

$	58.20	General fee
	2.15	Required student activity fee
	3.60	Required facility fee
$	63.95	Total per credit hour
$	36.00	Required Student Health Center fee per semester*



Nonresidents of Oklahoma

Lower-division courses

$	41.30	General fee
	2.15	Required student activity fee
	3.60	Required facility fee
	91.70	Nonresident tuition
$	138.75	Total per credit hour
$	36.00	Required Student Health Center fee per semester*

Upper-division courses

$	44.30	General fee
	2.15	Required student activity fee
	3.60	Required facility fee
	105.40	Nonresident tuition
$	155.45	Total per credit hour
$	36.00	Required Student Health Center fee per semester*

Graduate-division courses

$	58.20	General fee
	2.15	Required student activity fee
	3.60	Required facility fee
	128.90	Nonresident tuition
$	192.85	Total per credit hour
$	36.00	Required Student Health Center fee per semester*

College of Veterinary Medicine

Oklahoma Residents

$1,770.00		General fee per semester
$	2.15	Required student activity fee per credit hour
$	3.60	Required facility fee per credit hour
$	36.00	Required Student Health Center fee per semester*

Nonresidents of Oklahoma

$1,770.00		General fee per semester
$	2.15	Required student activity fee per credit hour
$	3.60	Required facility fee per credit hour
$3,310.00		Nonresident tuition per semester
$	36.00	Required Student Health Center fee per semester*

*Students enrolled in six hours or less pay only $5.00.

Fees for Facilities and Special Services

Students regularly enrolled in the University are assessed facility fees which entitle them to use the Student Union, and the Colvin Physical Education Center and the use of the Student Health Center. Certain groups of students in special courses may be on campus for very short time intervals or may be required by the University to reside off-campus for the entire semester. Such students will not use the facilities and will not be charged facility fees when enrolled (a) only in a specialized course(s) offered for a special-interest group and not in any other course(s) in the University or (b) in a course(s) which requires that the student reside off the campus for the entire semester or summer session (medical technology, geology and forestry summer camps). Such courses typically are offered at unusual times and presented in a concentrated curriculum format.

Special Class Charges

In certain courses, special services, supplies or equipment may be used. Costs for these are not normally covered by fees, tuition or departmental operating budgets, and, therefore, the cost is incurred by the student. Special charges are listed in each semester's class schedule book.

Special Fees

Advanced standing examination fee
- Locally developed $5.00 per credit hour.
- Nationally developed national agency rate

Application fee for nonresident students $10.00

Audit without credit same as Oklahoma residents general fee

Automobile parking permit:
- Campus residents $25.00 per year
- Off-campus residents $35.00 per year

Correspondence course fees*:
- High school courses $55.00 per credit (1/2 unit)
- College courses $40.00 per semester hour
- *Out-of-state: $75 per SCH (or per 1/2 unit) in addition to the fees listed above.

Extension course fees*:
- Undergraduate courses $55.00 per semester hour
- Graduate courses $59.00 per semester hour
- Off-campus at military bases:
- Undergraduate $50.00 per semester hour
- Graduate $62.50 per semester hour
- *Out-of-state: $75.00 per SCH in addition to the fees listed above.

Graduation fees:
- Bachelor's degree $10.00
- Master's degree $15.00
- Doctor of Veterinary Medicine degree $12.50
- Specialist in Education, Doctor of Philosophy, Doctor of Education degrees $20.00
- Thesis binding fee $6.00 each
- Dissertation microfilming fee $35.00 each

International student status maintenance fee:
- $15.00 per semester
- $10.00 per summer session

Irregular examination fee $1.00

Late enrollment fee $5.00 first day, $10.00 maximum

Music fees:
- Beginning class lessons in music $7.50 per semester hour
- Group lessons in music $15.00 per semester hour
- Individual lessons in music $15.00 per semester hour
- Organ practice $7.50 per semester hour
- Maximum charge per semester for music instruction $60.00

Transcript (per copy after first one) $1.00

Other Expenses

Books and supplies used by the student are available in the University Bookstore at reasonable prices. Additional incidental and personal expenses such as clothing and entertainment will depend upon the individual student.

International Students. It is the long-established practice of Oklahoma State University to charge a special administrative/management/programming fee for international students who need extra



assistance and/or whose sponsors have indicated a requirement or desire for supplementary assistance. This assistance is beyond the content of the regular academic program of the University established for domestic students. The amount of the fees will be based on the level of professional assistance needed. It is the established practice of the University to charge appropriate amounts for such items as special training, research costs, enrichment, necessary travel and transportation, and other costs as may be required to provide a complete and appropriate program of education for international students.

Fee Policy for Faculty and Staff

The advance fee payment, the facility fee and the student health center fee are waived for permanent, full-time faculty and staff. These employees are eligible to enroll in or audit courses and be charged fees at the rate of one-half the amount charged other students under the University fee waiver policy (one-half the general fee, for auditing only, and one-half the activity fee). To be eligible under this fee policy, an employee-student must submit a completed Request for Faculty-Staff Fee Waiver form to the Office of the Registrar prior to the beginning of classes. If the form is not on file prior to the beginning of classes, the student will not be granted the waiver in fees.

Any individual 65 years or older may obtain an audit form at no charge.

Fee Policy for Graduate Assistants

The University will waive the nonresident tuition for graduate assistants employed at least one-fourth time in instruction, research or extension. Such waiver will include the summer term immediately following employment as a graduate assistant for the spring semester, even though the student is not employed for that summer term.

Refunds

Refunds and deposits that may be due a student will be first applied to encumbrances owed to the University.

Withdrawal and Drop Fee Policy

A student withdrawing from the University or dropping a course prior to completion of the semester or summer session will pay a percentage of the total fees in order to cover administrative and/or instructional expenses. The percentage of fees to be refunded:

Prior to the first week of classes of a semester or summer session—
100 percent

During the first week of classes of a semester or summer session—
100 percent if course dropped
80 percent if withdrawing from the University

During the second week of classes of a semester—
80 percent

During the third or fourth week of classes of a semester or the second week of a summer session—
50 percent

During the fifth or sixth week of classes of a semester or the third week of a summer session—
25 percent

After the sixth week of classes of a semester or the third week of a summer session—
0 percent

Fee Refund Policy for Students Entering Military Service

If a student enters military service during the term in which he or she is enrolled and has not completed sufficient work for receiving grades, but is in good standing academically, the University will waive enrollment fees for the student during the term in which he or she re-enrolls after military service has been completed. The amount of the fee waiver is equal to the amount of fees paid for the semester during which withdrawal occurred. If the University finds that it is not feasible to waive the enrollment fees, it will make a refund to the student of the full amount of fees paid.

If a student enters military service during the term and is not in good academic standing at the time, the regular fee refund policy of the University applies.

Residence Hall Rates

All rates are approved by the OSU Board of Regents and are subject to change. The rates listed below are effective for the academic year 1989-90.

Residence Halls

Men's Halls	Women's Halls
East Bennett	West Bennett
Kerr	Drummond
Parker	Scott
Stout	Stout
Wentz	Wentz
Willham South	Willham North
Iba	Iba

East and West Bennett Residence Halls
(Rates include a telephone instrument and local phone service in each room.)

Room Type/Meal Plan	Semester Charge
Double Room/5 Meal Plan	$1,001.00
Double Room/10 Meal Plan	$1,232.00
Double Room/15 Meal Plan	$1,261.00
Double Room/20 Meal Plan	$1,292.00
Double Room/No Food Service	$620.00

Kerr-Drummond and Scott-Parker Residence Halls
(Air conditioned. Rates include a telephone instrument and local phone service in each room.)

Room Type/Meal Plan	Semester Charge
Double Room/5 Meal Plan	$1,081.00
Double Room/10 Meal Plan	$1,312.00
Double Room/15 Meal Plan	$1,341.00
Double Room/20 Meal Plan	$1,372.00
Double Room/No Food Service	$700.00

Stout Residence Hall
(Stout is open only to students who are sophomores and above. Rates include a telephone instrument and local phone service in each room.)

Room Type/Meal Plan	Semester Charge
Double Room/5 Meal Plan	$954.00
Double Room/10 Meal Plan	$1,185.00
Double Room/15 Meal Plan	$1,214.00
Double Room/20 Meal Plan	$1,245.00
Double Room/No Food Service	$573.00

Wentz*, Willham North and South Residence Halls
(Air conditioned. Rates include a telephone instrument and local phone service in each room. Cable TV is provided in individual rooms.)

Room Type/Meal Plan	Semester Charge
Double Room/5 Meal Plan	$1,101.00
Double Room/10 Meal Plan	$1,332.00
Double Room/15 Meal Plan	$1,361.00
Double Room/20 Meal Plan	$1,392.00
Double Room/No Food Service	$720.00

*Wentz is open only to students who are sophomores and above.

Iba Residence Hall
(Air conditioned. Iba is open only to graduate students and those over 21 years of age. These rates cover charges for the academic year in Iba, from one week prior to the beginning of classes in August through one week after commencement in May, including all break periods. There is an additional charge for the period May through August. Rates include a telephone instrument and local phone service in each room.)

Room Type/Meal Plan	Semester Charge
Double Room/5 Meal Plan	$1,138.00
Double Room/10 Meal Plan	$1,369.00
Double Room/15 Meal Plan	$1,398.00
Double Room/20 Meal Plan	$1,429.00
Double Room/No Food Service	$757.00

Bennett Apartments

(Air conditioned. Rates include a telephone instrument and local telephone service in each room. Cable TV is provided in additional rooms.)

Room Type/Meal Plan	Semester Charge
4/Apartment/5 Meal Plan	$1,203.00
4/Apartment/10 Meal Plan	$1,434.00
4/Apartment/15 Meal Plan	$1,463.00
4/Apartment/20 Meal Plan	$1,494.00
4/Apartment/No Food Service	$822.00

3/Apartment/5 Meal Plan	$1,229.00
3/Apartment/10 Meal Plan	$1,460.00
3/Apartment/15 Meal Plan	$1,489.00
3/Apartment/20 Meal Plan	$1,520.00
3/Apartment/No Food Service	$848.00
2/Apartment/5 Meal Plan	$1,653.00
2/Apartment/10 Meal Plan	$1,884.00
2/Apartment/15 Meal Plan	$1,913.00
2/Apartment/20 Meal Plan	$1,944.00
2/Apartment/No Food Service	$1,272.00

University Apartments

(Rates include a telephone instrument and local phone service in each apartment. There is an additional $6.25 per month charge for cable service.)

The University operates apartments designed to house married, single parent, and a limited number of single graduate and upperclass students.

	Monthly Charge
Graduate Apartments (central AC)	
Unfurnished	$363.00
Furnished	$378.00
Brumley Apartments (window AC)	
Unfurnished	$304.00
Furnished	$319.00
Dwellings Similar to Graduate Apartments	
Unfurnished	$292.00
Furnished	$307.00

(Air conditioning can be provided by the University for an additional monthly charge during the months the air conditioner is in use.)

Single-story and two-story dwellings	
Unfurnished	$292.00
Furnished	$307.00

(Basic differences are the age of the apartments, color scheme, lighting and furniture. Air conditioning can be provided by the University for an additional monthly charge during the months the air conditioner is in use.)

Estimated Total Expenses for Students

An estimated budget (based on 1989-90 figures) for an undergraduate student at OSU is as follows:

Resident	
Tuition and Fees (Based on 14 credit hours)	$ 715.00
University Housing (Based on average, double occupancy, residence hall charges)	1,327.00
Textbooks and Supplies	203.00
Ave. Misc. Personal Expenses	1,063.00
Total Per Semester	$3,308.00
Nonresident	
Tuition and Fees (Based on 14 credit hours)	$2,094.00
University Housing (Based on average, double occupancy, residence hall charges)	1,327.00
Textbooks and Supplies	203.00
Ave. Misc. Personal Expenses	1,063.00
Total Per Semester	$4,687.00

Financial Obligation

Enrollment at Oklahoma State University incurs certain obligations and commitments on the part of an individual student, one of which is the student's responsibility to pay all financial accounts owed to the University in a timely manner. In order to remain in good financial standing with the University and thereby continue to participate in its educational programs, services and benefits, a student must meet all financial obligations incurred at the University on or before the due dates described.

All students are required to pay an advance fee payment toward their estimated fees at the time of enrollment. This advance payment will be credited to the student's account and applied to outstanding charges during the last semester of attendance. A student may request a refund of the advance payment at any time in which it is not required to hold an enrollment and there are no outstanding charges against the account.

Fees and tuition will appear on the regular monthly statement which is mailed to the student's local address.

All fees (required and optional) and tuition associated with the student's enrollment shall be due in the Office of the Bursar no later than 5:00 p.m. on the 15th day of each month following billing. All delinquent accounts in excess of $40 will accrue an interest penalty at the rate of one and one-half percent monthly.

Accounts must be cleared before the student can obtain the release of any records, secure a transcript, receive a diploma, or enroll at Oklahoma State University for subsequent semesters.

Financial Aid

Charles W. Bruce, *Director*
Patrick Kennedy, *Assistant Director, Administrative Services*
Gary Garoffolo, *Assistant Director, Programs*
Linda K. Good, *Coordinator, College Work Study Programs*
B.B Butler, *Coordinator, Records*
Cheryl Gebhart, *Coordinator, Reports*
Bonnie Joerschke, *Senior Counselor*
Gary Davidson, *Counselor*
Judith Finnegan, *Counselor*
Cathy Gose, *Counselor*
Kathy Greenlee, *Counselor*
Diane Van Fleet, *Interim Manager, Financial Aid Data Systems*

Students who need financial assistance to attend college are encouraged to consider the many types of financial aid available through the OSU Office of Student Financial Aid. These programs include scholarships, grants, loans, and part-time jobs.

Financial aid at OSU is awarded on the basis of demonstrated financial need. Each student who wishes to be considered for need-based assistance should complete the American College Testing Service Family Financial Statement (ACT-FFS) and submit it to the processing center in Iowa City, Iowa as soon after January 1 as possible to receive aid for the succeeding academic year. ACT-FFS packets are available at the Office of Student Financial Aid as well as at most colleges and high schools. Early application is encouraged due to the high demand for money available. An analysis of the ACT-FFS is used to determine demonstrated need for federal, state, and institutional programs such as Pell Grants; Supplemental Educational Opportunity Grants (SEOG), Oklahoma Tuition Aid Grants (OTAG), Perkins Loans (formerly NDSL), Stafford Loans (formerly GSL), College Work-Study (CWS), and Fee Waiver Scholarships.

There are also programs available for students who do not demonstrate financial need. A number of fee waiver scholarships are awarded solely on the basis of academic achievement, for which standardized test scores and high school and college grade-point averages are used as awarding criteria. Wentz Service Scholarships provide students with jobs designed to develop skills beneficial to future employment while working in a University office. These scholarships are awarded through each of the seven colleges at OSU as well as a number of administrative offices on campus. The Parent Loan for Undergraduate Students (PLUS) Program and Supplemental Loans for Students (SLS) allow graduate students and independent undergraduates, as well as parents of dependent undergraduates, to borrow through participating lenders. Fund advances (formerly short-term loans) are also available to students who experience short-term cash flow problems.

To be considered for financial aid, a student must:

1. Be a U.S. citizen or a permanent resident of the United States. Those who are not citizens or permanent residents are not eligible for federal or state assistance.
2. Be enrolled at least half-time as a degree or certificate-seeking candidate. Half-time status is defined as taking at least six credit hours as an undergraduate or four credit hours as a graduate student.
3. Not be in default on a Stafford, PLUS/SLS, or Perkins Loan.
4. Not owe a repayment to the Pell Grant, SEOG, or OTAG program.
5. Meet minimum satisfactory academic progress standards.

Students and parents are invited to contact the Office of Student Financial Aid for information regarding financial aid programs or to make an appointment with a financial aid counselor to discuss specific eligibility requirements.



Student Loans

OSU has several loan funds for students who need financial assistance. These funds are available to students who meet the eligibility requirements of the various programs and are making satisfactory progress in their college work.

Institutional loans include short- and long-term loans. The Funds Advance program provides up to a maximum of $200 per semester (less a $4.00 service charge) for the purpose of meeting educationally-related expenses which are not charged to a student's University account. Students are billed for the Funds Advance through the Office of the Bursar on the billing statement of the month in which they apply. Applications, however, must be made in person at the Office of Student Financial Aid.

Long-term loan programs consist of the Perkins Loan, Stafford Loan, and Parent Loan and Supplemental Loan programs. The rate of interest on a Perkins Loan during the period of repayment is five percent simple interest per annum on the unpaid balance. The rate of interest on the Stafford Loan is eight percent for first-time borrowers. The rate of interest on a Parent Loan or Supplemental Loan is variable but cannot exceed 12%. Both loans require additional applications which are available at lending institutions or the OSU Office of Student Financial Aid.

Scholarships

Approximately 1,900 undergraduates and graduate students receive fee waiver scholarships each year. Approximately 100 students receive Wentz Service Scholarhips and numerous other scholarships are awarded through the various departments and colleges at OSU.

Fee Waiver Scholarships

Fee waivers are awarded to undergraduate and graduate students on the basis of both demonstrated financial need and academic achievement. Awards range from approximately $550 to $850 per year. Freshman fee waivers are awarded to entering students who have attained a high scholastic standing in high school. Further information may be obtained from the Office of High School and College Relations.

Upperclass University scholarships are awarded each year to sophomores, juniors, and seniors who have outstanding academic records. Applications for these scholarships can be obtained from the Office of Financial Aid and must be received by March 1.

Transfer scholarships are offered each year to students transferring from junior colleges to OSU. Applicants must apply for admission by March 1.

Graduate students should contact their department heads regarding application procedures and scholarship deadlines.

Wentz Service Scholarships

This program provides undergraduate students with work settings in which they can develop skills to benefit them in their future employment. Application is made directly to any of the respective colleges or participating administrative offices at OSU. Service scholarship recipients earn $4.25 per hour and may earn up to $1,500 per year. Recipients will be notified about their awards and work assignments by either the colleges or administrative offices through which they receive their scholarships.

Other OSU Scholarships

Both undergraduate and graduate students are encouraged to explore other scholarship opportunities that may be offered by the various colleges and academic departments at OSU. The student academic services office of each college is an excellent resource for specific scholarship information. The student may wish to use the scholarship search program, FINDS, to assist in locating other scholarship sources. FINDS is located in the Office of Student Financial Aid.

Grants

Undergraduate students who have not completed their first undergraduate degree are eligible to apply for two federal grant programs, the Pell Grant and Supplemental Education Opportunity Grant. Undergraduate and graduate students who are Oklahoma residents are eligible to apply for the state grant program, the Oklahoma Tuition Aid Grant.

Pell Grant eligibility is determined by the U.S. Department of Education by using a congressionally- approved formula. Each applicant will receive a Student Aid Report (SAR) from the Pell Grant processor. Eligible students should submit all copies of their SAR's to the Office of Student Financial Aid.

Supplemental Education Opportunity Grants are awarded to students who demonstrate financial need as reflected in the needs analysis form. Funding in this program is limited and is usually awarded to applicants who demonstrate the most financial need.

Oklahoma Tuition Aid Grants are awarded to eligible Oklahoma residents who may apply by completing the appropriate sections of the ACT-FFS. Grant amounts are determined by the applicant's academic classification, enrollment status, demonstrated need, and by the availability of funds. Students are notified of their eligibility and award amounts by the Oklahoma State Regents for Higher Education, not by OSU.

College Work-Study

This program is designed to help students meet their education expenses through part-time employment. The Office of Student Financial Aid determines award amounts on the basis of financial need. While all College Work Study student employees are paid at least the current federal minimum wage, the actual rate of pay depends on their qualifications and the types of jobs that they hold. Eligible students may be employed by any office or department at OSU or at an off-campus, non-profit agency. By attempting to place students in areas in which they are interested, the College Work-Study Program helps to stimulate the development of worthwhile work experience for the student while attending college.

Student Employment

The Office of University Personnel Services, Employment section, provides assistance to OSU students seeking part-time employment. Students are informed of job opportunities both on campus and in the Stillwater community. Students interested in employment may obtain applications in this office. After completing the application, the student should return it to the office and make arrangements to visit with an employment interviewer. The largest number of jobs are available at the beginning of each semester; however, jobs do become available throughout the year.

Jobs on campus usually offer 12 to 20 hours of work per week in clerical, technical, food service or general labor positions. Rate of pay and work schedules vary. Ideally, students seeking on-campus work should schedule their classes to allow for a block of four hours free time during the morning or afternoon, Monday through Friday. More flexible working hours may be possible in similar positions in the Stillwater community.

Part-time job opportunities are posted on the bulletin board outside the office at 407 Whitehurst.

Student Services

Residential Life

Robert Huss, *Director of Residential Life*
Eddie Denman, *Assistant Director of Residential Life—Business and Administrative Services*
Dane Blubaugh, *Assistant Director of Residential Life—Construction and Renovation*
Kent Sampson, *Assistant Director of Residential Life—Residence Halls East*
Tim Luckadoo, *Assistant Director of Residential Life—Residence Halls West*

The Office of Residential Life exists to aid its residents. Students who live on campus are more likely to graduate in four years and maintain higher grades than their off-campus counterparts. The Office of Residential Life provides residence hall space for approximately 5,000 students, apartments for more than 700 students, and a food service program, available to all students and staff, that is nutritional, convenient and enjoyable. All freshmen live in residence halls unless exempt for one of the following reasons: being married; living with parents in Stillwater or the surrounding area; being a veteran; living in a fraternity or sorority house (sorority pledges generally live in residence halls due to limited sorority house space); having a demonstrated financial or medical hardship; or having completed 27 credit hours.

All inquiries should be addressed to the appropriate office, depending on the student's housing needs. All accomodations are rented on a contract date priority basis. Applications and contracts are encouraged to be sent in early in order to receive the preferred on-campus housing location.

Residence Halls

OSU Residence Halls offer a variety of living accommodations: apartments in Bennett, traditional non-air- conditioned space in Bennett and Stout, and contemporary air-conditioned space in Scott-Parker-Wentz, Kerr-Drummond, and Willham North and South. Iba Residence Hall provides year-round housing for graduate and undergraduate students who are 21 years of age or older. Stout and Wentz halls are available for students of sophomore standing and above.

The Office of Residential Life emphasizes the development of interpersonal skills by having the staff teach leadership skills, group development skills, personal interaction skills, and study skills in non-credit seminars and credit classes. These programs are the formal aspect of helping students to become involved in the residence halls. Resi-

dence halls and dining centers offer numerous opportunities for student leadership. More than 1,000 students are involved in planning and leading educational, recreational and social activities within the residence halls.

Residence hall living is relatively inexpensive. Over $1,400 per year is saved by the average student living in residence halls versus living off campus. Residence hall rates include all utilities including telephone (cable TV in some halls.) The 20-meal plan usually costs less than $2.00 per meal. The in-hall laundry facilities are convenient and economical as is the on-campus parking. Residence hall rates do *not* increase during the academic year.

Students are offered several lifestyle options from which to choose, such as floors and houses for fine arts; foreign languages; honors (ACT of 25 and above); intensive study; and engineering.

In every residence hall there is a well-trained professional staff to coordinate the day-to-day operations of the building, as well as the student staff whose primary function is to see that students benefit educationally from their residence hall living experience. Each floor or wing has a live-in student staff member (resident assistant) responsible for advising and guiding the residents. Resident assistants are undergraduate students specially trained in all aspects of residence hall living with the experience and knowledge to answer questions and act as an adviser for student government and programs.

Students who live on campus enjoy the opportunity to participate in the on-campus meal plan. Students may choose from five to 20 meals per week, (freshmen are required to take at least 10 meals per week) depending on their individual needs. Some students choose not to be on the meal plan. A variety of offerings are available in the four dining centers (Bennett, Kerr-Drummond, Scott-Parker-Wentz, and Willham cafeterias). Any student may eat any meal in any of the four dining centers. Each dining center offers a unique menu as well as the standard cafeteria selection. Specialty menus include delicatessen, health club, pasta and weight watchers. These specialty plans vary as the students' needs change.

For more information, contact the Office of Residential Life, Oklahoma State University, Iba Hall, Stillwater, Oklahoma 74078.

Disabled Student Housing

All residence halls offer some housing for students who have impaired mobility. Upon notification, the Office of Residential Life routinely modifies rooms to meet an individual's special needs. Six single-student rooms on the first floor of Drummond Hall have been permanently modified for students with physical disabilities. Alterations to this area include special bathroom and laundry facilities, bedlifts, specialty kitchen, automatic entrance and exit doors, and beds and desks that meet federal standards.

University Apartments

More than 700 all-brick apartments are available within walking distance of the campus. These apartments serve students in the following priority: families, single graduate student, and single undergraduate students. All apartments are two-bedroom units that are available fully or partially furnished, or unfurnished.

The apartments have attractive outdoor surroundings with sidewalks, off-street parking, play areas, and laundry facilities provided in the University laundry and in the Brumley area.

School bus transportation is provided to the Stillwater Middle School and High School, and one of the elementary schools. All other schools are within one and one-half miles of the housing area.

The Family Resource Center located in the University Apartments area offers a variety of programs to meet the needs of University Apartment residents. These programs vary depending upon the needs of the clientele as determined by surveys and individual meetings with residents. Typical programs have included: car seat loans, toy library, adolescent sexuality, child care information, and Thanksgiving dinners.

For more information contact the University Apartments Office, E-2 Brumley, Oklahoma State University, Stillwater, Oklahoma 74078.

Student Health Services

Donald L. Cooper, M.D., *Director*
Alice F. Gambill, M.D., *Assistant Director*
O. Joseph Hake, M.D., *Staff Physician*
Thomas L. Hansen, M.D., *Staff Physician*
Ngheim X. Huc, M.D., *Staff Physician*
Mary Sue Pinski, M.D., *Staff Physician*
Ronald R. Sanders, M.D., *Staff Physician*
Sherry Maxwell, *Director Mental Health Clinic*

A student enrolling at Oklahoma State University for the first time is required to present a record of a physical examination by his or her private physician, or present a recent equivalent record of physical examination, such as a record from a place of employment or school, or the Armed Forces. An immunization record is of utmost importance. This health report is for determination and evaluation of the condition of the student so that corrective measures may be taken.

Oklahoma State University is as interested in the student's physical and emotional well-being as it is in his or her intellectual and cultural development. Good health will not guarantee academic success, but it will help; while poor health, either physical or emotional, can impair both the academic and the extra-curricular career.

The OSU Student Health Center maintains a staff of seven full-time physicians, three staff psychologists, 20 registered nurses, three laboratory and x-ray technicians, and other necessary supportive and ancillary personnel who make a specialty of providing the best possible care at the least possible expense for the student. Along with this full-time help, there are part-time specialists in internal medicine, psychiatry, dietetics and radiology. Specialists in all other fields are available for individual and group cases.

Most injuries and illnesses can be treated at the Student Health Center, except major surgical cases, which can be diagnosed and then referred to either the family physician if time permits, or to a local surgeon in Stillwater. No dental care is offered.

There are no charges for office visits to see the physicians. This service is covered by the designated health fee paid by the student. To cover direct costs on laboratory, x-ray, pharmacy and hospital services a moderate fee is charged. There are 18 beds available for hospitalization and isolation if needed. A licensed nurse is on duty in the hospital and a physician is on call 24 hours a day for care of patients.

Counseling Services

Patrick M. Murphy, *Director*
Martha Jordan, *Assistant Director*

The University Counseling Services provides free and confidential professional counseling assistance to students. Students experiencing a variety of concerns may find this service helpful to them.

Assistance can be provided with emotional problems, as they affect personal and academic goals, intellectual functioning or relationships with others. Services include a broad range of developmental, remedial and preventive activities.

Help is available with the selection of an academic major, when such selections are more complicated or difficult than usual.

The Counseling Services also assist students with problems, concerns, and experiences relating to educational difficulties; i.e. study habits, unusual test-taking stress, lack of motivation, or attitudes related to school.

Most services are provided at no charge. Minimal fees are assessed for certain tests and for specific programs or workshops. Depending upon the need, tests and other University services may be used in conjunction with counseling.

All information regarding appointments and content of meetings is confidential.

The University Counseling Services is an accredited member of the International Association of Counseling Services, Inc.

Personal Counseling Services

Pamela A. Miller, *Coordinator*

Personal counseling is offered in either an individual or group setting. Discussions between counselor and student in personal counseling can center on any situation which keeps the client from fully realizing his or her personal or academic



potential. Among the variety of concerns dealt with in personal counseling are stress, anxiety, depression, eating disorders, substance use/abuse and interpersonal relationships.

Additional services provided to the academic community are developmental programs and workshops and consultation services.

Career Counseling Services

Counselors are available to assist students in personal assessment of career interests, values, and abilities to identify possible career directions related to a major area of study. Several services are provided for career decision making: individual counseling, DISCOVER Center, Career Interest Testing, and Career Outreach Programs.

Disabled Student Services

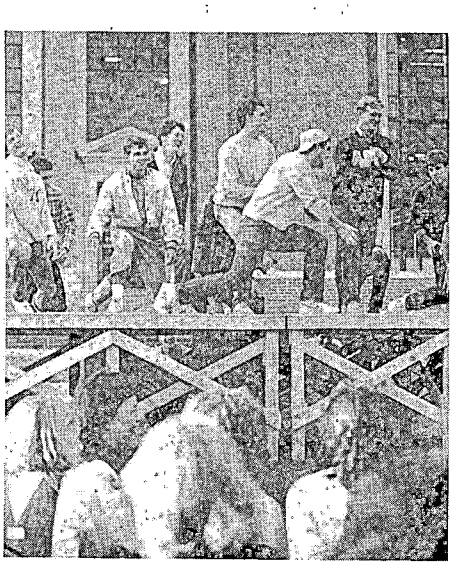
Disabled Student Services provides assistance for prospective and current students with physical disabilities. Information and assistance with the University Attendant Care Program, Van Service, tutors, and other programs can be obtained from the Office of Disabled Student Services.

Minority Programs and Services

Howard Shipp, *Coordinator*
Teresa Newson, *Black Student Counselor*
Patricia Brooks, *Hispanic Student Counselor*
Pete G. Coser, *Native American Student Counselor*

Minority Programs and Services (MPS) is a comprehensive support service for Black, Hispanic, Native American and Vietnamese-American students. The program provides educational and personal growth opportunities to enhance the university experience for minority students matriculating at Oklahoma State University. Support services are provided through one-to-one counseling, group counseling, outreach programs, academic skill development programs, and tutoring. The following areas of student development are emphasized: academic development, personal adjustment/development, motivation, and career goals.

Minority Programs and Services staff work closely with other offices of the University. These efforts include direct and indirect assistance in the following areas: recruitment and retention; financial assistance; career development and employment opportunities; and a network of accurate information.



To enhance the social and cultural opportunities for minority students, MPS staff members serve as a resource to various minority student groups and organizations in an advisory or consultative capacity. These organizations include: Hispanic Student Association, Afro-American Student Association, Minority Women's Association, Native American Student Association, Vietnamese-American Student Association, American Indian Science and Engineering Society, Burnin' Black Choir, NAACP, Society of Black Engineers, Technicians and Architects, and the Black Greek organizations.

International Student Services

Elaine Burgess, *Coordinator*
Stephen Haseley, *Counselor*
Mary Ann Kelly, *Counselor*
Regina Henry, *Program Specialist*

The International Student Services office (ISS) provides assistance to more than 1,500 international students from countries as far away as Singapore and Zambia and as close as Canada and Mexico. The goals of the office are to assist international students to: learn about their new surroundings; use the resources of the University and community; provide programs and services to promote academic and social adaptation; and be advocates for students throughout the University and the community.

The staff in the International Student Services office is responsible for advisement to students and faculty on matters which are unique to international students and scholars. Personal counseling, financial planning, liason with embassies and consulates, legal referrals, academic referrals, immigration matters, orientation programs, and advisement to groups, are among the services offered. Non-immigrant students can apply for on-campus work permits in the office.

Pre-arrival information is sent to new students from the office. Orientation and assistance with housing, banking, enrollment, etc., are offered to newly-arrived students. A one-hour credit course, "American Studies Survey," (UNIV 1011) taught by many OSU professors, is coordinated by ISS. In collaboration with other OSU departments and community groups, a variety of cross-cultural programs is presented throughout the year. Interested American student volunteers participate and assist with a variety of activities.

The International Student Services office encourages international and American students, faculty, staff and community members to use its services and participate in the programs.

Student Activities

Jan Carlson, *Manager, Student Activities*
James Jordan, *Coordinator of Greek Life*
Marie Basler, *Program Adviser, Off-Campus Students*
Marilon Morgan, *Program Adviser, Sorority Affairs*
Kathryn Andre, *Program Coordinator, Allied Arts*

The Office of Student Activities is located in the basement level of the Student Union. This office is responsible for the program development of several student organizations and serves as the liaison with all student groups. The staff of this unit advises Student Government Association, Off-Campus Students Association, fraternities and sororities, Returning Students Association, as well as other student leadership groups. This office also develops training programs for student leaders.

Working closely with Student Activities is the Office of Student Union Programs. The staff of this area advises the Student Union Activities Board and is responsible for the program development within the Student Union. These programs include films, speakers, exhibits, Freshman Follies, as well as other special events within the Student Union.

Special Programs, Services and Facilities

Special Programs

The Honors Program

Oklahoma State University's college-centered Honors Program provides special opportunities for outstanding students through special honors courses, honors sections of many general education courses, and honors contracts. The Honors Program utilizes the extensive resources of a comprehensive university in a setting which provides personal attention and a supportive academic environment through small classes, independent study and faculty-guided research opportunities.

Honors awards include the general education honors certificate, departmental honors, and the bachelor's degree with honors. The student's official transcript reflects these awards, and a special honors diploma is awarded for the bachelor's degree with honors.

In addition to the academic opportunities available in the classroom, Honors Program students receive priority enrollment status, extended library privileges, and the opportunity to utilize the recently completed Honors Lounge in the Edmon Low Library.

For details about the Honors Program in each of the academic colleges, interested students should consult the director of student academic services of their college or, in the College of Arts and Sciences, the director of the Honors Program.

Bachelor of University Studies

Individualization and flexibility are the features of the program leading to the degree of Bachelor of University Studies. This program is designed for the goal-directed, motivated and mature student who finds that the present degree programs (majors) at the University will not enable the student to attain his or her educational objectives; it is not intended for students whose educational objectives are undetermined. The Bachelor of University Studies degree permits a student to utilize the total resources of the University available in accomplishing unique educational objectives. The program may or may not prepare a student for a particular occupation or entry into a professional school.

Students interested in the Bachelor of University Studies Extended Studies Option (BUS-ESO) should visit with the dean or designated administrative officer of the college. Available in some colleges, this option is designed especially to meet

the needs of the adult learner who has amassed either a number of credits from a variety of institutions of higher education or life-experience learning which can be documented and substituted for credits via a portfolio or other form of examination.

A student who believes that his or her educational objectives can best be fulfilled through a Bachelor of University Studies degree program can obtain information on the program from the office of student academic services in the college in which the student is to be enrolled.

All students who intend to present a program for the Bachelor of University Studies degree must enroll in one of the colleges of the University. The Bachelor of University Studies degree program must meet requirements stated in the "University Academic Regulations" in this *Catalog*.

Pre-law, Premedicine and Other Preprofessional Programs

Students planning to enter a professional school should visit with their advisers and consult professional school admission and course work requirements listed in the specific school catalog. It is the practice of many professional schools to select students with a variety of bachelor's degrees, although others may require a minimum basic core curriculum of varying length and grade-point average. Preprofessional program information is available in such areas as law, medicine, dental hygiene, dentistry, engineering, library science, medical technology, nursing, occupational therapy, optometry, osteopathy, pharmacy, physical therapy, physician's associate, radiologic technology, social work, and veterinary medicine. For more information, students should consult their advisers or the director of student academic services of the appropriate college.

University Center at Tulsa

The University Center at Tulsa (UCT) was established in 1982 to provide the third and fourth years of undergraduate study and master's degree programs for the Tulsa metropolitan area.

Programs of study are offered by each of four institutions—Langston, Northeastern, Oklahoma State University, and the University of Oklahoma. The Oklahoma State Regents for Higher Education exercise governmental control of the University Center at Tulsa including allocating and administering state-appropriated funds.

Oklahoma State University is approved to offer courses leading to twenty-six degree programs, three of which are undergraduate and the remaining are graduate programs. The four cooperating institutions are not permitted to duplicate programs. Courses taken through the University Center at Tulsa are treated as residence credit at the institution teaching the course. To ensure programs at UCT are comparable to those on the Stillwater campus, Oklahoma State University assigns UCT classes as part of the regular teaching load of OSU faculty when possible.

Courses taken through the University Center at Tulsa taught by Langston, Northeastern, or the University of Oklahoma are accepted at Oklahoma State University as transfer credits. For information on transfer of credits, refer to the section "Transfer of Credits" elsewhere in this *Catalog*.

Admission requirements for students seeking admission to programs offered by Oklahoma State University through the University Center at Tulsa are the same as if they were enrolling in classes at the Stillwater campus.

Degrees are granted by each of the cooperating institutions, not by the University Center at Tulsa. Graduates participate in the home institutions' commencement programs.

Advanced Standing Program

Oklahoma State University Testing and Evaluation Service is a national test site for the College Board's College Level Examination Program (CLEP). National CLEP testing centers offer two kinds of examinations: general examinations and subject examinations. OSU only grants college credit for the subject examinations. Credit earned through these examinations are normally recognized by other colleges and universities throughout the nation.

Oklahoma State University is a national test site for ACT's Proficiency Examination Program (PEP). The University Testing and Evaluation Service administers PEP examinations in nursing, business, and the arts and sciences.

OSU grants credit for acceptable scores in the Advanced Placement Program (AP)as administered by the College Entrance Examination Board in Princeton, New Jersey. The AP tests are taken by high school students while in high school. High school counselors can be of assistance in making testing arrangements.

Oklahoma State University recognizes credit earned through the International Baccalaureate Program which is administered through some high schools.

Military personnel and veterans who wish to establish credit for military training should submit to the Office of the Registrar and Admissions a copy of their DD214, Armed Forces of the United States Report of Transfer of Discharge, or their DD295, Application for the Evaluation of Educational Experiences During Military Service. OSU also accepts credits earned throughout the DANTES Subject Standardized tests for active military personnel.

Academic departments on campus at OSU may offer advanced standing examinations in subject areas not offered by the CLEP, PEP or AP. Any currently enrolled student whose travel, employment, extensive readings or educational experience appear to have given the student proficiency in a subject that is offered at OSU, equivalent to the proficiency ordinarily expected of those students who take the subject in a regular class, may apply for an examination on the subject.

A student who has earned credit in a course which OSU refused to accept, because the institution at which the course was taken was not accredited, may apply for a validation examination. The dean of the college in which the course is offered appoints a committee of three to construct, administer and evaluate the examination.

Information pertaining to these examinations may be obtained from the Office of the Registrar and Admissions.

Scholar-Leadership Enrichment Program

The Scholar-Leadership Enrichment Program (SLEP) is a statewide academic program designed to develop scholarship and leadership abilities of outstanding students. Students study in intensive, five-day seminars with a distinguished scholar and are selected from Oklahoma's 21 four-year colleges and universities. OSU's upper-division and graduate students with a 3.00 GPA are eligible to apply. Freshmen and sophomores who have demonstrated exceptional academic achievement are also considered. SLEP seminars carry two



hours of credit, and the only cost to students is the tuition for two credit hours and a transcript fee. The seminars are graded on a satisfactory/unsatisfactory basis and is transferred to OSU as Pass/Fail. Application should be made as early in the academic year as possible. Further information and application materials may be obtained from OSU's SLEP Coordinator, College of Arts and Sciences Dean's Office.

Semester at Sea

Semester at Sea is an opportunity for OSU undergraduates in good academic standing to earn a semester of credit in a wide range of academic areas while traveling around the world on the *S.S. Universe*. Approximately 50 percent of the semester is spent at sea and 50 percent in various ports allowing students to travel and relate experiences directly to the academic program aboard ship. Specific information may be obtained by contacting the Office of International Programs.

Study Abroad

Students at OSU are encouraged to broaden and add an international aspect to their education by taking part in study abroad programs. Students may earn credit while participating in programs in many parts of the world, including China, France, Germany, Japan, Mexico, Spain and the Soviet Union.

Students may earn OSU credit for summer work and residence in Belgium, France, Germany and Switzerland, through the International Cooperative Education Program.

Outstanding undergraduate and graduate students may qualify for the Bailey Trust Memorial Scholarship for study abroad in the liberal arts.

Students interested in study or work abroad and in scholarship opportunities should inquire at the Center for Global Studies, Life Science East 322, or at the Department of Foreign Languages and Literatures.

MASUA Traveling Scholar Program

The Mid-America State University Association (MASUA) Traveling Scholar Program is designed to provide breadth and depth in the opportunities for graduate study offered at MASUA universities by permitting advanced graduate students to

apply at another MASUA university for one full term where they may utilize unique facilities or specializations.

For additional information concerning the MASUA Traveling Scholar Program, interested students should contact the Graduate College.

Special Services

Academic Advising

Academic advising is considered a major function within the University and is student-centered in that it serves the student first and foremost and not a particular discipline, department or college. Academic advising is designed to assist students in developing their intellectual potential through effective use of all resources available at the University—academic, cultural and social. Thus the role of the student's academic adviser is (1) to assist in educational planning, including clarification of career and educational goals, curriculum planning, and short-term course selection, (2) to become aware of and make appropriate referrals to campus support services, (3) to provide information to prospective majors, and (4) to prepare degree plans for graduating seniors and submit these to the respective college graduation certification office.

The advising function is performed within each of the undergraduate colleges and in the Office of Freshman Programs and Services. Each college structures its advising system based upon the college's philosophy and perceived student needs. In most colleges, freshmen and undeclared students are advised through the college's office of student academic services, while students who have declared majors are advised by an adviser in their major department.

Each academic dean has established an office of student academic services to represent him or her in matters concerning undergraduate students. Students are encouraged to contact their office of student academic services when questions arise regarding advising, academic programs and requirements, and academic support services.

The locations of the offices of student academic services are:

Agriculture—136 Agricultural Hall
Arts and Sciences—202 Life Science East
Business—201L Business Building
Education—102 Gundersen
Engineering, Architecture and Technology—101 Engineering North
Home Economics—113 Home Economics West
Freshman Programs and Services—201 Whitehurst Hall

Students should keep in mind that while the University provides advising as a service and resource, the ultimate responsibility for identifying and completing degree requirements rests with the student.

Freshman Programs and Services

The Office of Freshman Programs and Services (FPS) is responsible for providing academic advisement and other related academic services to entering freshmen who do not wish to declare a major or college during their first semester and to students who are admitted on probation. Students who enroll through FPS are assigned to advisers who assist with the exploration of career goals, and decision making regarding appropriate degree programs, as well as with the clarification of University policies. The primary goal of FPS is to provide personal attention and assistance to students as they explore the various academic options available to them at OSU. Advisement in Freshman Programs and Services is also directed toward assisting students in meeting the University's General Education requirements required of all students pursuing a baccalaureate degree. FPS advisers are knowledgeable in the degree programs in all of the six undergraduate academic colleges and maintain liaison relationships with the student academic services offices on campus.

University Academic Assessment Program. The office also provides academic advising and counseling to students enrolled in the University Academic Assessment Program (UAAP). This program is designed for students who have been suspended due to academic difficulty, yet recommended by their academic college to UAAP for reinstatement on a probationary basis. Reinstatement in UAAP gives students another opportunity to re-evaluate their career and educational goals in an attempt to develop a realistic and successful educational plan. In addition to meeting minimum grade-point averages required by UAAP, students must enroll in and satisfactorily complete the course "Academic Assessment and Exploration." This course is designed to help students identify their reasons for experiencing academic difficulty and determine ways to overcome their academic weaknesses. It also assists students in exploring various career and educational alternatives.

In addition to the teaching, academic advising and counseling functions of FPS, the office serves as a central informational center through which referral to a variety of campus academic and non-academic support services may be obtained.

Tutor Referral Service. The Tutor Referral Service is a resource which refers OSU students to qualified tutors, free departmental tutoring programs, and other academic support and resource centers. This information is offered on a campus-wide basis and is made available to students through the Office of Freshman Programs and Services.



Computer Center

The University Computer Center is one of three departments in the University Computing and Information Systems unit. The purpose of the Computer Center is to provide computing services to support the instruction, research and administrative functions of the University. The Center also provides technical assistance and training to the University community in the use of the Computer Center facilities.

The main Computer Center facilities are located in the basement and the first floor of the Math Science building. In addition, the Computer Center has four remote facilities for general use, consisting of computer terminals and printers located in Agricultural Hall 241, Business 009, Engineering South 113, and Parker Hall basement.

The Computer Center provides approximately 110 terminals and 14 printers for general use in Agricultural Hall 241, Business 009, Engineering South 113, Iba Hall, Math Science basement, Parker Hall basement, and Stout Hall 047. The terminal rooms are open the same hours as the buildings.

Mathematics Learning Resource Center

The Mathematics Learning Resource Center (MLRC) is intended to be the hub of undergraduate mathematics instruction at OSU. The MLRC is located in the basement of South Murray Hall and is open to students on a walk-in basis. The MLRC consists of a 52-station networked microcomputer lab, a twenty-station video lab, and a tutoring room. Instructional software and several programming languages are available, as well as a library of video cassettes which contain lessons on almost all mathematics courses from calculus and below. There are also five Caramate audiovisual units for studying audio tapes and slide presentations.

Graduate and undergraduate students major-



ing in mathematics are assigned to the Center to tutor students and to assist students in the use of the equipment.

Psychological Services Center

The Psychological Services Center in North Murray Hall was established in 1971 as a training, service, and research facility for Oklahoma State University, Stillwater, and the surrounding community. It is operated by the Department of Psychology through the College of Arts and Sciences.

Services are provided to children, adolescents, and adults. The Center's clients include residents of Stillwater and the surrounding community as well as OSU students, faculty, and staff.

The Center offers a variety of psychological services such as: emergency and crisis intervention; individual, group, family, and marital therapy; parental counseling and training; play therapy for children; treatment of phobias and anxiety disorders; biofeedback; relaxation training; assertiveness training; hypnosis; stress management; intellectual, personality, neuropsychological assessment; and school consultation.

The Center's staff includes master's, doctoral, and postdoctoral students in the clinical psychology training program, which is accredited by the American Psychological Association. The staff also includes supervising clinical and developmental psychologists from the Department of Psychology faculty who are licensed by the Oklahoma State Board of Examiners of Psychologists. Although the exact composition of the staff may change from year to year, the staff is generally composed of individuals from diverse ethnic and cultural backgrounds.

There is a graduated fee ranging from $2.50 to $35.00 per hourly session, depending on one's financial situation, although no one is turned away because of an inability to pay. Partial coverage is generally available for OSU faculty and staff covered by the OSU group insurance policy.

The Center is open from 8:00 a.m. until 10:00 p.m. Monday and Tuesday and from 8:00 a.m. until 5:00 p.m. Wednesday, Thursday and Friday. Appointments for confidential assistance can be made by contacting the Center, or on a "walk-in" basis.

University Placement

University Placement assists OSU students and alumni in the colleges of Arts and Sciences, Business Administration, Education, and Home Economics with career planning, development, and professional employment after graduation. Placement services for students and alumni in the colleges of Agriculture and Engineering, Architecture, and Technology are coordinated by their respective student academic services offices. Services to students by University Placement include: campus interviewing, providing job vacancy lists, referring graduates to employers, assisting in resume preparation, sending placement credentials, maintaining a career library, and providing job search counseling. Support is given to the academic areas by providing placement information to faculty and facilitating employer and faculty interaction.

Special Facilities

Bartlett Center for the Studio Arts and the Gardiner Art Gallery

Old Gardiner Hall, as the Bartlett Center was formerly known, was built in 1910 as a women's residence hall and has served also as a classroom building for women's physical education, speech, agriculture extension and the college of business. The building was named to recognize Maude Gardiner, founder of the University's home economics program. Gardiner Hall was renamed the Bartlett Center when Mr. & Mrs. F. M. "Pete" Bartlett gave Oklahoma State University a generous gift designated for the renovation of the Hall.

The Bartlett Center has greatly enhanced the image of the visual arts at OSU. The Center provides activities which have brought regional recognition to OSU in the visual arts. The Center contains eleven new studios, custom designed for specific activities. Special studios include oil painting, watercolor, graphic design, and drawing. In addition to studio space, the center provides a 100 seat auditorium with rear screen projection, Art Department faculty offices and the Gardiner Art Gallery.

The Gallery provides year-round exhibitions of regional and national importance to which the public is invited. Exhibitions have included the work of Manuel Neri, Deborah Butterfield, and traveling exhibitions such as "American Works on Paper: 100 years of American Art," and "Watercolor U.S.A." Faculty and student work is also exhibited on a regular basis.

Bartlett Independent Living Laboratory

In 1988, a residential structure owned by the University was renovated and renamed the Bartlett Independent Living Laboratory. The renovation was funded by a generous gift from the F.M. "Pete" Bartlett family. Furnishings and equipment have been provided by cash and in-kind gifts from a wide variety of corporate and individual donors.

The purpose of the laboratory is to demonstrate ways that handicapped and older persons can live independently, comfortably, safely, and securely in the environments of their choice. Features of the lab include low thresholds, wide doorways and hallways, universal hardware; computerized environmental control systems; motorized windows, blinds, and draperies; special features for visually and hearing impaired; adjustable-height work centers; and numerous examples of devices that help with daily living skills.

The laboratory is used daily by students and faculty from various disciplines. Visitors to the laboratory have included home builders, architects, interior designers, professionals who work with handicapped and older clients, families who want to build new homes or adapt present homes, inventors, engineers and others. The laboratory, nicknamed "Independence Hall," is open by appointment, Monday through Friday 8:00 a.m.-5:00 p.m. Appointments may also be arranged on weekends.

Colvin Physical Education Center

The Colvin Physical Education Center, one of the finest facilities in the nation, encompasses a wide variety of organized and informal recreation activities for all University students. It houses the School of Health, Physical Education and Leisure, which includes the academic program, as well as recreation, intramurals, sports clubs, non-credit activity courses and outdoor adventure programs. Activity areas available include racquetball, indoor and outdoor swimming, gymnastics, fencing, billiards, dance, golf, table tennis, wrestling, weightlifting, basketball, volleyball, badminton and squash. Intramural programs are conducted for women, men and co-rec (coed) teams.

Outdoor facilities available for student recreational use include tennis courts, basketball courts, archery range, golf driving range, jogging track and fields for soccer-rugby-football and softball. Facilities are also available at Lake Carl Blackwell and Camp Redlands for sailing, canoeing, and crew. Additional information about recreation programs may be found in the "Student Life" section.

Edmon Low Library

Conveniently situated in the center of the campus, the attractive Williamsburg-style Edmon Low Library contains more than 1,450,000 volumes and over 14,000 journals which support the diverse academic and research programs of the University. In keeping with its tradition of service, the Library has a friendly and competent faculty and staff and on open-stack arrangement so that patrons may browse and select their own materials. The philosophy of service which underlies the Library's operation is also reflected in the number of reference desks located throughout the building, in the public service photocopy machines situated on every floor (5 cents per copy), in the more than 110 hours that the Library is open each week that classes are in session, and in the extended hours during final examination time at the end of the fall and spring semesters.

Students, particularly those who are new to the campus, are encouraged to visit the Library. A good place to begin the visit is the Information Desk on the second floor. Floor plans and guides to locating different types of material are available near this desk. In addition, throughout the year librarians help acquaint students with library resources by providing presentations at faculty request to classes preparing to do research.

Documents. Located on the fifth floor of the Library, the documents collection, considered by many to be the best in the Southwest, contains information on almost every subject. The Department serves as a patent depository library and houses over four million U.S. patents. The docu-

ments area also serves as a depository for all publications distributed by the United States Government Printing Office and the State of Oklahoma. Nondepository materials acquired from federal agencies supplement the depository collection. Publications of states, foreign governments, and international organizations are obtained to support fields of special interest to the University.

Maps. The Map Room houses one of the largest and most comprehensive collections of maps in the state. This collection contains more than 160,000 maps, as well as aerial photographs of Oklahoma. The Map Room is a depository for maps from both the Defense Mapping Agency and the United States Geological Survey. The collection provides complete USGS topographic coverage of the United States.

Microforms. Numerous manuscripts, research reports, theses, books, periodicals, documents, and newspapers are available on the more than 2,100,000 pieces of microform which are housed in the Microform and Media Room and the Documents Department. In addition to the back files of newspapers on microfilm, including the New York Times and the London Times, the collection in the Microform and Media Room also contains large sets of material on microform, such as Landmarks of Science, Early American Imprints, Early English Books, U.S. Patents, and Western Americana. Staff members are available to locate material, to make paper copies from microfilm and microfiche, and to assist patrons with questions.

Interlibrary Loan. Interlibrary loan service is available at the Library to students and faculty for obtaining material they need to carry out advanced University-related research. All borrowing and photocopying is done within the provisions of the General Interlibrary Loan Code of the American Library Association and those of the Oklahoma State Interlibrary Loan Code. Inquiries regarding this service may be made at any subject-division reference desk or at the Interlibrary Loan Office.

Special Collections. The Special Collections area contains a diverse group of noncirculating collections which relate to OSU and its history, Oklahoma history, rare books and manuscripts. Books and journals in the OSU, Oklahoma, and Rare Book Collections are listed in the main card catalog. Special finding aids and indices are available in the Special Collections area for locating uncataloged material in the OSU collection, the vertical file collections and the manuscript collections. The latter contains the papers of two former Oklahoma governors, Henry S. Johnston and Henry L. Bellmon. The Special Collections area, which provides a reading room for patrons using this material, is on the third floor of the Library.



On-line Services. The Library provides three kinds of computer-assisted search services which are described below. An on-line catalog will be available through computer terminals located near the Information Desk on the second floor. The screen displays are intended to be "user friendly" and to provide helpful prompts regarding the search options and procedures. Assistance in the use of the on-line database will be available at the Information Desk. The database contains all of the materials which are listed in the card catalog, some government documents, microforms, maps and Curriculum Materials Laboratory items.

An ON-LINE computer-assisted literature search and retrieval service provides instantaneous access to more than 200 computerized data bases located in different parts of the United States relating to nearly every area of campus teaching and research interest. The service is available to interested students who are willing to pay for the on-line computer and communications time and any off-line printing that may be requested. Inquiries concerning ON-LINE should be directed to the appropriate reference desk where more detailed information is available.

CD-ROM products are available in several areas of the Library and users may have direct access to them. Databases currently available include AGRICOLA, ERIC, Dissertation Abstracts, and Infortrac.

M. B. Seretean Center for the Performing Arts

The M.B. Seretean Center for the Performing Arts provides a modern and well-equipped home for the Music and Theater departments. Constructed in 1970 at a cost of three million dollars and named in honor of its principal benefactor, M.B. "Bud" Seretean, a 1947 OSU graduate, the Center is the focal point of all major dramatic and musical events on the OSU campus. The center's 75,000 square feet include a 900-seat auditorium and a 600-seat continental theater, which attract a myriad of fine arts activities such as ballet, concerts, mime, opera, plays, faculty and student recitals and a host of summer conventions.

In addition to the auditorium and theater, the Seretean Center houses teaching studios for music, a variety of classrooms, a specially-designed choral room, a rehearsal hall for band and orchestra, costume and scene shops, and a well-equipped audio center, all designed to provide the best atmosphere in Oklahoma for the teaching of the fine arts.

Museum of Higher Education in Oklahoma—Old Central

Old Central, the oldest building on campus (1894), was placed on the National Register of Historic Places in 1971; it is now operated by the Oklahoma Historical Society as a museum. The building presently has exhibits relating to OSU's early history, and some rooms have been recreated as they would have been in 1894. Traveling exhibits are also presented on various subjects.

Information and exhibit materials are being collected from other higher education institutions around the state; when completed, the Museum of Higher Education in Oklahoma will be the only museum offering a comprehensive history of higher education for an entire state. There will be permanent and rotating displays portraying the development of the educational system from Oklahoma and Indian Territory days to the present.

The museum is open to the public Tuesday - Friday, 9:00 a.m.-5:00 p.m., and Saturday and Sunday, 2:00-5:00 p.m. Special tours and slide presentations are available for groups by appointment. The Assembly Room, on the second floor, may be reserved by non-profit groups and organizations.

Student Union

The primary purpose of the Oklahoma State University Student Union is to serve the members of the University community through an organization which provides a myriad of necessary and convenient goods and services; offers programs to enhance the educational, social, cultural, and recreational development of individuals; and fosters an atmosphere conducive to open interaction and exchange among all students, faculty, staff, alumni and guests.

Dating back to 1815, college unions have always been thought of as "places where all may meet on common ground." In their early years, the college unions were debating halls for university students. Through the years, student unions have added to these halls such facilities as recreation centers, dining halls and meeting rooms. Today student unions bring together students, faculty, staff, alumni and guests in a friendly, casual atmosphere. They are not merely buildings, but serve as the community center—"the heart of the campus."

The OSU Student Union is certainly no exception to this tradition as it has been serving the University community and state since opening in 1950. With a facility consisting of 543,441 square feet, it stands as one of the largest and most comprehensive unions in the world. It provides the University with such services as an 81-room hotel, a variety of lounges, a theater, an art gallery, extensive food services, a shopping mall, a recreation center, a bookstore, a post office, a travel agency and many University offices.

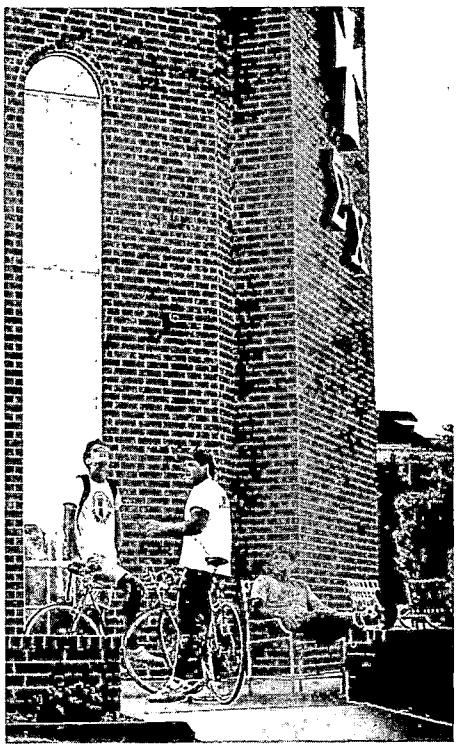
The Student Union is the center of student activities as it houses the offices for most student organizations. Many activities such as movies, dances and speakers are provided for students by the Union's student programming organization, the Student Union Activities Board.

As Oklahoma State University's conference center, the Student Union hosts many continuing education conferences throughout the year. The variety of meeting rooms located throughout the Union are also available for student and faculty use, normally at no charge.

Although the OSU Student Union has an annual budget of approximately $9 million, less than 10 percent of the total cost of operating the Union is funded from student fees. As the Union receives no state funds for its operations, the remainder of its budget is generated from the sale of goods and services, thereby making it virtually a self-supporting University facility.

Telecommunications Center

The Telecommunications Center is a visable commitment to the University's desire to keep pace with the communications revolution. Educational Television Services (ETS) occupies a majority of the facility and is equipped with two independent, fully operational studios with a capacity of



eight cameras. There are two off-line and one on-line editing suites and two remote camera units.

ETS has the ability to transmit or receive on either the C-band or Ku-band satellite format, including from remote locations using a Ku-band satellite truck. ETS produces over 500 live and tape programs per year consisting of video teleconferences, educational programs, documentaries, video training tapes, and public service announcements for the University, state agencies and for state and federal grants.

ETS employs a full-time staff of 18 in the areas of production, engineering and art. Each of these areas is also staffed with students working to earn practical experience under the guidance of professionals. For those students who meet the prerequisites, who are conscientious and who are willing to work, there are three methods of entry into employment at ETS. One method is through an internship which allows the student to earn college credit. Another method is through part-time employment at ETS, usually reserved for those students who have completed an internship, and the third is through the University's work-study program.

Student Life

Allied Arts

A unit of the Office of Student Activities, Allied Arts has the responsibility of developing and implementing for the University a diversified program in the performing arts. This includes musical performances from orchestras to quartets and soloists. Allied Arts has also brought to campus outstanding dance and theatrical companies. Each year, Allied Arts schedules five to six performances for the campus community.

Campus Recreation

Health and Fitness Center

The Health and Fitness Center hosts a variety of adult fitness and exercise programs. Housed in the Colvin Physical Education Center, the Health and Fitness Center provides a complete Adult Fitness Evaluation for persons on campus, in the Stillwater area, and in communities outside the Stillwater area utilizing the Mobile Laboratory.

The Cardiac Rehabilitation Unit is a part of the Health and Fitness Center and provides aggressive Phase II and III cardiac rehabilitation for patients in the Stillwater area.

In addition to the aforementioned programs, the Health and Fitness Center also provides several credit and non-credit classes in contemporary health issues. This unique combination provides many opportunities for students to receive practical "hands-on" experience with scientific testing equipment and actual patients and clients on a day-to-day basis.

Campus Recreation Program

Campus recreation programs are designed to provide equipment, space and professional assistance in helping University students and staff members and their families pursue individual recreation interests. Located in the Colvin Center and Annex are facilities for 32 activities including racquetball, gymnastics, basketball and swimming. In addition, areas for soccer, football, rugby, softball, archery, tennis, jogging, sailing, canoeing and hiking are made available for student and staff use.

Recreation. Through the recreation program, the staff of the Colvin Center offers a variety of non-credit instructional programs each semester to students, faculty, staff and their dependents. Specialty services include poolside dances and movies, International Olympics, married student recreation, freshman programming, and extension services for visiting groups. Instructional programs for adults include yoga, noon fitness, evening fitness, beginning karate, advanced karate, tennis, racquetball, swimming, scuba, water exercises, exercise to music, aerobic dance, weight training, massage, country swing, ballet and belly dancing. Instructional programs for dependents include beginning gymnastics, intermediate gymnastics, beginning swimming, intermediate swimming, karate, creative dance and rhythmic gymnastics (3-4 years). Free children's activity programs are offered prior to the dependent's instructional program each Saturday morning.

Intramurals. The intramurals program at Oklahoma State University is an important part of student life on campus. The goal is to offer a wide variety of sports experiences for each student, regardless of skill or ability, to develop carry-over sports skills for life, to encourage physical activity, to develop habits of fair play and to provide for leadership development. Programs are available for both men and women (23 different activities), as well as participation in co-recreational activities.

Sports Clubs. The campus recreation program advises and helps organize the active sport clubs on campus, which are governed by the Sports Club Council. The Council is chartered by the University and its officers are elected students. This Council develops sports club policies, sets priorities and functions as the official representative for all sports clubs. The campus recreation program provides the adviser for this Council. Membership in all sports clubs is open to all students. If a group of students is interested in starting a sports club, the coordinator will assist them.

Active sports clubs are Auto Club, Bowling, Crew, Cycling, Fencing, Karate, Lacrosse, Racquetball, Rugby, Sailing, Scuba, Skydiving, Soccer, Snow Skiing, Volleyball, Waterskiing, Weightlifting and Wilderness Pursuits.

Outdoor Adventure. Another thrust of the program is the OSU Outdoor Adventure Program. Organized trips are led by professional staff and trained students. The student's choice of activity will lead to the top of the mountains, over rocks and down rivers. The wilderness trips are designed to offer an opportunity for developing outdoor skills, but even more importantly, to develop and explore the individual, other people and the surroundings.

A children's summer camp at Camp Redlands, Lake Carl Blackwell, and a challenge ropes course at the Redlands site as well as the OSU Aquatic Center (Lake Carl Blackwell) are included in the varied offerings. The management and development of the 80-acre Camp Redlands for use by University and community groups has recently been incorporated into this program.

An extensive rental and purchase of quality outdoor equipment is available in the Colvin Center.

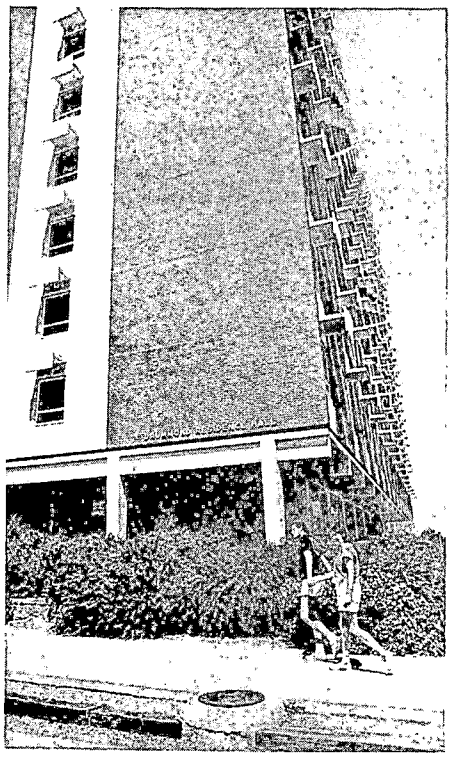
Film Series

There are several regularly scheduled film programs on campus, in addition to individual films scheduled by campus groups. The primary sponsor of the popular film series is the Student Union Activities Board. This series features popular films, many of which are still being shown in commercial theaters. A classic film series is sponsored by the Department of English. This series brings the best of foreign and classic films to campus.

The Arts and Sciences Film Series presents screenings of six international films during the regular semester, three during the summer session. Season subscriptions as well as single admissions are available. The Series devotes itself to films otherwise unavailable in Stillwater, whether motion pictures from abroad (all foreign language films have English subtitles) or from the U.S. At least two films each season are recent Academy Award winners or nominees for Best Foreign Film. The Series occasionally co-sponsors lectures by visiting filmmakers.

Greek Organizations

The fraternity and sorority system is and has been a viable part of Oklahoma State University since 1917. There are approximately 3500 men and women who are members of the 24 national fraternities and 14 national sororities. The majority of these Greek letter organizations own their own houses which are considered by the University as University-recognized housing. The primary thrust of the Greek system is to enhance and promote brotherhood/sisterhood, academic achievement, leadership and social awareness. Fraternities have an informal rush and normally contact potential members during the spring and summer months. Sororities hold a formal rush which traditionally begins in late August. For additional information on the Greek system or how to apply for rush, write to the Office of Greek Life, 050 Student Union.



Honor and Service Organizations

OSU offers opportunities for personal and professional development through many nationally-affiliated honor and service organizations. These organizations provide opportunities for leadership and program development, new friendships and recognition of achievement. University-wide organizations include:

Alpha Phi Omega (service organization)
Blue Key (junior and senior honor society)
Golden Key (junior and senior honor society)
Iota Kappa (sophomore honor society)
Mortar Board (junior and senior honor society)
Orange and Black Quill (honor society for sophomore women)
Order of Omega (honor society for sorority and fraternity members)
Phi Eta Sigma (freshman and sophomore honor society)
Phi Theta Kappa Alumni Association (honor society for transfer students)

(See college sections for organizations within each college.)

Lectures

Oklahoma State University, through its academic organizations and student groups, has a significant number of speakers each year, enriching the intellectural life on campus. Individuals, from both off-campus and on-campus, share their expertise with faculty, students, staff, and town's people on a wide variety of topics.

Many of the academic units as well as student groups invite speakers to their meetings in order to enhance the educational component of the University. These lectures are generally of interest to specific academic areas, rather than to the general campus. The Student Government Association, through its Forum Committee, brings major figures in politics, entertainment, and business to the campus. The Student Union Activities Board also has a speaker's program related to topics of general student interest. Other student organizations conduct active lecture programs of general interest.

Allied Arts conducts lecture-demonstrations in conjunction with a number of its classical arts performances. In this manner, students can gain additional knowledge of classical arts and artists.

Religious Life

Campus religious centers, supported by state and national church bodies specifically to serve the University community, provide opportunity for worship in both traditional and contemporary services; religious education commensurate with higher learning for the development of the whole person; counseling that maintains a spiritual basis for the cohesion and meaning of life; and social activities which allow relationships and life views to deepen. The 18 religious centers have strategic locations close to campus and, in addition to their own ministry, coordinate many of their efforts with each other and the University administration through the Association of University Ministers.

Residential Life

Residence halls are a popular place to live on the OSU campus. The housing and food service program has a proud tradition of excellence recognized nationwide. Much of the success of the residence halls is the strong and vital student government system consisting of floor government, house councils for each hall or complex and the Residence Halls Association, which represents all halls on campus.

The Residence Halls Association acts as the voice of residence hall students to the University administration concerning policies and regulations, and coordinates campus-wide activities for the enrichment of residence hall life and the improvement of residence hall living. All residence halls on campus combine to form the Residence Halls Association (RHA). Each hall has its own elected officers and constitution, and is a part of the RHA system of representative government. There are numerous opportunities for involvement in the hall, such as floor officer, social committees, food committee, and sports and athletic activities. Living in a residence hall is not so much different than living in a city or a town elsewhere, in terms of community. Residence hall living is a community of people who live and interact with each other daily and who can work together to make their hall a "home away from home" and be proud of it.

Theater

The four to six plays produced each year range from classical to contemporary; from sublime to ridiculous; from high seriousness to low comedy. So too, variety in casting is assured by a policy of choosing actors from the entire range of the OSU student body, regardless of major. While one play may be of greatest interest to students of history or philosophy, the next may appeal most to those who need escape for an evening's light entertainment.

OSU Theater extends beyond OSU student productions in the Seretean Center. In recent years the local department has hosted statewide versions of the American College Theater Festival, displaying outstanding theater from other Oklahoma colleges and universities enroute to regional and national festivals.

Alumni Programs and Services

The Alumni Association serves as a liaison between OSU and its former students, and provides members immediate and direct contact with the University. The Association operates for the benefit of both former students and Oklahoma State University.

All graduates, former students, and friends of OSU are eligible for membership in the Alumni Association by paying an annual or life membership fee.

The OSU Alumni Association is governed by a Board of Directors. The director of Alumni Relations also serves as executive director. Three program directors, a records coordinator, and an administrative associate serve as staff.

The Alumni Association promotes involvement of alumni and friends in many ways.

Clubs. There are approximately fifty alumni clubs in the state of Oklahoma. Other clubs are located across the United States. Club activities include membership drives, social functions, and other programs to support OSU.

Homecoming and Reunions. Alumni are invited to return to campus to renew friendships and participate in a series of informative and social activities.

Travel. The Alumni Association organizes travel packages designed to meet educational and social objectives of alumni and friends.

Awards and Recognition. Each year students and alumni are honored for outstanding service to OSU or for outstanding personal achievement.

Publications. O'Stater tabloid and Outreach magazine are publications that are sent to all Association members. These publications provide information about the University and alumni programs.

The Alumni Office is located in Room 212 of the Student Union. Opinions and suggestions are welcome and will receive the full attention of the professional staff.

OSU Foundation

The primary objective of the OSU Foundation is to independently generate, manage and prudently disburse funds raised for a wide variety of programs, including scholarships, student aid, faculty awards, library and museum acquisitions, varsity athletics and capital improvement projects.

Established in 1961 as an independent, private, non-profit corporation, the OSU Foundation operates on behalf of Oklahoma State University.

The private funds raised by the OSU Foundation enable Oklahoma State University to provide a high quality education. The efforts of the OSU Foundation help meet the ever-changing needs of education and enrich higher education for the ultimate benefit of the citizens of Oklahoma.

The Technical Branch, Oklahoma City

James E. Hooper, *Director and Vice-President of Oklahoma State University*
Don E. Connel, *Assistant Director for Academic Affairs*
Joe D. Kinder, *Assistant Director for Business and Finance*
Carla C. Splaingard, *Assistant Director for Student Affairs*
Evelyn H. Wilson, *Director of Admissions and Records*

The University Technical Branch, Oklahoma City, is a part of Oklahoma State University and is accredited by the North Central Association of Colleges and Secondary Schools.

The Technical Branch has become the institution most directly related to the education of technicians in the United States. It offers college courses leading to an associate degree, preparing the student in two years for employment in various career fields, as well as providing credits that are transferable to bachelor's degree programs and general education courses.

The new Branch offers two-year programs leading to the associate degree in accounting technology; architectural technology; civil/surveying technology; computer programming with emphasis in accounting, business, scientific or operations management; construction technology; electronics technology; environmental systems technology; equine racing with race track management emphasis; fire protection technology; general engineering technology; horticulture technology; industrial loss prevention technology; industrial drafting and design technology; instrumentation technology; interpreter training; management technology; municipal fire protection technology; nurse science; oil and gas management technology; police science; residential construction design technology; technical writing; and transportation and traffic management.

Teaching methods emphasize the application of theory through state of the art laboratories and equipment. The faculty are working professionals with in-depth business and industry experience in their areas of expertise.

The curricula are designed to prepare graduates for a variety of positions in business, government and industry. Specialized technical courses enable the graduate to understand the underlying purposes of the operations and functions for which he or she is responsible and to utilize basic scientific principles in developing ideas. General courses in communication skills, personal development, and social and economic principles broaden the graduate's interests and aid him or her in the further development of his or her abilities.

The Oklahoma State University Technical Branch is located at the crossroads of Oklahoma City, Interstate 44 and Interstate 40, at 900 North Portland, Oklahoma City, Oklahoma, 73107.

The Technical Branch, Okmulgee

Robert Klabenes, *Director and Vice-President of Oklahoma State University*
Thomas Dooley, *Assistant Director for Business Affairs*
Larry Williams, *Assistant Director for Student Affairs*

The Oklahoma State University Technical Branch, Okmulgee, offers post-secondary, technical education in a residential campus setting culminating in the associate degree. This branch campus has been labeled a national pacesetter in this specialized field of higher education.

OSU Tech's mission is accomplished in a multidimensional program of general studies, related and specific technologies, and cocurricular skills. OSU Tech offers more than 40 post-secondary, college credit technical programs not duplicated at state vocational and technical schools or at other colleges. The Okmulgee Branch emphasizes teaching of emerging and advancing technologies. Students are introduced to computer applications as an enhancement to their educational studies.

OSU Tech serves the educational needs of students seeking exciting and rewarding careers in business and industry. These students want an education that is of sufficient breadth and depth to enable them to enter the world of business and industry with highly marketable skills, and provide a pathway for career advancement. OSU Tech graduates are employed throughout Oklahoma, the nation and the world in occupations ranging from highly skilled technicians and craftsmen to artisans and businessmen.

OSU Tech operates year round on the trimester system—three 15-week sessions per year. Classes begin in early January, mid-May and late August.

Major instructional departments include air conditioning and refrigeration technology, automotive technology, business and office occupations, computer information systems, construction technology, diesel and heavy equipment technology, electrical and electronics technology, engineering graphics technology, hospitality services technology, manufacturing technology, small business occupations, and visual communications.

OSU Tech's academic programs are complemented by outstanding educational facilities. Labs feature state of the art instructional equipment.

Nationwide attention is being focused upon the college's Noble Center For Advancing Technology. This facility houses many computer-intensive technologies, including information processing, energy, microelectronics and automated manufacturing.

The OSU Technical Branch is located at 4th and Mission Road, Okmulgee, OK 74447.

University Academic Regulations

Contents—Academic Regulations

1. Admission—Withdrawal
   - 1.1 Admission of Freshmen
   - 1.2 Admission of Transfer Students
   - 1.3 Admission to Certain Professional Programs
   - 1.4 International Student English Proficiency Requirement
   - 1.5 Satisfactory Academic Progress
   - 1.6 Scholastic Requirements for Continuing Enrollment of a Student under Academic Probation in an Undergraduate College
   - 1.7 Academic Suspension
   - 1.8 Reinstatement after Academic Suspension
   - 1.9 Readmission
   - 1.10 Withdrawing from the University
2. Student Status
   - 2.1 Classification of Students
   - 2.2 Full-time Students
   - 2.3 Part-time Students
   - 2.4 Special Students
3. Requirements
   - 3.1 Date of Matriculation
   - 3.2 Changes in Degree Requirements
   - 3.3 Honors Programs
   - 3.4 General Education Requirements
   - 3.5 English Composition Requirement
   - 3.6 English Essay Proficiency Examination
   - 3.7 Substitution of Required Courses
   - 3.8 Waiving of Required Courses
   - 3.9 Changing Majors
   - 3.10 Deadline for Completion of Requirements
   - 3.11 Second Baccalaureate Degree
4. Credits
   - 4.1 Residence Credit
   - 4.2 Extension and Correspondence Credit
   - 4.3 Transfer Credit from Other Accredited Four-year Institutions
   - 4.4 Transfer Credit from Junior Colleges
   - 4.5 Transfer Students with Less Than a "C" Grade-point Average
   - 4.6 Advanced Standing Credit
   - 4.7 Validation Examination Credit
   - 4.8 Graduate Credit Hours for a Senior
   - 4.9 Semester Credit Hour
   - 4.10 Foreign Language Credit for Native Speakers
5. Registration
   - 5.1 Course Numbering System
   - 5.2 Maximum Semester Credit Hour Load
   - 5.3 Adding Courses
   - 5.4 Dropping Courses
   - 5.5 Concurrent Registration
   - 5.6 Prerequisites to Upper-division and Graduate-division Courses
   - 5.7 Class Enrollment Maxima
   - 5.8 Priority Enrollment
   - 5.9 Late Registration
   - 5.10 Payment of Tuition and Fees
   - 5.11 Audit

6. Grades and Grading
   - 6.1 Official Transcripts
   - 6.2 Grade Interpretation
   - 6.3 Grade Point System
   - 6.4 Grade-point Average Calculating
   - 6.5 Freshman Progress Reports
   - 6.6 Pass-no pass Grading System
   - 6.7 Pass-fail Grading System
   - 6.8 Grade Reports
   - 6.9 Correcting Grades Reported in Error
   - 6.10 Grade Appeals
   - 6.11 Honor Rolls
   - 6.12 Academic Dishonesty or Misconduct

7. Graduation
   - 7.1 Graduation Requirements
   - 7.2 Residence Requirements
   - 7.3 College Enrollment Requirement
   - 7.4 Residence Waiver for Certain Premedical Students
   - 7.5 Minimum Hours for Graduation
   - 7.6 Grade-point Average for Graduation
   - 7.7 Payment of Graduation Fees
   - 7.8 Requirements for Honors Degree
   - 7.9 Diploma Application
   - 7.10 Presence at Commencement Exercises

In addition to these minimal regulations, there may be additional college, department or program requirements which apply. Students are advised to review all steps of their academic progress with their academic adviser.

1. Admission—Withdrawal

1.1 Admission of Freshmen. Policies and procedures governing the admission of new freshmen are detailed in another section of the *Catalog.* (See "Admission" section.)

1.2 Admission of Transfer Students. Policies and procedures governing the admission of transfer students are detailed in another section of the *Catalog.* (See "Admission" section.)

1.3 Admission to Certain Professional Programs. Admission to certain programs as approved by the University may be restricted. (See "Admission" section and college sections in the *Catalog.*)

1.4 International Student English Proficiency Requirement. As a condition of admission to undergraduate study at OSU, all persons for whom English is a second language shall be required to present a score of 500 or above on the *Test of English as a Foreign Language* (TOEFL) regardless of the number of semesters or terms completed in other institutions of higher education or previous enrollment in English language programs. (See "Admission" section of the *Catalog.*)

1.5 Satisfactory Academic Progress. Students not under academic suspension from the University are judged to be making satisfactory progress toward their educational objectives. They are eligible to enroll in any of the undergraduate colleges except as may be restricted. (See "Admission to Certain Professional Programs.")

1.6 Scholastic Requirements for Continuing Enrollment of a Student under Academic Probation in an Undergraduate College. A student will automatically be placed on academic probation when the grade-point average of the last semester attempted is less than 2.00 or as determined by an individual college. A student enrolling on probation should seek help from an academic adviser and a counselor in the University Counseling Services when deciding on an academic load and extracurricular activities. A student whose poor grades may have been caused by health problems should seek the help of a physician.

1.7 Academic Suspension. A student will be suspended when he or she earns less than a 2.00 grade-point average over the last semester attempted and (a) the cumulative grade-point average for the last two semesters is less than 1.40, or (b) the cumulative grade-point average for the last two semesters is less than a 2.00 and the cumulative grade-point average for all hours attempted falls below the following:

Total hours attempted	*Minimum grade-point average required*
fewer than 24	1.40
24 through 36	1.60
37 through 72	1.80
over 72	2.00

A student who at any time does not make satisfactory progress toward an approved educational objective will, at the request of the dean of the college, be suspended from the University. A student who fails to meet the conditions of probation will be suspended.

1.8 Reinstatement after Academic Suspension. A student who has been suspended from the University for academic reasons may not ordinarily be readmitted sooner than one year from the date of suspension; readmission will be considered by the dean of the college in which the student wishes to enroll and on the merits of the individual case.

1.9 Readmission. Students who have attended OSU but were not enrolled during the immediate past semester must file an application for readmission. A student who has attended another college or university since last attending OSU, must file a transcript of all work taken elsewhere. Admission status will be determined after an evaluation of the previous work has been made.

1.10 Withdrawing from the University. The withdrawal process is initiated in the student's dean's office.

A student who withdraws prior to the end of the sixth week of a regular semester or the third week of a summer session will receive a grade of "W" (withdrawn). A student who withdraws after the sixth week of a regular semester or the third week of a summer session but prior to "Pre-finals Week," will receive a grade of "WP" (withdrawn passing) or "WF" (withdrawn failing) as assigned by the instructor of each course. The grade of "WF" will be calculated in the grade-point average.

After the beginning of "Pre-finals Week" a student may not withdraw from the University and shall be assigned only the grade of "A," "B," "C," "D," or "F" or (when appropriate) "I," "NP," "P," or "R" by the instructor of each course at the end of the semester or summer session.

2. Student Status

2.1 Classification of Students. Undergraduate classification is determined by the criteria below:

Freshman	fewer than 28 semester credit hours passed
Sophomore	28 to 59 semester credit hours passed
Junior	60 to 93 semester credit hours passed
Senior	94 or more semester credit hours passed

2.2 Full-time Students. Regular semesters: undergraduate students who are enrolled in 12 or more semester credit hours are classified as "full-time" students. Graduate students enrolled in nine or more semester credit hours are classified as "full-time." Summer session: undergraduate students who are enrolled in six or more semester credit hours, or graduate students who are enrolled in four or more semester credit hours, are classified as "full-time."

Students engaged in an internship or cooperative education program assignment that requires full-time work on the assignment are regarded as full-time students when they are enrolled in the number of credit hours deemed appropriate for the academic credit they receive for the assignment. A student holding a 0.50 FTE graduate assistant appointment, and enrolled in a minimum of six hours during the fall or spring semester, and three hours during the summer semester will be certified as a full-time graduate student. Any FTE appointment less than 0.50 requires nine hours of enrollment for the fall or spring semester, and four hours of enrollment for the summer semester in order for the student to be classified as a full- time student.

A student in the terminal phase of the dissertation or thesis, and having completed all course work on the plan of study, with the exception of thesis or dissertation hours, may take less than six hours while holding a research or teaching graduate assistantship, and be classified as a full-time graduate student, with the approval of the department head and the dean of the Graduate College.

2.3 Part-time Students. Students who are enrolled but not meeting the definition of full-time students are classified as "part-time." Undergraduate students are classified as "half-time" if they are enrolled in six hours in a regular semester (or three hours in a summer session). Graduate students are classified as "half-time" if they are enrolled in four hours in a regular semester (or two hours in a summer session).

2.4 Special Students. A student who does not have immediate plans to enter a degree program but wants to take courses, may be classified as a "special student." A student on an F-1 visa may not enroll as a special student since he or she must be admitted to a degree program.

3. Requirements

3.1 Date of Matriculation. Matriculation occurs when a student first enrolls in an accredited institution of higher education. That date will be used in calculating the time limit for the use of a given plan of study.

3.2 Changes in Degree Requirements. When a student first enrolls at OSU, the degree requirements are made available. Although the curriculum may be revised before a student graduates, a student who makes normal progress toward graduation (completing a four-year degree in not more than six years) will be held responsible for the degree requirements in effect at the time of matriculation, *and* any changes that are made, so long as these changes do not result in semester credit hours being added or do not delay graduation. A student has the option of adopting the new requirements that have been established since matriculation.

3.3 Honors Programs. (See "Honors Programs" in the *Catalog.)*

3.4 General Education Requirements. Each college determines and publishes the general education requirements for its degree programs. College requirements may exceed the minima for general education established by the University, which are: (a) 40 semester credit hours, including six semester credit hours of English composition and 34 semester credit hours of breadth requirements, (b) an international dimension requirement, and (c) a scientific investigation requirement.

The 34 semester credit hours of breadth requirements must include three semester credit hours of American history (HIST 1103 or 1483 or 1493),

and three semester credit hours of American government (POLSC 1013), and, in addition, at least three semester credit hours of designated general education courses in each of the following areas: Social and Behavioral Science, Humanities, Natural Sciences, and Abstract and Quantitative Thought. At least 15 of the 34 semester credit hours must be in disciplines not directly supportive of the student's major field of study. The International Dimension requirement (the equivalent of at least three semester credit hours in courses approved as having an international dimension) and the Scientific Investigation requirement (one course approved as having an investigative laboratory or comparable experience in scientific methodology) may be satisfied in any part of the student's degree program.

A course in a breadth area not designated for general education purposes may be substituted for a designated course in the same breadth area when this is justified on educational grounds specific to an individual student. Such a substitution requires the recommendation of the student's academic adviser and dean and the approval of the vice president, Office of Academic Affairs and Research.

Courses used to fulfill general education requirements are identified by code letters which appear preceding the course titles listed in the back of the *Catalog* and in the class schedule. The code letters designate the general education category for which the course may be used:

A	Abstract and Quantitative Thought
H	Humanities
I	International Dimension
L	Scientific Investigation
N	Natural Sciences
S	Social and Behavioral Sciences

Specially designated courses in the categories A, H, N, S which have been designed especially to provide general education experiences to students outside their major field are marked with SpD.

3.5 English Composition Requirement. The University requires a minimum of six semester credit hours in English composition for a baccalaureate degree. The required sequence of courses is ENGL 1113 and ENGL 1213. For those who qualify, ENGL 1013 or 1313 may be substituted for ENGL 1113. Students who earn an "A" or "B" in ENGL 1113 (or ENGL 1013 or 1313) or who earn three semester credit hours in English composition by advanced standing examination, and who have the consent of their college, may substitute ENGL 3323 for ENGL 1213. Students who qualify may substitute ENGL 1033 or 1413 for ENGL 1213.

3.6 English Essay Proficiency Examination. All candidates for a baccalaureate degree at OSU must pass the University English Essay Proficiency Examination. Students are required to take the examination no later than the first semester of their junior year. The Department of English administers the examination in special group sessions; for a small fee, it may also be taken by appointment at the University Testing and Evaluation Service. Registration for the examination is in the office of student academic services of each college. Only students who present registration cards will be permitted to take the examination. Students who fail the examination will be required to take it again until they have demonstrated proficiency; they may want to provide additional educational experiences for themselves, such as attending tutorial sessions in the Writing Lab or taking or auditing any writing courses. The National Teacher Education Communications Skills Test may be substituted for the University English Essay Proficiency Examination.

3.7 Substitution of Required Courses. In meeting degree requirements a lower-division course may not be substituted for an upper-division course requirement. Substitution policy is governed by the individual colleges.

3.8 Waiving of Required Courses. A maximum of six semester credit hours may be waived. Required courses in English, American history and American government cannot be waived, and the total number of semester credit hours required for the degree cannot be reduced. Waive cards must be signed by the student's adviser, the head of the student's major department and the dean of the college.

3.9 Changing Majors. Students are advised to select a specific major no later than the end of the sophomore year. Students on probation, or not making satisfactory progress toward a degree, may change majors only with the approval of the dean of the college in which they wish to pursue a different degree.

3.10 Deadline for Completion of Requirements. Degrees are conferred only on specific commencement dates. If a student completes requirements for a degree after a commencement date, the degree will be granted at the next scheduled commencement after the student files a diploma application. (See "Diploma Application.") The student may receive a certified statement of completion of graduation requirements at the Office of the Registrar. All candidates for degrees must have their names listed in the commencement program.

3.11 Second Baccalaureate Degree. A student who receives a baccalaureate degree from OSU may use all applicable courses toward a second bachelor's degree. A minimum of 30 semester credit hours of additional work, including all requirements of the second bachelor's degree, is required. The Bachelor of University Studies degree has separate requirements.

4. Credits

4.1 Residence Credit. Residence credit is awarded for work taken on campus (not through extension or correspondence) or at a location officially designated as a residence center by the governing board of the institution (e.g., in-state military bases and OSU courses at the University Center at Tulsa.)

4.2 Extension and Correspondence Credit. Academic credit is awarded for courses offered through the extension offices of the six colleges, by the Independent and Correspondence Study Center of OSU, or by transfer of work certified as extension or correspondence credit by another fully accredited institution.

Extension Credit. OSU will accept, toward a degree, a maximum of eight semester credit hours earned through extension at another institution if that institution is fully accredited. Credits earned through extension plus any earned through correspondence cannot exceed one-fourth of the credits required for a bachelor's degree.

Correspondence Credit. OSU will accept, toward a degree, a maximum of eight semester credit hours earned through correspondence at another institution if that institution is fully accredited. Credits earned through correspondence plus any earned through extension cannot exceed one-fourth of the credits required for a bachelor's degree.

4.3 Transfer Credit from Other Accredited Four-year Institutions. Except as excluded in the section on "Transfer of Credits from Junior Colleges" and "Residence Requirements," credits transferred from accredited senior colleges will apply toward baccalaureate degrees in the same way that they would apply had they been earned in residence at OSU. Students may not use transfer credits to satisfy more than one-half the major course requirements for a department unless they have the approval of the head of that department and the academic dean.

4.4 Transfer Credit from Junior Colleges. Credits will be accepted by transfer from a junior college to meet lower-division (i.e., 1000-and 2000-level courses) requirements only. A minimum of 60 semester credit hours must be earned at a senior college. Within these guidelines, transfer credits are subject to the individual colleges' degree requirements.

4.5 Transfer Students with Less than a "C" Grade-point Average. Students who are accepted with a transcript with a grade-point average below "C" will be placed on academic probation.

4.6 Advanced Standing Credit. Any currently enrolled student whose travel, employment, extensive readings or educational experience appear to have given the student proficiency in a subject that is offered at OSU, equivalent to the proficiency ordinarily expected of those students who take the subject in a regular class, may apply for an examination on the subject.

Credit will be recorded with a grade of "P" if the student earns a "C" or better on the examination. In order to qualify for an advanced standing examination, the student must:

(a) be enrolled at OSU.
(b) need 15 or more semester credit hours at OSU (excluding the hours in which currently enrolled) toward meeting the requirements for the degree. These 15 hours must be resident course work, i.e., exclusive of transfer, correspondence, extension or other advanced standing credit hours. (See "Residence Requirements.")
(c) need the course to meet some requirement for a certificate or degree that is being pursued at OSU.
(d) not have taken an examination over the course within the preceding six months.
(e) have the recommendation of the Office of the Registrar and the approval of the head of the department in which the course is offered.
(f) have paid the fee of $5.00 per credit hour. (This fee is not refunded even if the student receives no credit.)

Advanced standing credit awarded to a student must be validated by successful completion of 12 or more semester credit hours of academic work before the credit is placed on the student's transcript. The amount of advanced standing credit which may be applied to a degree program is subject only to meeting the residency requirements of OSU.

4.7 Validation Examination Credit. A student who has earned credit in a course which OSU refuses to accept, because the institution at which the course was taken was not accredited, may apply for a validation examination. In order to qualify for a validation examination, a student must:

(a) be enrolled at OSU at the time the student takes the examination.
(b) present the necessary evidence to prove that the student has taken the course.
(c) get approval from the Office of the Registrar and Admissions, the dean and head of the department in which the the course is offered to take the examination.
(d) take the examination within the first semester after entering OSU.
(e) take only one such examination in each subject.

The student secures the forms for the examination at the Office of the Registrar and Admissions. The dean of the college in which the course is offered appoints a committee of three to construct, administer and evaluate the examination. The result is reported to the Office of the Registrar and Admissions where a 'P" grade is recorded if the examination result is "C" or above.

4.8 Graduate Credit Hours for a Senior. A senior who is graduating from OSU at the end of a semester or summer session may take a limited number of courses for graduate credit during the last two semesters or summer sessions. The written request to receive graduate credit must be made before the end of the fifth week of class instruction of a regular semester or the second week of a summer session. Such credit may be earned under the following conditions: (a)the student must meet the same admission requirements and be subject to the same possible probationary or provisional restrictions as students admitted in graduate status. The student must achieve an overall 3.00 grade-point average in *all* courses and make no less than a "B" in those courses for which he or she wants graduate credit; (b) the credits must not be required or needed for the bachelor's degree; (c) the total registration must not exceed 18 credit hours for a semester or nine credit hours for a summer session; (d) the student must either complete the requirements for the bachelor's degree at the end of the semester or summer session or be within 12 semester credit hours of completing such requirements at the beginning of the semester or summer session in which graduate credit is requested; (e) admission to courses taken for graduate credit must have the approval of the course instructor, the head of the department in which the courses are offered and the dean of the Graduate College; (f) not more than 14 semester credit hours taken while a senior may be approved for graduate credit, and a minimum of 16 semester credit hours must be completed in residence after the student registers in the Graduate College. Courses taken for graduate credit during the senior year may not be accepted for graduate credit at institutions other than OSU; (g) the use to be made of the graduate courses will be determined by the adviser when the student registers in the Graduate College and submits a plan of study for an advanced degree.

4.9 Semester Credit Hour. A semester credit hour is equivalent to (a) 16 50-minute class sessions (including examinations) conducted under the guidance of a qualified instructor plus 32 hours of preparation time, or (b) 16 3-hour laboratory sessions, or (c) 16 2-hour laboratory sessions plus 16 hours of preparation time. These same equivalencies apply to extension courses, short courses and other learning formats for which academic credit is awarded.

4.10 Foreign Language Credit for Native Speakers. A native speaker of a foreign language cannot enroll in or earn credit toward graduation in lower-division (1000- or 2000-level) courses in that language. A native speaker of a foreign language is defined as a person whose high-school level instruction was conducted principally in that language.
Native speakers may occasionally have valid reasons for establishing credit in a lower-divison course. Requests for such consideration should be directed to the dean of the student's college for recommendation to the head of the Department of Foreign Languages and Literatures.

5. Registration

5.1 Course Numbering System. All courses are identified by numbers composed of four digits. The first digit indicates the class year in which the subject is ordinarily taken, although enrollment is not exclusive as to student classification; the second and third digits identify the course within the field; and the last digit indicates the number of semester credit hours the course carries. For example, a course numbered 1123 should be interpreted as a freshman, or beginning, level course carrying three hours of credit. A course number beginning with zero indicates that the course does not carry University credit. A course number ending in zero indicates that the course carries variable credit.

5.2 Maximum Semester Credit Hour Load. All semester credit hours above 19 (nine during a summer session) are excessive and require written approval *in advance* of enrollment by the student's adviser and the dean of the college. Excessive hours will be limited to the number of semester credit hours 50 percent greater than the number of weeks in the applicable academic semester or summer session.

5.3 Adding Courses. Approval of the student's academic adviser is required for adding a course. The first day of the second week of classes of a regular semester or summer session is the last day a course may be added. A short course may be added no later than the first day of the short course.

5.4 Dropping Courses. At any time prior to the end of the first week of a regular semester or summer session, or during the proportionate period for block or short courses, a student may drop a course, and no record of the course will appear on the student's academic record.
After the first week but prior to the end of the sixth week of a regular semester or the third week of a summer session, or proportionate periods for block or short courses, a student may drop a course and receive the grade of "W" (dropped).
After the sixth week of a regular semester or the third week of a summer session but prior to the end of the 10th week of a regular semester or the fifth week of a summer session, a student may drop a course with the grade of "WP" (dropped passing) or "WF" (dropped failing) as assigned by the instructor. The grade of "WF" will be calculated in the grade-point average.
After the 10th week of a regular semester, or the fifth week of a summer session, or proportionate periods for block or short courses, a student may not drop a course and shall be assigned only the grade of "A," "B," "C," "D" or "F," or (when appropriate) "I," "NP," "P" or "R" by the instructor at the end of the semester. (Exceptions to this policy may be allowed by petition due to extraordinary circumstances. A petition requires the signatures of the student's instructor, adviser and dean with the grade of "WP" or "WF" assigned by the instructor.)
No course may be dropped without the approval of the student's academic adviser.
A student may not drop any course in which a formal charge of academic dishonesty is pending against the student. If the student is absolved of the formal charge, he or she may drop the course with a grade of "WP" (dropped passing) appearing on the academic record. If the student is found guilty, the instructor may take appropriate disciplinary action, including assigning the grade "F" for the assignment or the course.

5.5 Concurrent Registration. A student who desires to earn credits concurrently at another institution or through correspondence, extension, advanced standing examinations, or DANTES (Defense Activity for Non-traditional Education Support) examinations while enrolled for residence credit at OSU, must secure approval *in advance* from his or her dean if he or she expects this institution to accept those credits. Armed Forces personnel will be granted 60 days from the date of their first enrollment to establish, through DANTES examinations, advanced standing in subject matter that they mastered while in the Armed Forces.

5.6 Prerequisites to Upper-division and Graduate-division Courses. When no prerequisites are listed for courses numbered 3000 or 4000, it is understood that the prerequisite is 60 credit hours of work completed, or 45 credit hours of work completed with an overall grade-point average of 3.25. The prerequisite for courses numbered 5000 or 6000 is graduate standing in addition to any other prerequisites listed. Instructors may waive prerequisites when the student's background justifies. Prior approval of the instructor may be required in problems courses, independent study, internships, thesis and dissertation courses, and courses taught in a professional school.

5.7 Class Enrollment Maxima. The maximum numbers of students permitted to be enrolled in each section of a course is determined by the department head and can be increased or decreased only by the department head or dean.

5.8 Priority Enrollment. Priority enrollment addresses the needs of students in relation to graduation proximity, beginning with those students who have completed 75 or more credit hours, 45-74 credit hours, 30-44 credit hours, 15-29 credit hours, and 0-14 credit hours. Physically handicapped students are extended the option of priority enrollment. Those students currently in an OSU college honors program are extended the option of priority enrollment. Full-time employees of the University who have approval for enrollment and current OSU students who accept University scholarships will be given priority in turning in trial schedules for class assignment. Scholarships that qualify students for priority in turning in trial schedules are University band, athletic, and graduate teaching assistanceships for teaching or research assignments. (These are not to be considered inclusive, but the scholarship must require that the student perform a service for the University at a regular time specified by the University.) Working part-time for the University or outside the University does not qualify the student for priority in turning in a trial schedule.

5.9 Late Registration. A student is permitted to enroll during the first week of a semester or a summer session or on the first day of a summer short course. A student enrolling during the first week of a semester or summer session will pay a late enrollment fee. The late enrollment fee will not be charged on or prior to the first day of a summer short course.

5.10 Payment of Tuition and Fees. Fees and tuition will appear on the regular monthly statement which is mailed to the student's local address. All fees and tuition associated with the student's enrollment are due in the Office of the Bursar no later than 5:00 p.m. on the 15th day of each month following billing. All delinquent accounts in excess of the advance fee payment will accrue an interest penalty at the rate of 1 1/2 percent per month. Accounts must be cleared before the student can obtain the release of any records, obtain a transcript, receive a diploma, or enroll at OSU for subsequent semesters.

5.11 Audit. A student who does not wish to receive credit in a course may, with the approvals of the student's adviser and the instructor of the course concerned, attend the class strictly as a visitor. A student who applies to audit a course promises that he or she will not use the audit to avoid the rule against excessive hours, and that he or she will not petition or ask in any way for the privilege of taking an examination to obtain credit after he or she has audited the course. The audit form is available in the Office of the Registrar. (Laboratory courses, private music lessons and art courses are not open for audit.)
A student who has established a permanent record at OSU may have the audited course recorded on his or her transcript with "AU" appearing in place of the grade. Not later than one week after the close of that semester, the student must present to the Office of the Registrar the instructor's copy of the audit form with a signed statement from the instructor, on the reverse side, that it is appropriate for the course to be recorded on the student's transcript.
Any individual 65 years or older may obtain an audit form at no charge.

6. Grades and Grading

6.1 Official Transcripts. All official transcripts of the student's academic record at OSU are prepared and released by the Office of the Registrar.

6.2 Grade Interpretation. The quality of student performance in all classes is indicated by the following letter grades: "A," "B," "C," "D," "F," "I," "NP," "P," "R," "W," "WP," and "WF." Descriptions of the grades are:

Grade "A" Superior performance
Grade "B" Good performance, but not superior
Grade "C" Average performance
Grade "D" Minimal passing performance
Grade "F" Failing

Grade "I." This grade is given to students who satisfactorily completed the majority of the course work and whose work averaged "D" or better, but who have been unavoidably prevented from completing the remaining work of the course. The conditions, including appropriate time limits, for the removal of the "I" are indicated on the official class roll by the instructor. A condition that the student must repeat the course in order to remove the "I" is not permitted. The maximum time allowed for a student to remove an "I" is one calendar year. The dean of the student's college may recommend to the registrar the adjustment of this period in exceptional circumstances. It is the responsibility of the student to satisfy the requirements stipulated by the instructor at the time the "I" is assigned; it is the responibility of the instructor to initiate action to have the new grade entered as soon as possible after the student fulfills the requirement. The new grade does not result in the deletion of the "I" symbol from the transcript. Upon completion of the course requirements, a second entry is posted beside the original "I" on the transcript to show the final grade for the course. The incomplete grade which is not removed within the allotted period becomes a permanent incomplete.

Grade "NP." This grade is given for unsatisfactory work (including that evaluated as "D") in courses on the pass-no pass grading system. Both credit hours and grade-points are ignored in calculating grade-point averages.

Grade "P." This grade is given for passing work in OSU courses approved for pass-no pass and pass-fail grading systems. Both credit hours and grade-points are ignored in calculating grade-point averages.

Grade "R." This grade is given to students in all thesis and dissertation courses (5000 and 6000) when course work is still in progress. It is the responsibility of the instructor to initiate action to have the grade entered as soon as possible after the student completes the course work. The new grade does not result in the deletion of the "R" symbol from the transcript, but a second entry is posted beside the original "R" on the transcript to show the final grade.

Grade "W." This grade indicates that the student dropped the course.

Grade "WP." This grade indicates that the student dropped the course while doing passing work.

Grade "WF." This grade indicates that the student dropped the course while doing failing work.

Mark of "AU." An "AU" indicates that the student audited the course, and requested that it be recorded on the academic record. An "AU" is not a grade and is not used in calculating grade-point averages.

Mark of "N." An "N" indicates that at the time grades were due in the Office of the Registrar, a final grade was not reported by the student's instructor. An "N" is not a grade and will be changed to the grade earned within a reasonable time. It is not used in calculating grade-point averages.

6.3 Grade-point System. The following grade-point system is used in calculating the grade-point average.

Grade "A" yields 4 grade points per semester credit hour.
Grade "B" yields 3 grade points per semester credit hour.
Grade "C" yields 2 grade points per semester credit hour.
Grade "D" yields 1 grade point per semester credit hour.
Grades "F," "I," "NP," "P," "R," "W," "WP" and "WF" yield 0 grade points per semester credit hour.

6.4 Grade-point Average Calculating. In calculating grade-point averages for all purposes other than for graduation, the total number of grade points earned is divided by the total number of hours attempted; for graduation, the hours and points of the lowest grade(s) in a repeated course will be ignored. The grade of "I," "NP," "P," "R," "W," "WP" or the mark of "N" will not affect the overall grade-point average.

6.5 Freshman Progress Reports. The faculty will report grades for all freshmen on the dates as printed in the official University calendar. The date will normally be Friday of the eighth week of classes. Progress reports are made available to freshman students shortly after mid-semester. Copies are made available to the students' advisers and the students' deans.

6.6 Pass-no pass Grading System. An undergraduate student may elect to take no more than four courses or 15 hours (whichever is greater) during his or her academic career with the pass-no pass grading option. The option is restricted to those students who (a) have passed 28 or more semester credit hours, (b) have at least a 2.50 grade-point average in all hours attempted, (c) have met all of the prerequisites for enrollment in the course in question, (d) do not need the course in question for meeting any requirements for graduation or certification other than as a free elective, and (e) have approval of the academic adviser.

A student who chooses the pass-no pass option must do so by the last date on which a course may be added. Once the deadline has passed a student may not change the choice of grading systems. The pass-no pass option is not identified on the official class roll and thus is not known to the instructor. The instructor assigns a normal grade based on the quality of the work performed. The grades of "A," "B" and "C" are recorded on the transcript as "P"; the grades of "D," "F" and "WF" are recorded as "NP," "W," "WP" and "I" grades will not affect the grade-point average. Graduate students may enroll to take a course by the pass-no pass option. A course so taken cannot be used to meet graduate degree requirements.

6.7 Pass-fail Grading System. Some courses are taught only on a pass-fail basis. Such courses are so designated in the "Course Listings" section of the *Catalog*. Students who pass the course are awarded the grade of "P"; those who fail the course are awarded the grade of "F."

6.8 Grade Reports. Reports of the grades of all students are compiled and released shortly after the end of each semester by the Office of the Registrar. These reports are made available to the students, the students' advisers and the students' deans.

6.9 Correcting Grades Reported in Error. An instructor who reports an incorrect grade to the Office of the Registrar may request that Office to correct the grade. The request must be in writing and must have both the department head's and the dean's approvals. In no case will a grade be lowered after the student has been graduated.

6.10 Grade Appeals. A student may appeal a grade given by an instructor in cases in which he or she believes the grade awarded is inconsistent with announced grading policy. (See *Student Rights and Responsibilities* pamphlet or contact the Office of the Vice-President for Academic Affairs and Research.)

6.11 Honor Rolls. Undergraduate students completing all enrolled hours (not less than 12 semester credit hours in a regular semester or six in a summer session) with an overall (not cumulative) grade-point average of 3.20 or higher, and with no grade of "I" or "WF" in any course and no grade lower than a "C" are placed on the Dean's List of Distinguished Students. Students who have completed their courses under the same requirements as outlined above, with a grade-point average of 4.00 (i.e., all "A's") are placed on the President's List of Distinguished Students. The grades of "P," "W" or "WP," or grades earned through correspondence may not be included in meeting the minimum enrollment required or grade-point average required for an honor roll.

6.12 Academic Dishonesty or Misconduct. Academic dishonesty or misconduct is not condoned nor tolerated at Oklahoma State University. Academic *dishonesty* is behavior in which a deliberately fraudulent misrepresentation is employed in an attempt to gain undeserved intellectual credit, either for oneself or for another. Academic *misconduct* is behavior that results in intellectual advantage obtained by violating specific directions, rules, or accepted academic standards, but without deliberate intent or use of fraudulent means. (See also Policy and Procedure Letters.)

7. Graduation

7.1 Graduation Requirements. The responsibility for satisfying all requirements for a degree rests with the student. Advisers, faculty members and administrators offer help to the student in meeting this responsibility.

7.2 Residence Requirements. A minimum of one-half of the upper-division requirements in a student's major field must be earned in residence at OSU. (See "College Enrollment Requirement.") The last 18 hours completed by a student immediately prior to graduation must be taken in residence at this institution. Under special circumstances, permission may be given to allow three of the last 18 hours to be taken out of residence. Including the last 18 semester credit hours the student must have earned a total of not less than 30 semester credit hours at OSU taken in not less than two semesters, or one semester and one summer session, or three summer sessions. Courses taken as part of a required internship, such as in medical technology, may not be used in meeting this requirement. In the College of Business Administration the last 30 hours must be earned in residence.

7.3 College Enrollment Requirement. A candidate for graduation must be enrolled in the college from which he or she wishes to receive the degree for at least two semesters, or one semester and one summer session, or three summer sessions immediately preceding graduation. For the award of a second baccalaureate degree, this requirement may be waived by the dean of the college awarding the second degree. (See "Residence Requirements" and "Second Baccalaureate Degree.")

7.4 Residence Waiver for Certain Premedical Students. Students who complete at least 94 semester credit hours in a recognized premedical science program and then transfer to a professional program leading to the doctoral degree at an accredited professional school of medicine,



osteopathic medicine, veterinary medicine, denistry or optometry will be awarded the appropriate baccalaureate degree upon the successful completion of 30 semester credit hours in basic medical science courses applicable to the OSU major. This option is available only to students who have completed all other degree requirements for the major and have taken at least the last 30 semester credit hours of work at OSU prior to transferring to a professional school. (See "Residence Requirements.")

7.5 Minimum Hours for Graduation. Each degree program requires a specific minimum number of semester credit hours for graduation, as indicated in the *Catalog.* No degree program shall require fewer than 120 semester credit hours for graduation. No student shall be permitted to graduate having completed fewer total hours than the requirement specified for that degree. At least 40 hours of upper-division course work shall be required in every baccalaureate degree program.

7.6 Grade-point Average for Graduation. A cumulative grade-point average of 2.00 or higher must be earned for the specified hours on the degree requirement sheet (including any electives), in addition to the 2.00 or higher grade-point average required by the department in the major or minor fields.

7.7 Payment of Graduation Fees. The graduation fee is due at the same time that tuition is due. Information on procedures and deadlines is given to students at the time they complete their enrollment.

7.8 Requirements for Honors Degrees. The individual colleges have specific requirements for degrees with honors. Students should consult the office of their academic dean for information. (See "Honors Programs" in the *Catalog.*)

7.9 Diploma Application. Each candidate for graduation shall file a diploma application in the Office of the Registrar within two weeks following enrollment in a regular semester or one week in a summer session in which the student wishes to be graduated.

7.10 Presence at Commencement Exercises. The University will hold one Commencement exercise each year at the close of the spring semester. Students who met the graduation requirements the preceding fall semester and students who plan to meet the graduation requirements at the close of the following summer session are invited and encouraged to participate in the Commencement exercises. Students who plan to meet requirements during the summer session (whether they are currently enrolled or not) should contact the Office of the Registrar to participate in Commencement.

The University encourages all candidates for degrees to be present at the Commencement exercises. Attendance is not compulsory. However, candidates who cannot be present should notify the Office of the Registrar of the addresses to which diplomas can be mailed.

Regents' Resolution on Disruption of the Educational Process

A resolution of the Board of Regents for Oklahoma State University to further clarify existing student regulations. Section 1, "Legal Obligation of the Student," as it pertains to the disruption of the educational process, was adopted in the regular monthly meeting at Stillwater, Oklahoma, on July 11, 1970:

Be it resolved by the Board of Regents of Oklahoma State University:

I. That this statement known as "Emergency Disciplinary Procedure in Cases of Disruption to the University's Educational Process" containing the following provisions be enacted:

A. Definition of Disruptive Conduct

Oklahoma State University has long honored the right of the individual to free discussion and expression, of peaceful demonstration, and of petition and peaceful assembly. That these rights are a part of the fabric of this institution and of the nation as stated in the Bill of Rights is not questioned. They must remain secure. It is equally clear, however, that in a community of learning, willful disruption of the educational process, destruction of property, and interference with the rights of other members of the community cannot be tolerated.

B. Responsibility of the Student

Any student, who willfully by use of violence, force, coercion, threat, intimidation or fear, obstructs, disrupts or attempts to obstruct or disrupt, the normal operations or functions of the University, or who orally or in writing advises, procures, or incites others to do so, shall be subject to dismissal from the University.

The following, while not intended to be exclusive, illustrates the offenses encompassed herein: occupation of any University building or part thereof with intent to deprive others of its use; blocking the entrance or exit of any University building or corridor or room therein; setting fire to or by any other means substantially damaging any University building or property, or the property of others on University premises; any possession or display of or attempt to threat to use or use of firearms, explosives, other weapons or destructive means or devices, except as necessary for law enforcement, in any University building or on the University campus; prevention of the convening, continuation or orderly conduct of any University class or activity or of any lawful meeting or assembly in any University building or on the University campus; inciting or organizing attempts to prevent student attendance at classes; and, interfering with or blocking normal pedestrian or vehicular traffic on the University campus.

C. Responsibility of the President

When it appears that there is a violation of Section I-A or I-B, it shall be the duty of the president (and he is fully authorized to act) to take all steps which the president deems advisable to protect the assumed and designated interests of Oklahoma State University and to see that its rules, regulations and policies are enforced. The president shall insure that any person or persons found guilty after proper hearing shall be disciplined in accordance with the existing Oklahoma State University student disciplinary regulations.

In carrying out these duties, the president may call upon any member of the University administration, or any member of the faculty, and the president may call upon any agency of the University created to deal with cases arising under Section A. Action by any state or federal court shall not preclude the University from exercising its disciplinary authority.

D. Responsibility of the Board of Regents

The Board of Regents recognizes that by the Constitution and Statutes it has the power to make such rules and regulations for the management of the University as it may deem necessary and expedient, not inconsistent with the Constitution and laws of the state. While the Regents fully appreciate their obligations in this respect, they further recognize that in dealing with those offenses against the University defined in Section A hereof, they must impose the duty and authority of enforcing the policies set forth herein in the principal executive officer of the University—the president. It will be the responsibility of the Board of Regents to furnish all possible assistance to the president when requested by the president.

II. Subject to the provisions of Sections I-A through I-D, it shall be this duty of the president to exercise full authority in the regulation of student conduct and in matters of student discipline. In the discharge of this duty, delegation of such authority may be made by the president to administrative or other officers of the institution, in such manner and to such extent as may by the president be deemed necessary and expedient; provided, that in the discharge of this duty it shall be the duty of the president to secure to every student the right of due process.

III. The text of this resolution shall be printed in the *Student Regulations* section of the *Student Handbook* of the University and in the *University Catalog.*

Degrees Offered

Degrees offered are listed alphabetically along with an indication of the college(s) in which they may be earned.

B Bachelor's
M Master's
D Doctorate
S Specialist

Ag Agriculture
A&S Arts and Sciences
Bus Business Administration
Ed Education
En Engineering
HE Home Economics
Gr Graduate College
OM Osteopathic Medicine
T Technology
VM Veterinary Medicine

Accounting (B,M) Bus/Gr
Aerospace Studies (B) A&S
Agricultural Communications (B) Ag
Agricultural Economics (B,M,D) Ag/Gr
Agricultural Education (B,M,D) Ag/Gr
Agricultural Engineering (B,M,D) En/Gr
Agriculture (M) Gr
Agronomy (B,M) Ag/Gr
  Crop Science (D) Gr
  Soil Science (D) Gr
Animal Science (B,M) Ag/Gr
  Animal Breeding (D) Gr
  Animal Nutrition (D) Gr
  Dairy Science (M) Gr
  Poultry Science (M) Gr
Applied Behavioral Studies (M,D) Gr
Applied Mathematics (M) Gr
Architectural Engineering (B,M) En/Gr
Architecture (B,M) En/Gr
Art (B) A&S
Aviation Science (B) Ed
Biochemistry (B,M,D) Ag/A&S/Gr
Biological Science (B) A&S
Botany (B,M,D) A&S/Gr
Business Administration (M,D) Gr
Chemical Engineering (B,M,D) En/Gr
Chemistry (B,M,D) A&S/Gr
Civil Engineering (B,M,D,) En/Gr
Clothing, Textiles and Merchandising (B,M) HE/Gr
Computing and Information Science (B,M,D) A&S/Gr
Construction Management Technology (B) T
Corrections (M) Gr
Counseling and Student Personnel (M,D,S) Gr
Curriculum and Instruction (M,D,S) Gr
Distributive Education (M) Gr
Economics (B,M,D) A&S/Bus/Gr
Education
  Elementary Education (B) Ed
  Secondary Education (B) Ed
  Special Education (B) Ed
Educational Administration (M,D,S) Gr
Electrical Engineering (B,M,D) En/Gr
Electronics Technology (B) T
English (B,M,D) A&S/Gr
Entomology (B,M,D) Ag/Gr
Environmental Engineering (M) Gr
Environmental Science (M,D) Gr
Family Relations and Child Development (B,M)HE/Gr
Finance (B) Bus
Fire Protection and Safety Technology (B) T
Food, Nutrition and Institution Administration (B,M) HE/Gr
Food Science (M,D) Gr
Foreign Language
  French (B) A&S
  German (B) A&S
  Russian Language and Literature (B) A&S
  Spanish (B) A&S
Forest Resources (M) Gr
Forestry (B) Ag
General Agriculture (B) Ag
General Business (B) Bus
General Engineering (B,M,D) En/Gr
General Technology (B) T
Geography (B,M) A&S/Gr
Geology (B,M) A&S/Gr
Health (B) A&S
Health, Physical Education and Recreation (M) Gr
Higher Education (M,D,S) Gr
History (B,M,D) A&S/Gr
Home Economics (D) Gr
Home Economics Education and Community Services (B,M,D) HE/Gr
Horticulture (M) Gr
Horticulture and Landscape Architecture (B) Ag
Hotel and Restaurant Administration (B) HE
Housing, Interior Design and Consumer Studies (B,M) HE/Gr
Industrial Arts Education (M) Gr
Industrial Technology Education (B) Ed
Industrial Engineering and Management (B,M,D) En/Gr
Journalism and Broadcasting (B) A&S
  Mass Communications (M) Gr
Leisure (B) A&S
Management (B) Bus
Management Information Systems (B) Bus
Management Science and Computer Systems (B) Bus
Manufacturing Systems Engineering (M) Gr
Manufacturing Technology (B) T
Marketing (B) Bus
Mathematics (B,M,D) A&S/Gr
Mechanical Engineering (B,M,D) En/Gr
Mechanical Design Technology (B) T
Mechanical Power Technology (B) T
Mechanized Agriculture (B) Ag
Medical Technology (B) A&S
Microbiology (B,M,D) A&S/Gr
Military Science (B) A&S
Music (B) A&S
Music Education (B) A&S
Natural Science (M) Gr
Nuclear Engineering (M) Gr
Occupational and Adult Education (M,D,S) Gr
Osteopathic Medicine (DO) OM
Petroleum Technology (B) T
Philosophy (B,M) A&S/Gr
Physical Education (B) A&S
Physics (B,M,D) A&S/Gr
Physiological Science (M,D) Gr
Physiology (B) A&S
Plant Pathology (M,D) Gr
Political Science (B,M) A&S/Gr
Pre-veterinary Science (B) Ag
Psychology (B,M,D) A&S/Gr
Radio-Television-Film (B) A&S
Religious Studies (B) A&S
Sociology (B,M,D) A&S/Gr
Speech (B,M) A&S/Gr
Speech Pathology (B) A&S
Statistics (B,M,D) A&S/Gr
Technical Education (B,M) Ed/Gr
Theater (B) A&S
Trade and Industrial Education (B,M) Ed/Gr
University Studies (B) All colleges
Veterinary Medicine (DVM) VM
Veterinary Parasitology (M,D) Gr
Veterinary Pathology (M,D) Gr
Wildlife and Fisheries Ecology (B,M,D) A&S/Gr
Zoology (B,M,D) A&S/Gr

Summary of degrees offered:

Bachelor's	89
Master's	70
Doctor's	46
Specialist	5



College of Agriculture

Charles B. Browning, Ph.D., *Dean*
Paul D. Hummer, Ph.D., *Associate Dean for Resident Instruction*
C. Wesley Holley, Ed.D., *Assistant Dean for Resident Instruction*
Clement R. Henderson, M.A., *Director of Student Academic Services*

Modern agriculture is the nation's largest industry employing approximately one-fourth of the nation's total work force. *The Dictionary of Occupational Titles* lists more than 500 different types of positions in the profession of agriculture. These positions include work in research, education, business, industry, government and international development as well as farming and ranching.

The curricula in the College of Agriculture are designed to meet the needs of students in a wide range of subject matter related to food and fiber production and associated agribusinesses and organizations. Courses of study are concerned with personal development as well as professional competence of students in their chosen fields.

Both general education and professional courses are available in 13 major fields of study. Plans of study that emphasize production, science, business or other specific areas of specialization are provided in the various departments.

Accreditation

Agriculture is a broad and diverse profession and does not have a single accrediting society as do some other professions. Programs in forestry and landscape architecture are accredited by their profession. In addition, each department's program is reviewed at least once every five years by a panel of scientists and other professionals with national or international reputation for excellence in that respective discipline.

Academic Programs

Undergraduate Programs. The *Bachelor of Science in Agriculture* degree is offered in the following major fields of study: agricultural communications, agricultural economics, agricultural education, agronomy, animal science, biochemistry, entomology, forestry, general agriculture, horticulture, mechanized agriculture and pre-veterinary science. The *Bachelor of Landscape Architecture* is also offered in the College of Agriculture.

Graduate Programs. Graduate study is available in all departments in the College. In addition to the *Master of Agriculture* and *Master of Science* degrees which may be obtained through several departments, the *Doctor of Philosophy* degree (Ph.D.) may be earned in the following areas: agricultural economics, agricultural education (Ed.D.), agricultural engineering, animal breeding, animal nutrition, biochemistry, entomology, crop science, food science, plant pathology, and soil science.

High School Preparation and Admission Requirements

The high school preparation and admission requirements for the College of Agriculture are the same as the general University requirements. A solid background in English, natural science, and algebra is important preparation for the many academic programs in the various agricultural disciplines.

Transfer Students

Students who transfer from an accredited college or junior college must meet the general University admission requirements. All transferred courses are recorded on the OSU transcript; however, transfer students from a junior college must complete at least one-half of the total credit hours required for graduation in a given curriculum at this institution. Specific departmental requirements needed for graduation are determined by the department in which the student plans to earn his or her degree.

Scholarships

Students enrolled and entering the College of Agriculture are annually awarded more than $185,000 in scholarships from the College and its departments. The following areas will be considered in the awarding of scholarships: financial need; scholastic standing in high school or college; leadership qualities which have been shown in school, church, community or youth groups; sincere interest in agriculture.

Applications and additional information may be obtained from the Dean's Office, College of Agriculture, Oklahoma State University, 136 Agricultural Hall, Stillwater, OK 74078. Applications are available beginning December 15.

Academic Advising

All students in the College of Agriculture have the advantage of being advised by a faculty member working in the individual student's academic discipline. Such advisers are readily available to students and work closely with the students throughout their academic careers.

Special Academic Programs

Honors Program. The Honors Program in the College of Agriculture is designed to provide outstanding students with opportunities to pursue new challenges and academic excellence. Honors courses, seminars, and special honors contracts provide for discussions and independent thought by students who have the desire and ability to explore academic subjects beyond the normal class work material.

Honors awards available in the College of Agriculture are:

1. General Education Honors
2. Departmental Honors
3. The bachelor's degree, with honors

Awards (1) and (2) may each be earned independently of the others. Award (3) is earned by satisfying the requirements of both (1) and (2). The completion of each award is noted on the student's transcript. Students who complete all three receive the bachelor's degree with honors diploma.



All entering freshmen who have ACT composite scores of 27 or above are eligible to become a part of the Honors Program. All other students who have an overall college-level grade-point average of 3.50 or above may enroll in the Honors Program.

Additional information may be obtained from the director of the Agriculture Honors Program, 136 Agricultural Hall.

Pre-veterinary Medicine Curriculum. The program in pre-veterinary medicine as offered in the College of Agriculture includes all courses required for admission to the College of Veterinary Medicine.

A minimum grade-point average of 2.80 is required in the courses listed below:

English composition and technical writing (8 hours minimum): ENGL 1113 and 1323; ENGL 2333 (or 3323).

Chemistry (17 hours minimum.)

1. General chemistry (8 hours minimum): CHEM 1314 and 1515 (or 1215 and 1225).
2. Organic chemistry (5 hours minimum): CHEM 3015 (or 3053, 3153, and 3112).
3. Biochemistry (4 hours minimum): BIOCH 3653 and 3721.

Physics (8 hours minimum): PHYSC 1114 and 1214.

Mathematics (3 hours minimum): MATH 1513 (or 1613 or 1715 or other advanced mathematics).

Biological science (15 hours minimum. Courses must cover botany, genetics, microbiology and zoology. Each course, except genetics, must include laboratory work).

1. Principles of biology: BISC 1304, 1403 and 1603.
2. Microbiology: MICRO 2124.
3. Genetics: (ANSI 3423 or AGRON 3553 or BISC 3024.)

Although these course requirements may be completed within two years, most pre-veterinary medicine students complete at least three years of preparatory course work or a bachelor's degree. For information as to required tests and application procedures, refer to the "College of Veterinary Medicine" section in this *Catalog* and the current *Veterinary Medicine at Oklahoma State University* brochure. Students are also encouraged to contact the assistant dean for resident instruction in the College of Agriculture.

Pre-veterinary Science Degree. A Bachelor of Science degree in Agriculture with a major in pre-veterinary science may be obtained after the completion of one year in the College of Veterinary Medicine. General education and other requirements for graduation in the College of Agriculture must be met. Specific plans of study may be obtained from the Office of the Assistant Dean of Instruction, 136 Agriculture Hall.

General Education Requirements

The College of Agriculture is committed to providing graduates both a depth of knowledge in their chosen field of study as well as breadth of knowledge outside their major. General education requirements are the same as those of the general University. Specific course offerings are given in the respective plans of study.

Graduation Requirements

General University requirements for graduation are stated elsewhere in this *Catalog.* In addition, specific requirements must be met for the Bachelor of Science and Bachelor of Landscape Architecture degrees in Agriculture. For the Bachelor of Science degree, a total of 130 semester credit hours must be completed satisfactorily in all departments except agricultural education, biochemistry and forestry. Agricultural education (teaching option) requires 133 credit hours; biochemistry requires 124 credit hours; and forestry requires 140 credit hours. The Bachelor of Landscape Architecture is a five-year program requiring 160 credit hours. No credit will be allowed for MATH 1113 toward meeting the requirements for graduation. A minimum of 40 semester credit hours and 100 grade-points must be earned in courses numbered 3000 or above.



Departmental Clubs and Honor Societies

Ag Communicators of Tomorrow
Aggie-X Club (agricultural economics)
Agriculture Ambassadors
Agriculture Student Council
Agronomy Club
Alpha Tau Alpha (agricultural education)
Alpha Zeta (College of Agriculture honor society)
American Chemical Society
American Society of Landscape Architects
Associated Landscape Contractors of America
Block and Bridle Club (animal science)
Collegiate 4-H
Collegiate FFA
Dairy Science Club
Food Industry Club
Forestry Club
Horticulture Club
Mechanized Agriculture Club
National Agri-marketing Association
Pre-veterinary Medicine Club
Rodeo Association
Sanborn Entomology Club
Sigma Lambda Alpha (horticulture and landscape architecture)
Society for Range Management
Soil Conservation Society
Xi Sigma Pi (forestry honor society)

Agricultural Communications

Associate Professor and Head Kevin G. Hayes, M.A.

The modern agricultural complex of production and industry is so diverse and specialized that communication between the segments, as well as with the general public, is vital to the function of the whole. Education in agriculture and journalism to effectively provide such communication is the curriculum objective of the agricultural communications and journalism program.

Students may develop strong emphasis in special-interest areas such as advertising, radio and television work, feature or newswriting and reporting, or research report writing, as well as develop a double-major program of study with specific departments of the College of Agriculture.

Career opportunities are excellent in all areas of modern agriculture for the graduate with a Bachelor of Science degree in Agriculture with a major in agricultural communications.

Agricultural Economics

Professor and Head James E. Osborn, Ph.D.

Agricultural economics provides professional opportunities for students interested in solving problems in agricultural production and agribusiness, as well as solving problems in the broader areas of resource development, environmental planning, recreation, public policy and agricultural law.

Agricultural economics combines instruction in the agricultural sciences with education in the application of business and economic principles and tools to the science and art of private and public decision-making. Emphasis is placed on the management of agricultural production and marketing firms and upon decision-making and problem-solving guides relevant to public policy decisions.

Careers of agricultural economists reflect the broad base of the educational program, particularly as related to management. Careers in production and marketing include self-employment as farmers or ranchers, and managers of agribusiness marketing firms such as processors, manufacturers and distributors of food products, chemicals and machinery. Other careers include employment by consulting firms, educational institutions and financial agencies in private and governmental research and service activities.

Major areas of course work in agricultural economics include farm management, agricultural marketing, agricultural financial management, resource conservation and development, agricultural prices, agricultural policy and land appraisal. Courses in economic theory, statistics, computer sciences, mathematics and technical agriculture provide additional depth and breadth to the curriculum. An intensive advisement program and a broad range of elective courses permit the student to structure a program consistent with his personal interests, objectives and needs.

Ten degree options or specialties are available to students majoring in agricultural economics: farm and ranch management, marketing and business, general, science, pre-law, pre-veterinary business management, international agricultural marketing, and rural development and natural resources with two additional options offering double majors in agricultural economics and accounting and in agricultural economics and computer science.

Graduate Programs

The Department offers graduate work leading to the Master of Science, the Master of Agriculture and the Doctor of Philosophy degrees. Both thesis and non-thesis options are available at the M.S. level. Ph.D. students complete a teaching practicum in addition to the research thesis as a part of the degree requirements.

The graduate program stresses development of superior professional competence suited to the demands of the modern business, academic, government and research environments. Advanced courses concentrate on economic analysis applied to problems of production, distribution and consumption of agricultural products.

Courses in economic theory, econometrics, mathematical economics, statistics, and computer science are an integral part of the program. Problems of agricultural policy, natural resource use and rural area development and planning are also important topics. The faculty gives direction and individual guidance to student research in marketing, production, management of agricultural enterprises, price analysis, land and water use and development, rural development and planning, agricultural finance, international trade, farm appraisal and agricultural policy. Specialization is achieved through course electives and research topics. Each student is guided in the preparation of the program of study by an advisory committee to assure that background or prerequisite work and the graduate plan will lead to the desired depth and breadth of proficiency.

Admission Requirements. Prerequisites to advanced training in agricultural economics are (1) the desire to understand and solve the complex and changing economic problems faced by agriculture and rural society, and (2) the desire and ability to learn methods of rigorous logical analysis. In addition, differential calculus, three semester hours of statistical methods and 15 semester hours of agricultural economics and economics, including intermediate micro- and macroeconomic theory, constitute a minimum background for advanced study in agricultural economics. In certain cases, a part of this work can be taken after admission, but will not count toward a graduate degree.

Acceptance by an adviser in the Department is not required prior to official admittance to the departmental graduate program.

Agricultural Education

Professor and Head H. Robert Terry, Ph.D.

The program of studies offered by the Department of Agricultural Education is designed to provide both comprehensive and specialized training in preparation for a career as an educator in the various fields of agriculture. In addition to the objective of preparation for licensure as teachers, graduates are professionally prepared for work in cooperative extension and other federal and state programs and services, as well as international education endeavors. Graduates also may find employment as educational directors and consultants with agribusiness industrial firms and organizations. Programs of study are designed for persons desiring to serve at secondary, postsecondary and adult education levels. Studies may culminate in the B.S., M.Ag., M.S. or Ed.D. degrees.

The undergraduate teaching option is designed primarily to qualify the bachelor's degree recipient for the Oklahoma Vocational Agriculture Teaching License. This license is recognized as meeting requirements for initial employment as a teacher in most other states. The professional service option is designed to focus on careers relating to education and service in agriculture, but outside of the public school setting. The primary emphasis is upon employment in cooperative extension or closely allied areas. Some students find it advantageous to elect a dual major, thus meeting requirements in both agricultural education and another major within the College of Agriculture. The undergraduate programs in agricultural education are structured to provide educational experience in general education, specialized or technical agriculture and professional education.

Graduate Programs

Graduate programs in the Department of Agricultural Education are designed to (1) prepare students for entry into or advancement in teaching careers and (2) provide for further development of professional leadership skills in other educational careers in agriculture, agribusiness, government service, extension, adult education, and vocational-technical programs. An attempt is made to develop individual study programs to meet needs of both international and domestic students.

Advanced graduate studies are more specifically directed toward preparing graduates for careers in teacher education, administration, supervision, curriculum development and other areas of professional leadership in agriculture, agricultural extension or vocational education.

Candidates for the degree of Master of Science must complete a minimum of 21 semester credit hours of 5000-level courses or above. A total of 16 hours must be in education; 12 hours must be in agricultural education completed at this institution. At least ten hours must be completed in a minor area of specialization such as technical agriculture, education, or youth development. Other courses completed within the total 30 credit hours required may be chosen as free electives. Students working toward the Master of Science degree are required to complete a course in research design and a thesis as a part of the requirements for the degree.

An alternative is the Master of Agriculture in the emphasis area of agricultural education. The credit hours required of 5000-level courses, education courses, and specialization courses are the same as for the Master of Science degree. Three options are available: (1) a 32-hour option which includes a formal research report; (2) a 36-hour option which includes a creative component; and (3) a 36-hour option which includes a professional internship.

The Doctor of Education degree with a major in agricultural education is offered by the Department of Agricultural Education as a member of the Teacher Education Group V of the Graduate Faculty. A minimum of 20 hours must be completed in agricultural education, education, and psychology. In addition, at least 20 semester hours must be completed in an area of specialization such as agricultural extension, technical agriculture, educational administration, curriculum development, adult education, or behavioral sciences. Ten hours of credit will be earned for the completion of a thesis. The remaining ten hours of course work within the 60-hour total requirement may be selected as free electives. Applicants for admission to the doctoral program must have at least three years of successful vocational agriculture teaching or similar professional experience.

In addition to the above programs, the Department also cooperates with the School of Occupational and Adult Education area at the specialist and doctoral levels.



Agricultural Engineering

Professor and Head David R. Thompson, Ph.D.

The Department of Agricultural Engineering is administered jointly by the College of Agriculture and the College of Engineering, Architecture and Technology.

Mechanized Agriculture Curriculum

Mechanized agriculture graduates are concerned with the practical application of engineering achievements in agriculture or biology with emphasis on the end product. Engineering graduates focus on the development of new methods or technologies, while mechanized agriculture graduates are more concerned with the effective use of established methods.

The agricultural mechanization curriculum is a four-year program leading to the Bachelor of Science degree in Agriculture. This curriculum is designed to provide the student with a broad general education in the social, biological and physical sciences, and mathematics. Degree candidates will receive technical training in specialized fields of greatest interest to them.

Course work emphasized at Oklahoma State University includes principles of modern mechanized agriculture, automation of farm operations, buildings for production and storage, management and utilization of water including irrigation and utilization of electrical energy. Related course work in fields such as economics, marketing, animal science, and agronomy give mechanized agriculture students the background for competitive positions in related industries. Computer programming and use is required.

Specific types of work in business and industry include product development, product education, firm or association field representatives, farm service advisers, service, sales and editorial work.

Graduates in agricultural mechanization are employed by farm machinery companies, building material suppliers, irrigation equipment companies, manufacturers of materials-handling equipment, manufacturers of processing equipment, pump companies, electric power companies or cooperatives, and government agencies such as the Farmers' Home Administration and the Federal Land Bank.

A degree with a major in agricultural mechanization requires 130 credit hours. Course work is distributed approximately as follows: basic science and mathematics—20%; applied science and engineering—35%; business—20%, social science and communications—25%.

Agricultural Engineering Degree

Agricultural engineers are professional people who generate and adapt engineering knowledge and technologies for the efficient and effective production, processing, storage, handling and distribution of agricultural, food and other biological products, and the management of natural resources.

Students interested in a degree in agricultural engineering may initially enroll in the College of Agriculture or College of Engineering, Architecture and Technology. If they elect to enroll in the College of Agriculture, they should request an agricultural engineering adviser, and transfer to the College of Engineering, Architecture and Technology by the end of their first semester. Agricultural engineering students study engineering, physical, mathematical, biological and agricultural sciences. Agricultural engineering courses apply mathematics, basic engineering and science to create and design new systems and equipment for agricultural and biological production and processing. Social studies and humanities prepare students to work with people; these studies are important because the agricultural engineer early in his or her career assumes supervisory and management responsibilities. Computer use is emphasized for simulation, control, analysis and design.

Agricultural engineering courses for juniors and seniors integrate the engineering sciences with agricultural and biological sciences and teach students to design solutions to real problems of society. Students work both as individuals and in teams to solve design problems provided by industrial firms who also hire agricultural engineering graduates. Students receive specialized design experiences in one or more of the following areas: hydrology and water resources, including flood control, irrigation, and water supply; machinery, instruments and controls for farming and ranching, food processing and packaging, and production of biotechnology products; and systems for efficient production, processing, handling and storage of agricultural and biological products.

A wide variety of employment opportunities are available for agricultural engineers in industry and public service. Some of these opportunities include governmental agencies; irrigation and drainage companies; tractor and machinery manufacturers; manufacturers of agricultural chemicals, producers of steel, building and construction supplies; electric power companies; food processing and canning; and feed processing companies.

Other opportunities include university teaching, research and extension; positions as engineering editors, industrial consultants and positions in foreign service. The United States and most large companies have agricultural engineers in foreign countries.

In addition to the 76 semester credit hours of common requirements for engineers, agricultural engineers take courses in electronic application, instrumentation, watershed hydrology, flood control, drainage and irrigation, environmental engineering, farm power and machinery, design structures and process engineering. The agricultural engineering program is accredited at the basic level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Graduate Programs

The School of Agricultural Engineering offers three programs leading to post-baccalaureate degrees: Master of Agricultural Engineering, Master of Science and Doctor of Philosophy. The Master of Agricultural Engineering program places emphasis on design and internship in engineering experience to prepare the graduate for practice in the engineering profession.

Facilities for design and research are available in processing of agricultural products, plant and animal environment, energy in agriculture, microelectronics, light structures, agricultural power and machinery, pesticide application, soil and water resources development, irrigation, hydraulics, and hydrology.

Research projects are supported by the Agricultural Experiment Station. A well-trained faculty, many of them registered professional engineers with research, consulting and design experience, guide the graduate students' activities and help plan programs to meet the students' needs. Graduate students prepare designs and specifications for special equipment and facilities needed to carry out their work. They are expected to demonstrate by thesis and supporting research or by designs the ability to organize a design problem or an experimental investigation, carry it to completion and report the results.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree program requires graduation from an engineering curriculum accredited by the Accreditation Board for Engineering and Technology.

Admission to the Master of Agricultural Engineering degree program is permitted for students who meet the prerequisites as stated in the "Master of Engineering" section of the College of Engineering, Architecture and Technology. The departmental graduate committee will evaluate the applicant's credentials to determine equivalency and specify requirements to overcome deficiencies. A student must be accepted by an adviser in the Department prior to official admission to the graduate program.

Degree Requirements. A candidate for any of the degrees listed above follows an approved plan of study which must satisfy at least the minimum University requirements for that particular degree.

Agriculture (General)

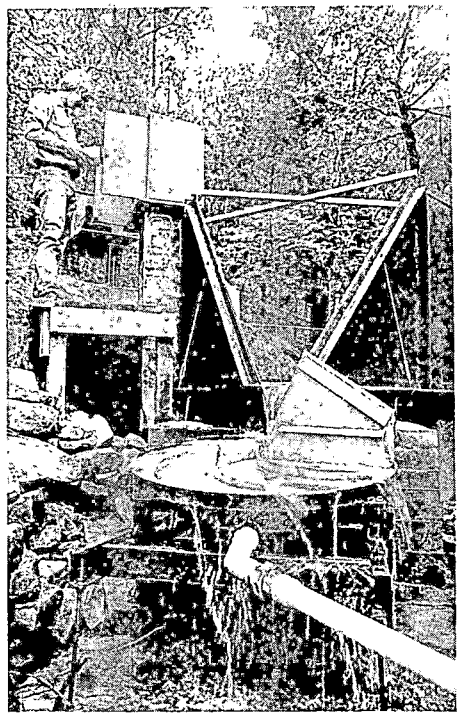
Professor and Associate Dean Paul D. Hummer, Ph.D.

The general agriculture program of study is designed to provide students the opportunity of obtaining a broad education in agriculture rather than the more specialized study typical of departmental programs.

Students select general agriculture as their major for one of two reasons:

1. Students undecided on a major may elect to take the general agriculture program as it provides the opportunity to investigate various majors and options. Courses taken in the general agriculture option apply to the B.S. degree programs in Agriculture, as well as degree programs in some other colleges. Transfers from one major to another may be made at any time. Career information and guidance is available from faculty advisers as well as the Agricultural Career Development Office, 136 Agricultural Hall.
2. Students wanting a broad-based degree program may do so through the general agriculture program. This option allows students to prepare for careers that require a broad background of understanding of the modern agricultural complex.

   The general agriculture curriculum may be pursued in any department in the college and allows students to select courses of special interest to them in relation to the work they plan to do. Basic courses in general education, the sciences and business are required along with over 40 credit hours of electives, in order to complete requirements for a Bachelor of Science degree in Agriculture.



Graduate Programs

The Master of Agriculture degree is designed for students interested in graduate professional training with a strongly applied research orientation. The degree is offered in the following areas of emphasis: agricultural economics, agricultural education, agronomy, animal science, entomology, forestry, horticulture and landscape architecture, and plant pathology.

Purpose. The purpose of this degree is to provide a program which will give additional specialization in technical fields as well as increased breadth of training. Students who are interested in working toward the Ph.D. degree should follow the regular Master of Science degree program.

Character of Program. This program will provide a greater breadth of study than the Master of Science program. Emphasis will be given to practical application of the technical aspects of the dis-

cipline as well as discipline interrelationships. The principal focus, however, is on an applied research concept and a broader program than is normally available with the specialized research degree.

Admission Requirements. A baccalaureate degree in agriculture or a related field is required for admission. The candidate must meet requirements for acceptance into the Graduate College and be recommended by the departmental graduate committee responsible for the program.

Degree Requirements. The requirements for this degree are the same as those listed in the "Graduate College" section under "The Master's Degree."

In addition, each candidate approved for study under this program will be assigned an adviser or advisory committee with whom he or she will develop a plan of study in accordance with guidelines established in the Department. An approved preliminary plan of study must be approved by the associate dean of resident instruction and must be filed in the Graduate College Office prior to enrollment for the 17th credit hour. Departmental comprehensive final examinations will be required of all candidates.

Degree Options. *Option "A" Requirements.* A total of 32 approved semester credit hours of work, including an approved report having a credit hour value of not more than two semester hours, is required.

Option "B" Requirements. A total of 36 approved semester credit hours of work without a report is required and must contain a creative component.

Option "C" Requirements. A total of 36 approved semester credit hours of work which includes six hours of credit for a professional internship is required. The internship includes professional practice and a report.

Agronomy

Professor and Head Charles J. Scifres, Ph.D.

Agronomy is the science of soil management and the production of field crops and forages. Undergraduate options include biotechnology, business, crop science, plant protection, range management and soil science. Each of these options provides a thorough preparation in the sciences relating to its specialization.

Modern agricultural production requires a highly technical approach to problems such as soil and water conservation, crop and range improvement and management, prevention and abatement of agricultural sources of environmental pollution, and judicious use of agricultural chemicals. In the vast field of agribusiness, technical preparation in agronomy is essential in supplying agricultural producers with up-to-date information, as well as improved seed, fertilizers, management systems and pesticides. Processing, distribution and marketing of food, fiber and feed crops require an integration of production technology with economics at all levels. Agronomists are in demand for research and marketing positions in universities, industry and government. Concern for future food supplies creates an urgency for technological advancement in food production which cannot be ignored.

Each of the areas of study is designed to permit students of varying backgrounds and



experiences to attain a level of preparation commensurate with their capabilities and motivation. There are no specific prerequisites.

Careers in agronomy include farm or ranch operation or management; land appraisal for banks or loan companies and crop consulting; technical sales and service for seed, fertilizer or agricultural chemical supply companies; federal employment in soil and range conservation; research positions as plant breeders, fertilizer chemists and weed control specialists with federal or state experiment stations or private industries; teaching and extension positions with colleges and universities; and a broad range of employment or ownership in retail businesses supplying feed, seed, grain, fertilizers, agricultural chemicals and other agricultural supplies and services.

Study for the B.S. degree, in addition to a standard agronomic academic program, provides a thorough grounding in the biological and physical sciences, and communications, with sufficient elective hours to permit flexibility.

Graduate Programs

The Department of Agronomy offers programs of course work and research leading to the Master of Agriculture in the emphasis area of agronomy, and Master of Science degrees in agronomy, and the Doctor of Philosophy degree with majors in crop science or in soil science. Programs are available in the areas of plant breeding and molecular genetics, cytogenetics, range management, forage management, weed science, crop physiology, soil morphology and genesis, soil microbiology, soil fertility and management, soil physics, soil-water management, and soil chemistry. Applicants should indicate their specific area of interest upon application.

The graduate programs of the Department of Agronomy prepare individuals for successful careers in a variety of areas including farming and ranching, extension education, agricultural business, and plant or soil science research and teaching.

Prerequisites. Admission to the graduate program requires a B.S. degree in agronomy or in a closely related field. Applicants should have completed basic courses in agronomy, biology, chemistry and mathematics, required of undergraduate majors. Deficiencies in fundamental course requirements will be met by the student with the direction of the student's advisory committee. Applicants must be accepted by an adviser in the Department prior to official admission.

Degree Requirements. Students must follow approved plans of study which meet the minimum University requirements for the respective degrees they are pursuing.

The Master of Science degree in agronomy may be earned by utilizing one of two plans:

Plan I—Thesis, minimum of 30 credit hours of course work, including six credit hours of AGRON 5000, master's thesis.

Plan II—Formal report (non-thesis), minimum of 32 credit hours of course work, including two credit hours of AGRON 5000, master's thesis.

The Master of Agriculture degree may be earned by utilizing one of three options:

Option A—Formal report (non-thesis), minimum of 32 credit hours of course work, including two credit hours of AGRON 5000, master's thesis.

Option B—Minimum of 36 credit hours of course work and a creative component.

Option C—Minimum of 36 credit hours of course work which includes six hours of credit (AGRON 5230, Research) for a professional internship. The internship will consist of professional practice and an informal report. Internships for students with previously established vocations and career experience must be in areas other than the specific vocational field of the students.

The degree plans of study for the Doctor of Philosophy degree in crop science or soil science are developed individually for each candidate. In general they must include 10 credit hours of agronomy courses at the 5000 level or above (excluding thesis), and meet certain requirements in basic disciplines such as statistics, mathematics, botany, and chemistry. Study of a foreign language is not required but can be incorporated if the student and advisory committee feel that it is desirable.

Animal Science

Professor and Head Robert Totusek, Ph.D.

The Department of Animal Science offers professional training at both the undergraduate and graduate levels. The undergraduate program leads to the Bachelor of Science in Agriculture degree. Graduate studies culminate in the Master of Science, Master of Agriculture (emphasis in animal science) or the Doctor of Philosophy in nutrition, animal breeding, animal reproduction or food science.

Animal science is concerned with the science, art and business of the production of beef cattle, dairy cattle, horses, poultry, sheep and swine. An animal scientist is concerned with the application of the principles of the biological, physical and social sciences to the problems associated with livestock production and management.

Animal science is also concerned with the products of food animals: meat, dairy foods and eggs. The food industry is one of the largest and most important industries in the United States. Students can gain expertise in the processing, quality control and marketing of meat, dairy and poultry products.

Undergraduate students may elect an option in the areas of animal biotechnology, business, food industry, food science, livestock merchandising, pre-veterinary animal science, production, ranch operations or a double major with agricultural education. In addition, students have the opportunity to concentrate their studies on one of the animal groups (meat animals, dairy, horses or poultry). Internship programs providing three to six months of off-campus work experience are available in all options. Participation in undergraduate clubs (Block & Bridle, Dairy Science or Food Industry clubs) or judging teams (livestock, meats, horses, dairy cattle, dairy foods or poultry) improves social, communication and leadership skills.

Students interested in veterinary medicine may complete the pre-veterinary medicine requirements at the same time they are working toward a B.S. degree in animal science. In addition, pre-vet students gain valuable insight into the care and management of animals throughout the animal science curriculum.

Undergraduate students follow a similar curriculum during the first two years which includes basic courses in the physical, biological and social sciences, and a series of basic courses in agriculture and business. Upper-class students take a basic core of advanced science courses including genetics, physiology and nutrition. As seniors, students complete a series of advanced animal science courses which are designed to apply knowledge of business, science and livestock management to livestock or food production systems. Every opportunity is taken in teaching to utilize the excellent herds, flocks and processing facilities owned or operated by the Department.

Students completing a degree with a major in animal science have a wide choice of challenging careers including ownership or management of farms, ranches, feedlots or state and federal agencies concerned with inspection, grading or regulation; sales and service positions with agricultural extension or teaching; and work in the processing, distributing and merchandising of dairy, poultry and meat products. Students who earn the masters or doctorate can look forward to careers in teaching, research or extension with universities, the U.S. Department of Agriculture or private industry.

Graduate Programs

The Department of Animal Science offers graduate work leading to the Master of Science degree in animal science, dairy science, poultry science, and food science. Research work at the M.S. level is available in the areas of animal breeding (genetics), animal nutrition, animal physiology or food science (meat or milk products). A Master of Agriculture degree in the emphasis area of animal science is also available. The Department offers programs leading to the Doctor of Philosophy degree in animal breeding, animal nutrition and food science.

Prerequisites. Admission to the graduate program requires an undergraduate major in animal science, dairy science or poultry science, or in closely-related biological sciences or biochemistry. In addition, students with a major in dairy manufacturing, microbiology, human nutrition, food science, or food technology can qualify for the program in food science. A student enrolling in a degree program must have been accepted by an adviser prior to official admission. In all cases, the student's graduate adviser or committee may recognize specific undergraduate deficiencies and require their removal.

Biochemistry

Professor and Head Roger E. Koeppe, Ph.D.

Biochemistry, the central scientific discipline linking the chemical, physical and biological sciences, exerts a profound influence on the progress of medicine and agriculture. By applying concepts and methods of chemistry and physics to the fundamental problems of biology, biochemists have made great progress in their effort to understand the chemistry of living organisms.

Biochemists are concerned with living things. They must acquire some knowledge of the biological sciences. Since a biochemist's tools are the physical sciences, he or she must receive sound training in mathematics, physics and chemistry.

Challenging positions for well-trained biochemists are available in colleges and universities, state and federal laboratories, research institutes, medical centers and in an increasing number of industrial organizations, particularly the pharmaceutical and food industries. Biochemists are involved with research on the chemistry of processes occurring in plants, animals, and various microorganisms, and with the discovery and development of antibiotics, vitamins, hormones, enzymes, insecticides and molecular genetic techniques.



At the undergraduate level a major in biochemistry administered by the Department of Biochemistry is available through either the College of Agriculture or the College of Arts and Sciences. An honors program is available. The curriculum provides a broad background in chemistry and biological science and permits flexibility in meeting particular interests of the student. Courses in biochemistry are based on general, organic and analytical chemistry. The biochemistry curriculum provides students with sufficient training in the basic sciences of mathematics, physics, chemistry and biology to meet the needs for graduate study in most fields of modern science related to agriculture or medicine. The curriculum is excellent for preprofessional students of medicine, dentistry and veterinary medicine.

Graduate Programs

Because many of the opportunities in biochemistry require advanced training, a major part of the program in the Department of Biochemistry is concerned with its graduate program leading to the M.S. or Ph.D. degree. This graduate program is an integral part of extensive basic research activities in the Oklahoma Agricultural Experiment Station. These research activities provide opportunities for part-time employment of undergraduate majors to improve their professional competence.

Prerequisites. Although the B.S. in chemistry or biochemistry is preferred, students with strong backgrounds in other biological or physical science disciplines are eligible. Individuals not having at least eight semester credit hours in each of organic and physical chemistry and calculus must take appropriate undergraduate courses to make up deficiencies. Entering graduate students are given placement examinations to assess their chemistry background; if performance is unsatisfactory they are asked to repeat an appropriate undergraduate course without graduate credit.

Degree Requirements. A more detailed description of the graduate study program in biochemistry is available from the Department upon request. The requirements listed below complement the general graduate requirements described in the "Graduate College" section of this *Catalog*. After the first semester continuous attendance and participation in the departmental seminar is expected.

The Master of Science Degree. Twenty-four credit hours of formal graduate courses are required, to include BIOCH 5753 (or 4113), 5853, and 5930. In addition, a student must present an acceptable research thesis (six hours) and pass a final oral examination covering it and related material. Research advisers are selected at the end of the first semester.

The Doctor of Philosophy Degree. The course requirements are determined with the aid of the student's graduate advisory committee. Usually they follow these guidelines: total of 30-40 credit hours of formal graduate course work which

includes all the courses listed for the M.S. degree, at least four of the advanced graduate courses in biochemistry (6000 level) and two offerings of Special Topics (6820). Additional course requirements, appropriate to the student's interests, are determined by the advisory committee. The advisory committee is selected at the end of the second semester. Each student will take a series of cumulative examinations beginning in January of his or her first year. A more comprehensive qualifying examination is given, usually at the end of the fourth semester of graduate study.

One year of a foreign language at the college level is required. The student must present, and defend in a final oral examination, an acceptable research thesis which contains a substantial original contribution to the field of biochemistry. The Department offers research experience in a variety of areas of biochemistry.

Entomology

Professor and Interim Head Russell E. Wright, Ph.D.

Entomology is the science and study of insects and related organisms regarding their biology, structure, identification, physiology, economic significance and population manipulation.

Education in entomology prepares the student for a career in industry, public service with state or federal agencies, or self-employment. A background in the basic physical and biological sciences is required before specialization in entomology can be initiated. The entomologist is qualified for a wide range of activities including research, teaching, quarantine and enforcement, insect control with insecticides or biological control agents, agriculture, pest control, insecticide sales or distribution, military entomology and pest management consulting.

Graduate Programs

The Department offers programs of study and research leading to the degrees of Master of Science and Doctor of Philosophy.

Prerequisites. Students making applications must be accepted by an adviser and approved by the departmental graduate committee prior to being admitted to the Graduate College.

Each program of study will be under the direction of a graduate committee. The program will be adapted to the individual's needs but will comply with all departmental and Graduate College requirements. The thesis option for the M.S. requires a minimum of 30 credit hours while the report option has a minimum of 36 credit hours. An oral examination is required of all candidates. Graduate student candidates are required to meet with their advisory committee every six months for program reports and/or examinations. Doctoral candidates are required to present a public defense of their dissertations. Doctoral students must assist in teaching one or more laboratories, including "Introduction to Entomology", for at least one semester. Students supported as half-time research assistants are required to work a minimum of twenty hours per week on projects of their major professors.

Forestry

Associate Professor and Head Edwin L. Miller, Ph.D.

America's forests are an important natural renewable resource. With proper decisions concerning management, forests can provide a bounty of uses and values for generations to come. Professional foresters play a vital role in developing and utilizing the forest and its diverse resources: timber, water, wildlife, range forage, recreation and wilderness.

Professional foresters manage the planting, growth and harvest of trees, while at the same time protecting forests from the harmful effects of fire, disease and insects. Foresters today are problem solvers using a blend of science, technology, economics and sociology to produce the products of the forest desired by society. Foresters work with private landowners and city planners, they teach and conduct research at universities, they administer parks and recreation areas, they manage the business of forest industry, and they manage the public forest land.

Graduates with a Bachelor of Science degree may be employed by federal agencies, including the U.S. Forest Service, Bureau of Land Management, the Soil Conservation Service, the Fish and Wildlife Service, and the Bureau of Indian Affairs. In addition, state, county and municipal governments employ foresters in a variety of positions. Wood-using industries retain foresters for land management, land and timber acquisition and harvesting positions as well as in mill production and administrative work. Foresters work for associations promoting the use of forest products and in many other public relations jobs. Some foresters are self-employed as consultants, specializing in timber and land appraisals, management planning and a variety of special services. Recipients of advanced degrees, especially the doctorate, may conduct research for the federal or state governments, universities or industrial organizations, or may enter the teaching profession.

The Department of Forestry offers a major in forestry leading to a Bachelor of Science degree in Agriculture. Course work in forest management is offered for the individual with career aspirations in the U.S. Forest Service and other federal agencies, state and local forestry organizations, forest industry and consulting. Courses in forest products are designed for those interested in the business, manufacturing and sales aspects of forestry. For the student with a research career in mind, course work in forest science is available. Requirements for a B.S. degree include the successful completion of a nine-week summer camp and a total of 140 credit hours of course work. The summer camp is scheduled to follow the sophomore year and is held annually in different forest settings. Past summer camps have been held across the U.S. from Maine to Oregon, from Montana to Florida, and even in Brazil. Students learn field forestry skills and observe state-of-the-art operations.

The Department of Forestry maintains two research stations in southeastern Oklahoma in the midst of the Ouachita National Forest and industrial timber holdings. Oklahoma has an active and progressive forest industry with one of the most modern highly mechanized timber harvesting systems in the world. One of the largest paper mills in the southern United States is located in the pine-oak forests of southeastern Oklahoma. Field trips to this area comprise part of the instruction in many forestry courses.

Graduate Programs

The Department of Forestry offers instruction leading to Master of Science degrees in forest resources and environmental science for students interested in graduate training with a research orientation. The Master of Agriculture degree in the emphasis area of forestry is offered for students interested in non-research graduate training in forestry. Programs of instruction and research leading to a Doctor of Philosophy degree are available through cooperating departments with an adviser from the Department of Forestry.

Instructional programs are designed to serve the needs of individual students and allow concentration in the areas of: biometry, ecology, physiology, economics, genetics and tree improvement, silviculture, management, and watershed management. The prerequisite for graduate study in the Department of Forestry is a bachelor's degree in forestry or a related field with an overall undergraduate grade-point aver-



age of 3.00 ("B" average). Applicants for financial aid are required to submit scores from the Graduate Record Examination for full consideration. Students without a bachelor's degree in forestry must take an approved core of undergraduate forestry courses for the Master of Science in forest resources and the Master of Agriculture degree.

Students preparing for the Master of Science in forest resources are required to complete 30 credit hours of course work including six hours of "Research and Thesis" (FOR 5000) (Plan I). Students preparing for the Master of Agriculture degree may elect to meet the requirements of either Plan I or Plan II (see "Credit Requirements" section of the "Graduate College.")

A student must be accepted by an adviser on the Graduate Faculty in the department prior to official admission to the program.

Horticulture and Landscape Architecture

Professor and Head Dale M. Maroneck, Ph.D.

Horticulture is the science and art associated with the culture and production of flowers, trees, shrubs, turfgrass, vegetables, fruits and nuts. It also includes the proper use and maintenance of plants in the landscape. Thus, horticulture is involved with the production of a significant part of the food supply and provides a major source of the beauty in and around homes, cities, parks, highways, golf courses and other public areas.

Today, horticulture requires highly trained and capable people to help meet the food demands of society and to be involved in activities that lead to a better quality of life.

Studies in horticulture cover a wide variety of plants and subjects. Factors such as nutrition, irrigation, genetics, propagation, control of flowering and fruit and seed production are considered in their relationship to culture, production, harvesting and storage. Students can prepare themselves for careers in public grounds administration, horticulture business, production, teaching, extension and research.

The training that the student obtains is related to the specific area of emphasis that is chosen. Regardless of one's interest, objectives, or area of emphasis, a good knowledge and understanding of horticulture is a necessity. A student can receive a Bachelor of Science (B.S.) degree and choose from the two following options:

Horticulture provides the training and expertise for production of fruits, nuts, vegetables, nursery crops, flower crops, etc. Training can be general, have a business or science orientation, or be chosen to emphasize a particular commodity area of horticulture;

Turf management provides the training for turfgrass production and for management of turfgrass in golf courses, in parks, home landscapes, along highways, etc. After the B.S. degree is completed, a qualified student may choose to pursue a graduate degree, specializing in any option.

Landscape architecture is the art of design, planning or management of the land and arrangement of natural and man-made elements thereon through application of cultural and scientific knowledge. It is also concerned with resource conservation and stewardship to the end that the resultant environment serves a useful and enjoyable purpose.

There are two options in the landscape area:

Landscape architecture is the study of art, business, construction, design, ecology, engineering and horticulture in a five-year professional program leading to the Bachelor of Landscape Architecture (B.L.A.) degree. Typical employers include landscape architecture firms, architectural-engineering firms and governmental agencies dealing with land planning, urban planning and design, or parks and recreation.

In an effort to maintain an effective balance between students, faculty, and facilities, enrollment in the fourth and fifth years of the program is limited to 25 students each. Students will be evaluated during their third year by the faculty to select the most qualified candidates based upon academic achievement and professional potential. Minimum requirements may vary each year; however, a student must have completed a minimum of 60 credit hours with "C" average or above in all courses required as prerequisites to the last two years of the B.L.A. program.

Landscape contracting is a four-year study leading to the Bachelor of Science in Agriculture degree. It emphasizes the implementation and management phases of landscape development. Course work includes basic landscape architectural design, construction technology, business and horticulture. Graduates are employed by landscape nurseries, contracting companies, design/building firms and landscape maintenance companies.

Graduate Programs

The Department offers work leading to a Master of Science degree and a Master of Agriculture through the study of flower crops, fruit and nut crops, vegetable crops, ornamental nursery crops, and turf. The Department also offers a Ph.D. in crop science.

Prerequisites. The Department may require credit hours in horticulture and related technical subjects.

Prior to admission to the program, all applicants for advanced degrees must be approved by the head of the Department and a faculty member who will serve as the adviser. The program of study and research will be directed by the student's graduate adviser and advisory committee.

Plant Pathology

Professor and Head Larry J. Littlefield, Ph.D.

Plant pathology is a broad discipline that ranges from basic studies of physiological and genetic aspects of plant diseases to the development of practical plant disease controls. It encompasses the science required to understand the causes of plant diseases as well as the art of preventing or controlling these diseases. Thus, the plant pathologist must have knowledge of plant biology as well as practical plant culture. Plant pathology, as a discipline, is actively involved in the newly emerging field of biotechnology.

Graduates in plant pathology (Ph.D.-level individuals) commonly find employment as research scientists in universities, the government (U.S. Department of Agriculture), industry or with various international development agencies. Graduates with the M.S. degree often work as research technicians in industries, universities or government laboratories or as sales or technical representatives in the agrichemical or plant breeding industries.

To qualify for graduate study in plant pathology an undergraduate student should obtain a solid background in the basic sciences, especially biology and chemistry, math, English and communication skills.

In order to become a fully trained plant pathologist, one or more graduate degrees in plant pathology are required. The Department offers both M.S. and Ph.D. programs with opportunities to specialize in a wide range of basic or applied research fields.

Graduate Programs

The Department offers programs of study and research leading to the Master of Science, Master of Agriculture in the emphasis area of plant pathology, and Doctor of Philosophy degrees. Programs are concerned with the cause, development, and control of plant diseases. Research problems are involved with on-going projects in the Oklahoma Agricultural Experiment Station, which include investigations on disease control (chemical, cultural, biological, and genetic) soilborne diseases, virology, phytobacterology, nematology, genetics, and host-parasite physiology. Individual programs can be developed toward basic research or can be developed to provide a broad practical background in plant health and pest management.

Admission Requirements. It is desirable that applicants have a strong background in biological or agricultural sciences. All requirements of the Graduate College must be satisfied by each applicant. In addition, applicants for graduate programs in plant pathology are required to take the Graduate Record Examination and to submit their scores with their applications and transcripts. Approval for admittance will be determined by the departmental screening committee and the department head. During the first semester of enrollment, each student, after council with the department head, will select a faculty adviser. Each graduate program is under the direction of the major adviser and a selected faculty committee and is adapted to the needs of the graduate student. There is no graduate credit for courses below the 4000 level. Each student will follow a program of study and research approved by his or her committee and, except for the Master of Agriculture degree, must submit an approved thesis.

College of Arts and Sciences

Smith L. Holt, Ph.D., *Dean*
Neil J. Hackett, Ph.D., *Associate Dean*
Mary Rohrberger, Ph.D., *Director of Curricular Affairs and Academic Programs*
Stanley D. Green, M.M., *Director of Extension*
Robert L. Spurrier, Jr., Ph.D., *Director of the Honors Program*
David A. Francko, Ph.D., *Director of Research*
William Ivy, Ph.D., *Director of Student Academic Services*

The College of Arts and Sciences not only offers within itself a wide variety of programs in teaching, research and extension, but also underpins and reinforces all the other programs of the University as a whole.

Apart from strong programs in the basic natural and social sciences and in the liberal and fine arts, the College provides a number of more specialized and interdisciplinary strengths, and a variety of professional and preprofessional training. Its 29 academic units, of which 23 operate as departments and five are grouped in two schools (Health, Physical Education and Leisure; and Journalism and Broadcasting) offer more than 57 degree programs at the bachelor's level, and in conjunction with the Graduate College, 23 master's and 14 doctoral degrees.

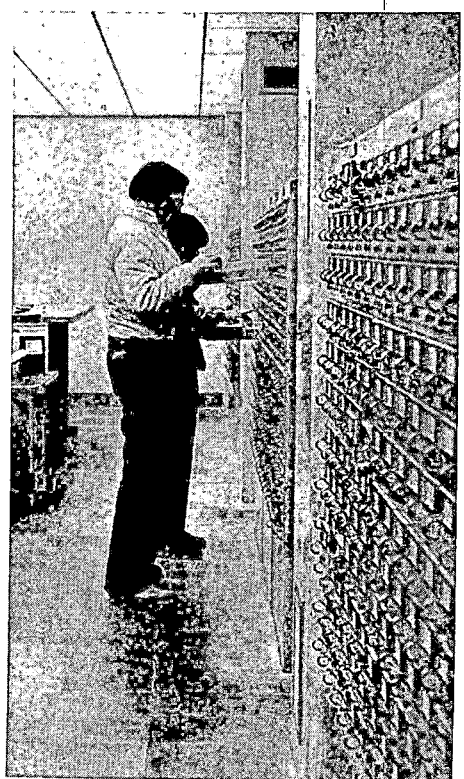
The Department of Economics, which belongs administratively to the College of Business Administration, offers B.A. and B.S. degrees through the College of Arts and Sciences. The Department of Biochemistry, which belongs administratively to the College of Agriculture, offers the B.S. through the College of Arts and Sciences.

Freshmen who are not yet certain of their career or educational goals can enroll without declaring a major in the College of Arts and Sciences and make satisfactory progress toward most degrees, without wasting time or credits, for as many as four semesters before they select their major fields of study. Under the careful advising of the Office of Student Academic Services, they can explore possible specializations or combinations of subjects as they complete necessary basic courses.

The College of Arts and Sciences provides academic training and background for a wide variety of professions including: law, medicine, social work, nursing, optometry, veterinary medicine, graphic arts, teaching, writing, foreign service, urban and regional planning, journalism, public service, radio/TV, advertising, public relations, medical technology, military science, public affairs, corrections, child services, interpersonal communications, and fine and performing arts.

Accreditation

Refer to appropriate pages under departmental listings for information on accreditation of specific programs.



High School Preparation

The College of Arts and Sciences strongly *recommends* that high school students have: four units of English; at least three units of mathematics; three units of science; three units of social studies including American history, world history, and one-half unit of Oklahoma history; two units of foreign language; one unit of arts such as music, theater, painting.

Credit by Advanced Standing Examination

Entering freshmen who believe that they can demonstrate sufficient mastery of a subject to earn advanced standing credit should write to the Office of Admissions for a schedule of advanced standing examinations. The most popular examinations are in foreign languages, English, mathematics and American history and government.

Scholarships

A number of undergraduate scholarships are available through the College and through the departments and schools within the College. Interested students should inquire in the Office of Student Academic Services for a list of available scholarships. Arts and Sciences students are also encouraged to apply for the variety of scholarships available through the general University which are listed in the "Financial Aid" section of the *Catalog.*

Academic Advising

The Office of Student Academic Services. The academic advising process in Arts and Sciences is coordinated by the Office of Student Academic Services. The counseling staff in Student Academic Services advises freshman, undecided and pre-health profession students. Departmental advisers provide advising for students who have declared their majors and are pursuing one of the more than 57 degree options available in the College.

The Student Academic Services staff also represents the College in the University's on-campus recruiting activities and represents the dean in such matters as petitions for extension and correspondence, change of major or college, and student withdrawals. Services also include graduate certification, information about college programs and requirements, and referral of A&S students to campus support services.

The "Undecided" Student. The general education program in the College of Arts and Sciences, while providing the breadth necessary for a quality undergraduate education, also makes it possible for freshmen who enroll without having decided on a major field of study to make satisfactory progress toward most degrees for up to four semesters. Students who initially enroll as undecided students may explore possible major fields of study with an academic counselor in the Office of Student Academic Services while completing required basic courses.

Responsibility and Assistance. The responsibility for satisfying all requirements for a degree, and for ensuring that a degree plan has been endorsed, rests with the student. Advisers assist students in curriculum planning, and students are encouraged to consult fully with their advisers and not restrict their visits to the pre-enrollment periods when only brief encounters may be possible.

Academic Programs

Undergraduate Programs. Requirements for all degree programs and options are detailed in the book *Undergraduate Programs and Requirements,* available in all Oklahoma colleges and high schools. Separate sheets, stating the requirements for any particular degree, may be obtained on request from the department or college in which the degree is offered.

Bachelor of Arts (B.A.): art, economics, English, French, geography, German, history, mathematics, music, philosophy, political science, psychology, radio-TV-film (production and performance), religious studies, Russian language and literature, sociology, Spanish, speech (communication consultancy), and theater.

Bachelor of Science (B.S.): aerospace studies, biochemistry, biological sciences, botany, chemistry, computing and information science, economics, geography, geology, health education, journalism and broadcasting, leisure, mathematics, medical technology, microbiology, military science, physical education, physics, physiology,

political science, psychology, sociology, speech (communication consultancy), speech pathology, statistics, wildlife and fisheries ecology and zoology.

Bachelor of Fine Arts (B.F.A.): art (graphic design and studio).

Bachelor of Music (B.M.): music (elective studies in business and performance); music education (instrumental/vocal certification).

Second Bachelor's Degree. To secure a second bachelor's degree, a student must complete a *minimum* of 30 semester credit hours in addition to those required for the first degree. The number actually needed depends on what a student must do to satisfy all the requirements for the second degree.

A student seeking a second degree in the College of Arts and Sciences at OSU should ask his or her second adviser to submit a degree plan for the second degree, clearly headed "second of two degrees," and showing how *all* the requirements of the second degree are to be satisfied. The plan should also state the major, date of award and total credit hours of the first degree, and indicate those courses which represent the minimum of 30 additional hours. The second degree plan should be sent to the College of Arts and Sciences Office of Student Academic Services within two weeks after the student's last pre-enrollment.

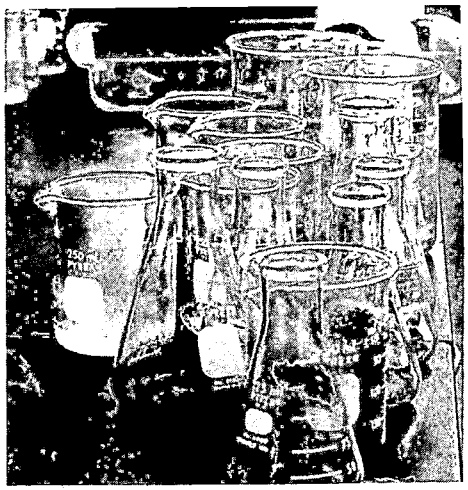
Students wishing to complete degrees in two different colleges at OSU should consult with the offices of student academic services of both. Concurrent enrollment in two colleges is possible, but a student must be enrolled in a college for at least two semesters before becoming eligible for a degree from that college.

Second Majors and Minors. If a student majoring in one field also completes the specified requirements for a "major" or a "minor" in other fields, the additional majors or minors may be noted on the student's transcript. Such specified requirements may be obtained from the student's own adviser or from the department in which the additional notation is sought. The student should, at the end of his or her senior year, ask the department head in the field of additional study to submit the request to the Office of Student Academic Services in the College of Arts and Sciences.

Graduate Programs. Master's degrees are offered in most undergraduate subjects, with doctor's degrees available in many. (For details, see the departmental entries below or consult the "Graduate College" section in the *Catalog*.)

Special Academic Programs

Honors Programs. The Arts and Sciences Honors Program is the oldest and largest program of its kind at Oklahoma State University. It provides outstanding students with the opportunity to study, conduct research, and interact with faculty and other Honors students in a variety of settings designed to assist talented students who seek to make the most of their educational opportunities. Honors sections of many general education courses allow participating students the benefits of small classes taught by experienced members of the faculty, thus combining the extensive resources of a major comprehensive university with personal faculty attention to each student. Special Honors seminars provide coverage of topical issues each semester in formats which encourage the exchange of ideas through discussion and writing. Honors seniors complete the requirements of the Honors Program by undertaking a senior Honors thesis (or similar creative



activity), and Honors seniors also may earn Honors credit by enrollment in graduate seminars.

Three Honors Program awards are available to A&S students—the general education Honors certificate, the departmental Honors award in the student's major field, and the bachelor's degree with Honors (which is earned by completing both general education and departmental Honors requirements). These awards are reflected on the student's transcript, and a special Honors diploma is awarded to students completing the requirements for the bachelor's degree with Honors.

Priority enrollment is provided for students who are active in the A&S Honors Program. This allows Honors students to select Honors courses and other courses taught by outstanding faculty at the earliest possible date each semester and facilitates the development of class schedules tailored to the special needs of Honors students.

Eligibility for admission to the A&S Honors Program as a first-semester freshman is based on the student's composite ACT score of 27 or higher. Students with scores of 25 or 26, combined with a high school grade-point average of 3.75 or higher, may be admitted at the discretion of the director. Later entry is permitted on the basis of a cumulative grade-point average of 3.50 or higher. Transfer students are eligible on the basis of the required ACT score and a 3.50 cumulative grade-point average. Eligibility for continuation in the A&S Honors Program is based on maintaining a 3.50 cumulative grade-point average.

The Arts and Sciences Honors Program Office is located in 216 Life Sciences East and Honors students are encouraged to contact the director of the A&S Honors Program at any time for assistance. In addition, each academic department in the College of Arts and Sciences has designated one or more faculty members or academic advisers to serve as the Honors contact for students in that department to assure that personal attention can be provided to Honors students in every academic major.

Bachelor of University Studies. For the student who has an academic objective which cannot be fulfilled by any of the regular degree programs, an individual plan of study fitted to the particular needs of the student may be devised with the approval of the student's adviser, dean and the Office of the Vice-president for Academic Affairs and Research.

Area Studies Certificates. *International Studies.* Students at OSU are encouraged to add an international aspect to their education by earning an Area Studies certificate. Certificates are offered in Asian, African, Latin American and Russian and Eastern European Studies.

The Area Studies certificate is granted upon successful completion of all requirements for a bachelor's degree in the student's major and of the following certificate requirements: (1) six credit hours of second-year level instruction in a language of the area choosen; (2) five upper-division courses (15 credit hours) pertinent to the area chosen; (3) A&S 3603, "Areas Studies Colloquium" (three credit hours).

For further information and advising inquire at the Center for Global Studies, 201 Life Science East.

Ancient and Medieval, Native American, and Women's Studies. A certificate in Ancient and Medieval Studies is also available as well as certificates in Native American Studies and Women's Studies. Further information may be obtained from the Office of the Dean of the College of Arts and Sciences.

High School Teaching Preparation. Students earning degrees in the College of Arts and Sciences may, by completing certain qualifying courses, receive state licensure for teaching in the secondary schools. Some programs, e.g. in physical education, cover grades K-12. Full details may be obtained from departmental advisers or from the Office of Teacher Education in the College of Education.

Students who wish to qualify for teaching licensure should consult as early as possible with the adviser in their fields of interest, and should apply for admission to teacher education as soon as possible, and preferably before the end of their sophomore year.

It is usually possible to qualify for teaching licensure and the bachelor's degree within the 127 semester credit hours required for graduation. When it is not possible, students may meet the requirements for the degree and then complete the licensure requirements by taking additional courses in a summer session or, in some cases, by correspondence.

Full teaching certification is awarded by the State Department of Education when the licensed candidate has successfully completed a period of teaching in a school system.

Preprofessional Programs in the Health Professions. *Pre-dentistry, Premedicine, Pre-osteopathic Medicine*, and *Pre-veterinary Medicine.*
(See also "Pre-veterinary Options" in the "College of Agriculture" section.)

The preprofessional curricula for medical doctors, dentists veterinarians, optometrists and osteopaths have the same basic core because they must prepare students for professional schools whose admission requirements are almost identical. These include a strong foundation in chemistry, biology and physics, the disciplines on which major advances in the health field depend. Included also are courses to develop written and spoken communication skills, which are highly important for a good relationship with patients, the public and other professionals.

Beyond this required core, preprofessional students may choose courses and a major as freely as any other students in the College of Arts and Sciences. Most students concentrate on some aspect of biology or chemistry, but other subject areas are not only acceptable but welcomed. Medical schools encourage study in the social sciences and humanities that contribute to the understand-

ing of human beings in their entirety—their history and environment, their attitudes and values, their emotions, motivations, interpersonal relationships and cultural heritage. All of these may affect sickness and health.

Although most students entering a professional school in one of the above fields have a bachelor's degree, it is possible to apply for admission after three years of college work (two years for a few dental and veterinary schools). OSU permits preprofessional (health-related) students to choose between two alternative bachelor's degree programs: (1) in a specific discipline that requires a minimum of 127 semester credit hours at OSU, or (2) in physiology, a degree program which allows a "3 plus 1" approach, requiring at least 97 semester credit hours at OSU and 30 hours to be transferred from a medical, osteopathic, dental or veterinary school after successful completion of the first year.

Some professional schools do not state a firm minimum grade-point average for admission, but a student should maintain better than a 3.00 grade-point average to be competitive. The specific admission requirements of medical, dental and veterinary schools are compiled in catalogs available in the offices of each preprofessional adviser and in the Office of Student Academic Services. The OSU pre-veterinary course requirements are listed under "Pre-veterinary Medicine Curriculum" in the "College of Agriculture" section.

All applicants for medical schools must take the Medical College Admissions Test (MCAT) and dental applicants must take the Dental Admission Test (DAT) prior to admission. The OSU College of Veterinary Medicine requires the General Test and the Advanced Biology Test of the Graduate Record Examination (GRE) within the previous four years.

Allied Health Professions. The allied health professions for which one can prepare at Oklahoma State University include dental hygiene, nursing, occupational therapy, optometry, pharmacy, physical therapy, physician's associate, radiologic technology, corrective therapy and athletic training. Each of these programs requires that the final phase of the education and degree program (usually two to three years) be completed elsewhere in a professional program. The College of Arts and Sciences offers the general education and basic science courses which one must complete before he or she can be accepted into a professional program. Students whose goal is admission to a professional program in the allied health professions should seek consultation with the senior academic counselor-coordinator of health professions advising for information regarding the specific requirements of particular programs and schools.

Medical Technology: See "Department of Botany and Microbiology."

Pre-law Program. Law schools have no preference for a specific undergraduate major. Admission to law school is normally based upon a strong record achieved in a rigorous undergraduate program and an acceptable score on the Law School Admission Test (LSAT).

Law school admissions officers most frequently recommend that students include in their undergraduate programs courses in economics, literature and languages, psychology, history and government, mathematics, logic, philosophy, accounting and speech. Courses in these areas are especially helpful as one seeks to develop the verbal and analytical abilities which are particularly critical for success in law school.



Pre-law students may select courses in consultation with a pre-law adviser in the Office of Student Academic Services until such time as they choose a particular degree program.

Library Science. Students who wish sound undergraduate preparation for admission to an accredited graduate library school should consult the adviser in the preprofessional program for librarians (Library, Room 510) concerning lower-division courses and the selection of an appropriate major field. Special aptitudes and interests are important in the selection of a specialization in librarianships. For general librarianship in public libraries, a humanities-related major is strongly advised, but specialists such as law or information-retrieval librarians are better served by undergraduate majors in social sciences or mathematics.

In the upper-division program, along with the required number of courses in the chosen Field of Concentration, students should take from 12 to 15 credit hours of basic library courses, including those usually required as prerequisites for the master's degree in library science. At least one modern foreign language is usually required, and a broad general background emphasizing the current literature of as many fields as possible is desirable. Students will receive individual attention to prepare them for the type of librarianship they prefer and for the graduate school of their choice.

Early admission to the preprofessional program will make it possible to avoid delay and to obtain a master's degree in as little time as two semesters.

Graduation Requirements

General Education Requirements. The General Education Requirements for the degrees offered by the College are shown for each program in *Undergraduate Programs and Requirements.* They total 40 credit hours for the B.S. and B.A. degrees.

All degrees include a common core of 12 credit hours. *Three credit hours of American history and three hours of American government* are required. These must be satisfied by HIST 1103 or 1483 or 1493 and POLSC 1013. *Six credit hours of English composition* is a University requirement, and this must be satisfied by English 1113 or 1313 and 1213 or 1413. Students who obtain a grade of "A" or "B" in ENGL 1113 may substitute ENGL 3323 for ENGL 1213. (See also "English Proficiency Examination," below.)

The remaining 28 credit hours must be distributed as follows: six credit hours of social sciences, six hours of humanities, eight hours of natural sciences, three hours of abstract and quantitative thought, three hours of communication systems, and two hours of elective.

College Requirements. In addition to the 40 hours of general education, the college requires one credit hour of orientation, A&S 1111, for both the B.A. and the B.S. degrees. For the B.S., nine additional hours of natural or mathematical sciences are required, as well as three additional hours from the humanities or arts. For the B.A., nine additional hours of humanities or arts are required, as well as three additional hours of natural or mathematical sciences. College requirements define the type of Arts and Sciences degree.

Foreign Language Proficiency Requirement. For the B.A., the foreign language requirement is 10 credit hours in *one* foreign language. Five hours in one language and five in another do not satisfy the requirement. The ten hours represent the first year of work in the language in college and are roughly equivalent to two years of work in high school. The courses are normally 1115 and 1225. Proof of equivalent proficiency must be recorded on the student's transcript, by either advanced standing credit or completion of a second year course or above in the language. FRNCH and GRMN 3013, 3023, FRNCH and SPAN 4113, RUSS 3I23, 4113, and 4223 do not satisfy this requirement.

For the B.S. degree, proficiency in a foreign language may be demonstrated by a high school transcript showing two years of high school study in a single foreign language or by college or advanced standing credit showing completion of one year of college study or a higher level course.

Non-Western Requirement (B.A. and B.F.A. only). One three-hour course in Non-Western studies from: A&S 3603 (Asian studies); ART 4633, 4643; CHIN 2115; 2123, 2223; ENGL 3173; FLL 3500, 3503; GEOG 3363, 3753; HIST 3013, 3203, 3403, 3413, 3423, 3433, 3980, 4613; JAPAN 2115, 2123, 2223; PHILO 3943; POLSC 3213, 3223, 3253, 3313; REL 3403, 3413, 3533, 3613, 4113, 4400, 4613.

International Dimension Requirement (all degrees). Three hours of credit in courses which foster understanding of, or the ability to communicate with, peoples and cultures of other countries. Courses satisfying this requirement are designated "I" in the *Catalog* and a list is available from any adviser or from the Office of the Dean of Arts and Sciences.

Scientific Investigation Requirement (all degrees). One course including an investigative laboratory giving experience with scientific method. Courses satisfying this requirement are designated "L" in the *Catalog* and a list is available from any adviser or from the Office of the Dean of Arts and Sciences.

The Non-Western, International Dimension, and Scientific Investigation requirements may be satisfied by courses used also to satisfy any other part of a student's degree program (i.e., in General Education, College, Major, ENDWC, or Electives requirements). No additional hours are required.

Additional College Requirements. For both the B.S. and the B.A., six hours of general education designated courses are to be taken at the 3000 level or above and 12 hours of college Enhanced Discussion/Writing Component (ENDWC) courses are to be included in a student's plan of study. A list of current college ENDWC courses may be obtained from any Arts and Sciences adviser or the Office of Student Academic Services.

The English Proficiency Examination. All candidates for a bachelor's degree must pass the University English Proficiency Examination. See "University Academic Regulations."

Mathematics Proficiency Requirement. All candidates for a bachelor's degree must pass the Arts and Sciences Mathematics Proficiency Examination or satisfy one of the following conditions:

1. Receive a grade of "A" or "B" in MATH 1314, 1513, 1613, or 1715; or
2. Receive advanced standing credit for any one of the courses listed in number (1) above; or
3. Receive a grade of "C" or better in any calculus course, that is, MATH 2265, 2365, 2373, 2383, 2713.
4. Pass the Arts and Sciences Mathematics Proficiency Examination prior to filing a diploma application. Students are encouraged to take the examination as early as possible. The examination is administered, by appointment, to individual students by the University Testing and Evaluation Service. A small fee will be charged for the administration and grading of the examination. Students who fail the examination will be required to take it again until they have demonstrated proficiency.

Major Requirements. At least 40 semester credit hours as specified by the department, including courses in the major and in supporting fields, must be completed. These 40 hours constitute the student's Major Requirements.

Upper-division Credit. A student must successfully complete at least 50 semester hours of upper-division credit, i.e. credit in courses at the 3000 or 4000 level.

Elective Hours. College policy allows students a minimum of 18 hours of free electives within a plan of study. Exceptions must be approved by the dean of the college.

Hours in One Prefix. If a student seeking a B.A. or B.S. degree takes more than 42 semester credit hours in one subject, including both lower-division and upper-division credit, the hours in excess of 42 will be added to the minimum total of 127 hours required by the College for a bachelor's degree. For example, if a department were to require 46 hours in one subject for a B.S. degree, the minimum requirement for a B.S. degree in that subject would be 131 hours. If a candidate for a B.A. in French has 46 hours of credit in French on his or her transcript, he or she must complete a total of 131 hours in order to graduate, instead of the stated total of 127.

This "42 hour maximum" applies to all courses taken in a subject, whether they are required or elective, with the exception of required courses in English composition and American history and government.

Total Semester Credit Hours and Grade-point Average. The minimum number of semester credit hours for graduation is 127. The minimum grade-point average is 2.00 and must be earned in all major courses, in Major Requirements, and all courses applied toward the degree.

Particular degree programs may specify higher grade-point requirements or exceed the 127 hours total. Details are given in *Undergraduate Programs and Requirements.*

Native Speaker Policy. It is the policy of the College of Arts and Sciences that native speakers of any foreign language (those whose language of instruction in high school was the language in question) may not normally be permitted to enroll in or establish credit in courses in that language at the 1000 or 2000 level. There are no restrictions on higher level courses. Exceptions resulting from degree requirements may be determined by interview with the head of the Department of Foreign Languages and Literatures and the appropriate language section chairman.

Endorsement of Student's Plan (Graduation Check). Immediately after their last pre-enrollment, before their last semester, students must check with their advisers to ascertain that a degree plan has been sent to the Arts and Sciences Office of Student Academic Services.

Changes in Degree Plan. Once a degree plan has been submitted, a student will not graduate until all requirements on it have been fulfilled. Any deviation in the plan must be recommended by the adviser on a "Change in Plan of Study" card, and sent to the Arts and Sciences Office of Student Academic Services for approval.

Checklist of Graduation Requirements.

1. *Total hours.* Minimum 127 (see degree sheet). Hours of "F" or "I," or for repeated courses unless officially approved in course descriptions in the *Catalog,* do not count. ENGL 0123 and MATH 0123 are not applicable to a degree. Students must ascertain that grade reports for the removal of "I's" have been sent to the Office of the Registrar by the instructor who gave the "I."
2. *Grade-point average.* See individual degree sheets for all grade-point minima, overall, in major, in major requirements, in professional courses, and in student teaching.
3. *Validity of credits.*
   a. No more than two courses in any one subject or (8 hours in biological science) may be used to satisfy General Education and College requirements.
   b. A course used in the Major Requirements may not be used to satisfy any other degree requirement, except the international dimension, scientific investigation, upper-division general education, ENDWC, and non-Western Requirements.
   c. Pass-no pass Grading System. Courses taken on this campus under the Pass-no pass Grading System (see "University Academic Regulations") may be used only as elective hours. They cannot satisfy any other requirement (General Education, Departmental, Major Requirement, certification).
4. All degree requirements listed above and specified in "University Academic Regulations" and *Undergraduate Programs and Requirements* must be satisfied.
5. *Exemption.* A student who believes that he or she has a valid reason for exemption from a College requirement should file with the Office of Student Academic Services a written request which has been approved by his or her adviser. Although general and departmental requirements apply to transfer students, all or most of their previous work may be acceptable as substitutions. Students should consult their advisers.

Departmental Clubs and Honor Societies

Advertising Club
Alpha Epsilon Delta (premedical honor society)
Alpha Epsilon Rho (broadcasting)
Alpha Kappa Delta (sociology)
American Association of Petroleum Geologists
American Chemical Society
Angel Flight
Arnold Air Society
Army Blades
Arts & Sciences Student Council
Association for Computing Machinery
Biology Club
Chinese Club
Dobro Slovo (Slavic languages)
Economics Club
HPELS Club
French Club
Friends of the Forms (philosophy)
Gamma Theta Upsilon (geography)
Geological Society
German Club
Japanese Club
Kappa Kappa Psi (band honor society)
Music Business Association
Music Educators National Conference
National Student Speech-Language-Hearing Association
Omicron Delta Epsilon (economics)
Pershing Rifles
Phi Alpha Delta (pre-law)
Phi Alpha Theta (history honor society)
Phi Epsilon Kappa (health, physical education, leisure)
Phi Lambda Upsilon (chemistry honor society)
Phi Mu Alpha (music)
Phi Mu Tau (medical technology)
Pi Mu Epsilon (mathematics)
Pi Sigma Alpha (political science honor society)
Political Science Club
Psi Chi (psychology)
Psychology Club
Public Relations Student Society of America
Russian Club
Scabbard & Blade
Sigma Alpha Iota (music)
Sigma Pi Sigma (physics)
Sigma Tau Delta (English honor society)
Society of Physics Students
Society of Professional Journalists
Sociology Club
Spanish Club
Speech Communication Organization
Statistics Club
Tau Beta Sigma (band honor society)
Wildlife Society
Women in Communications

Art

Professor and Head Richard A. Bivins, M.F.A.

The Department of Art provides courses for the following types of student needs: (1) general educational background, (2) major concentrations in art, (3) minor in art for other majors.

Two degrees are offered in art: Bachelor of Art (B.A.) with tracks in studio art and art history and the Bachelor of Fine Arts (B.F.A.), a professional degree. Students may choose one of two options in the B.F.A. program: studio art and graphic design. Fields of concentration available in both degree programs are drawing, painting, printmaking, graphic design, ceramics, jewelry, metalsmithing, sculpture and art history. Because of core curriculum department requirements, the freshman and sophomore years are virtually the same for all majors in art.

Students wishing teacher certification should contact the Teacher Education program in the College of Education or their art adviser. Art majors must attain a grade-point average of 2.50 in art courses in order to qualify for licensure and graduation.

The Department of Art maintains an exhibition gallery, the Gardiner Art Gallery in the Bartlett Center for the Studio Arts, with approximately 200 linear feet of exhibition space and 2600 square feet of floor space. Works by artists of national and international reputation, faculty and student works and cultural artifacts are shown.

Botany and Microbiology

Professor and Head Glenn W. Todd, Ph.D.

Botany

Botany is the science concerned with the study of plant life. Green plants are the constantly renewable source of food energy for all animals, including man, and it is important that they be thoroughly understood as survival and ecological balance depend upon this knowledge. As populations increase, the need for more and better supplies of food and fiber also increases. The study of botany underlies several applied sciences: agronomy, forestry, horticulture, plant pathology, range, lake and wildlife management.

To major in botany a student should have a strong interest in science with a good background in chemistry, physics and mathematics. Majors with a B.S. degree may qualify for secondary school science teaching licensure, for technical positions with the federal and state governments in plant inspection and plant introduction work, for plant breeding programs, and for various activities concerned with plants in private industry, such as plant biotechnology.

Facilities used in undergraduate teaching include well-equipped plant structure-function and ecology laboratories, constant-environment chambers, greenhouse facilities, a 160-acre 'ecology preserve' and herbarium with over 125,000 plant specimens. All of the faculty teach and do research in their specialty areas of botany: plant ecology, physiology, taxonomy, anatomy, development and limnology.

Graduate Programs

Programs of research and study leading to the degrees of Master of Science and Doctor of Philosophy are offered in many areas of botany including anatomy and ultrastructure, ecology, physiology, taxonomy, limnology, tissue culture, population biology, genetics and development.

Prerequisites. Applicants for admission must have received a baccalaureate degree from an accredited college and should have had 40 semester hours (or equivalent) in upper-division courses in the biological and physical sciences. A grade-point average of 3.00 (on a 4.00 scale) or above is required for unconditional admission. All applicants are required to submit scores for the Aptitude and Advanced Biology portions of the Graduate Record Examination.

Prerequisites for graduate degrees include successful completion of courses in the areas of plant taxonomy or field botany, plant morphology and anatomy, plant pathology or microbiology, plant physiology or cellular and molecular biology, genetics and ecology. Chemistry through organic and mathematics through calculus are also required. Students with an undergraduate major in plant science will have completed a substantial portion of this minimal list upon matriculation; those with a less closely related major may be required to take some background courses without graduate credit. Final authority for each student's plan of study, including courses to be taken at the undergraduate level, resides with the student's advisory committee.

A potential graduate student may be required to take one or more advisory examinations covering the various subject matter areas of botany. The examinations to be taken will be determined by the student's screening or advisory committee. The results will be used to determine course work needed or the level at which the student should proceed.

Demonstrated research competence through submission and acceptance of a thesis or dissertation is required for all graduate degrees. A minimum of one semester teaching experience is required of all M.S. and Ph.D. candidates. This requirement may be satisfied by enrollment in a college teaching practicum course (GRAD 5990) or by one semester teaching experience. The requirement for competence in a foreign language will be determined by the student's advisory committee.

All graduate students are expected to attend and participate in departmental seminars.

The Master of Science Degree. Plans of study must include 30 credit hours including no fewer than 21 semester credit hours numbered 5000 or above, which must include six credit hours of thesis and two credit hours of seminar. A minimum of 16 semester credit hours must be in the major department or field above the prerequisites required for entrance into the M.S. program.

The Doctor of Philosophy Degree. The student must complete a minimum of 90 credit hours beyond the bachelor's degree or 60 hours beyond the master's degree. The plan of study must include four credit hours of seminar. No fewer than 25 nor more than 36 hours of BOT 6000 will be allowed in the plan of study. After a Ph.D. candidate has completed most of the course work, qualifying examinations will be scheduled. These will cover major areas of the student's plan of study; all major subdivisions of botany will be included. The examinations will be both written and oral.

Microbiology

Microbiology is the study of microorganisms (i.e., fungi, bacteria, and viruses) and their relationship to higher organisms. Areas of practical and theoretical consideration that require some understanding of microorganisms include: public health and sanitation; biotechnology, genetic engineering; food production and preservation; industrial fermentations which produce chemicals, drugs, antibiotics, alcoholic beverages, and various foods; prevention and treatment of diseases of plants, animals and man; and biodegradation of toxic chemicals and other materials present in the environment. Most of the recent advances in the current understanding of genetics at the molecular level and in genetic engineering have resulted from research involving microorganisms.

Microbiologists work in federal and state departments of public health, the fermentation industry, laboratories of pharmaceutical companies, hospitals and medical schools, and research laboratories of universities, health centers, research foundations and private companies.



Students interested in careers in microbiology should have broad interests in the biological sciences and an aptitude for biology and chemistry. For some areas of specialization, an aptitude for mathematics and physics is also essential.

Departmental courses are designed to provide comprehensive training and the skills required for working with microorganisms, as well as a broad understanding of all aspects of microbial life. Many of the microbiology positions require graduate level studies. In addition to the B.S. degree, the department offers graduate studies leading to the M.S. and Ph.D. degrees in various areas of concentration including virology, microbial physiology, microbial genetics, microbial anatomy, immunology, and several applied areas.

Medical Technology

The program in medical technology is designed to give the student the broad general education and the highly technical skills that are required for a successful career in this important medical science. The minimum requirement for the B.S. degree in medical technology is three years of university work and one year of clinical laboratory education (internship) in an approved school of medical technology.

Clinical Laboratory Education. For the B.S. degree and certification, the students will, after three years of university work, complete one year of clinical laboratory education (internship) in a school of medical technology accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) and currently affiliated with Oklahoma State University. Schools of medical technology at the following hospitals are currently affiliated:

Comanche County Memorial Hospital, Lawton, Okla.
Mercy Health Center, Oklahoma City, Okla.
Muskogee General Hospital, Muskogee, Okla.
St. Anthony's Hospital, Oklahoma City, Okla.
St. Francis Hospital, Tulsa, Okla.
St. Mary's Hospital, Enid, Okla.
Valley View Hospital, Ada, Okla.

Students entering their twelve months of internship must enroll in Medical Technology Clinical Laboratory (MTCL) courses for 12 credit hours during the equivalent fall and spring semesters and for six hours during the equivalent summer session, as follows: Fall—MTCL 4117, 4125; Spring—MTCL 4236, 4246; Summer—MTCL 4325, 4351. A grade of "I" will be given for the first two semesters of internship. Final letter grades will be awarded upon receipt of the final official transcript showing final letter grades in the six MTCL courses from the school of medical technology by the University medical technology coordinator. If a student fails to complete the entire 12-month internship, no course credit will be awarded. Students will pay the regular tuition for the credit hours in which they are enrolled, except that the facilities fees will be waived for the 30 hours of MTCL courses. Students who earn a B.S. degree prior to entering hospital internship will not be required to enroll and pay tuition during internship unless they desire to earn a second B.S. degree in medical technology.

Preprofessional Courses. NAACLS requires a minimum of 16 hours of chemistry, including organic and/or biochemistry and 16 hours of biology, including immunology. The University requirement for the B.S. degree in medical technology is as follows: two semesters of general chemistry; organic chemistry and quantitative analysis; immunology and 10 additional credit hours of upper-division microbiology (physiology must be included in this 10 hours); college algebra and statistics.

Residence Requirements. Although the MTCL courses are considered to be resident credit, the student is required to complete additional resident requirements from regular on-campus courses as follows: 30 hours of resident courses, including 18 hours of upper-division courses listed under Major Requirements on the current degree requirement sheet in the *Undergraduate Programs and Requirements.*

Grade-point Average Requirements. Students, to be qualified for the B.S. degree, must earn a grade-point average of not less than 2.00 overall and 2.00 in upper-division major courses. Students with less than 2.80 overall grade-point average may find it difficult to gain acceptance to a school of medical technology under current conditions of competition.



Applications and Admission to Internship. Students should apply directly to one or more schools of medical technology about 12 months prior to the beginning date for internship. Approximately 70 percent of students applying for internship are accepted, depending upon the degree of competition in any particular year. The decision on acceptance of any applicant is entirely at the discretion of the hospital-based school of medical technology. Enrollment is limited by the size of the classes in the affiliated hospital-based programs. Satisfactory completion of the clinical laboratory education is required for eligibility to take a certifying examination. The B.S. degree in medical technology is not dependent on a passing grade on the certifying examination.

Graduate Programs

Programs of course work and research leading to the degrees of Master of Science and Doctor of Philosophy are offered by the Department of Microbiology.

Prerequisites. Applicants for admission must have received the baccalaureate degree from an accredited college and must have completed a minimum of 30 semester credit hours in biological and physical sciences. The Aptitude Test portion of the Graduate Record Examination is required of all applicants. An applicant will not be accepted unless at least one member of the departmental graduate faculty agrees to act as the applicant's adviser at the M.S. level. A majority of the departmental graduate faculty must approve an applicant at the Ph.D. level.

The Master of Science Degree. In addition to the general requirements for the degree, the following departmental requirements must be met: 30 credit hours with thesis. The plan of study must include six credit hours in MICRO 5000, one credit hour in MICRO 5160, and 12 credit hours in formal courses in Microbiology, of which at least eight credit hours must be at the 5000 or 6000 level, not including MICRO 5000 or other zero-ending numbers except with a prior majority approval by the departmental graduate faculty.

All candidates for the M.S. degree are expected to attend and participate in all departmental seminars. A final oral examination covering the thesis is administered by the advisory committee.

The Doctor of Philosophy Degree. The study plan must include 45 credit hours in formal courses, 22 hours of which must be in microbiology courses at the 4000, 5000 or 6000 level. In addition, two credit hours in MICRO 5160 are required. Students are required to attend and participate in all departmental seminars each semester. Proficiency in a foreign language (French, German, Italian, Russian, or Spanish) must be demonstrated and is required for all Ph.D. candidates in microbiology. This requirement may be satisfied by: (a) passing a graduate proficiency examination given in the Department of Foreign Languages and Literatures or (b) taking and passing (no grade less than "C") the two-semester introductory sequence in the language of choice (e.g., FRNCH 1115 and 1225).

Candidates for the Ph.D. degree must pass both a written and an oral qualifying examination. The written examination, given the last week of May and October of each year, will consist of questions covering the following six areas: (1) microbial systematics and evolution, (2) microbial physiology, (3) microbial ecology, (4) virology, (5) immunology, and (6) genetics. The oral examination will be administered by the candidate's advisory committee only after the written examination has been passed. The final examination covering the thesis (the candidate may be responsible for additional areas if the committee has stipulated such as a requirement for passing the qualifying examination) is given promptly after the candidate has given a public seminar on his or her research work.

Chemistry

Professor and Head Neil Purdie, Ph.D.

Chemistry is the science that deals with the composition, structure and interactions of matter of all kinds. Materials obtained from the earth, such as ores, petroleum and natural gas, as well as those from plants and animals, such as food, fibers and antibiotics, are all studied and modified through chemical means. The chemist creates from natural products new and useful substances that add to the enjoyment of life. He or she creates new agents to combat pests that destroy great portions of food supplies and new drugs to fight diseases of many kinds. Chemists lead the fight against pollution of the environment that results from rapid multiplication of population and of use of energy. Chemists are at the forefront of the search for new energy sources and for ways to better use existing sources of energy.

A great curiosity concerning the physical world should be characteristic of one who is considering chemistry as a profession. The student should want to learn more about the changes of materials and to use his or her knowledge for the betterment of life. The student should have an interest in physics and mathematics since their principles are basic to the study of chemistry.

Chemists are employed by most large companies in this country, especially those that produce foods, medicines, fuels and materials. These chemists work in the areas of research, sales and quality control. Many chemists become teachers in public schools or colleges. State and federal agencies employ chemists for research and analysis. Generally an M.S. or Ph.D. degree is desirable for those interested in research or college teaching.

The Department of Chemistry offers two bachelor's degrees: (1) a B.S. degree that is accredited by the American Chemical Society; and (2) a B.S. degree that requires less specialization.

The chemical laboratories are modern and well-equipped with instruments for determination of properties of chemicals and studies of reactions. Individual laboratory work is encouraged.

Graduate Programs

Prerequisites. The student should have at least eight semester credit hours (or the equivalent) in general, analytical, organic, and physical chemistry. The physical chemistry should have been based on mathematics through calculus.

A beginning graduate student must take diagnostic examinations covering one year of undergraduate study in analytical, organic, and physical chemistry before the student enrolls for the first

time. If the student fails to pass one of these examinations, he or she will be required to repeat the appropriate undergraduate course without graduate credit at the first opportunity. No graduate credit may be earned for chemistry courses numbered below 4000. The student may enroll in graduate courses for which the student has passed the entrance examination.

Admission Requirements. Admission requirements are minimal. For admission without qualification a grade-point average of 3.00 or better is required. Deserving applicants with grade-point averages less than 3.00 are infrequently admitted under probationary conditions. Additional support of the application is sought in the form of three letters of recommendation. Graduate Record Examination scores are not used as a criterion for admission. Recommendations on admission to the Graduate College are made on behalf of the applicant by the departmental admission officer. Acceptance by a permanent adviser is not a prerequisite to admission to the program.

Degree Requirements. A more detailed description of the graduate study program in chemistry is available in a brochure which will be supplied by the department upon request. The requirements set forth below complement the general requirements stated in the "Graduate College" section of the *Catalog*.

Attendance and participation in the departmental colloquium and CHEM 5011 and 6011 are required.

The Master of Science Degree. Students must complete at least 30 credit hours of graduate course work in chemistry or related fields.

Each student must present an acceptable thesis dealing with a research problem and pass a final oral examination covering it and related material. Research on the thesis problem should be started as early as possible in the graduate program.

The Doctor of Philosophy Degree. Work is offered which leads to the degree with specialization in analytical, inorganic, organic and physical chemistry. A major in biological chemistry is offered by the Department of Biochemistry.

The student must pass a qualifying examination in the student's field of specialization.

An acceptable thesis must be presented which contains a substantial original contribution to the field of chemistry. The student must pass a final oral examination covering the thesis and related material.

The Doctor of Philosophy degree requires the completion of at least 90 semester credit hours of work beyond the bachelor's degree, divided nearly equally between thesis and course work.

The course requirements are determined by an advisory committee which is appointed for each student.

Computing and Information Science

Professor and Head George E. Hedrick, Ph.D.

Computer science is concerned with theoretical and practical methods of storing, processing and communicating information by means of computers. Professional computer scientists obtain a formal education through the B.S., M.S. or Ph.D. degrees and apply their knowledge to many diversified fields of science, engineering, business and communications. Computing science offers opportunities to both specialists and generalists.

In little more than one human generation, the computing field has evolved from one associated primarily with engineering and scientific calculations of only casual interest to the layman to a factor of significant influence in almost every aspect of modern life. Technical careers in computer architecture and software design, as well as applications in the business and scientific areas, require a thorough knowledge of the principles of computer science. In addition, most managers in any field require some familiarity with computers, not only to be able to understand and cope with them, but also to incorporate them into their own decision-making processes.

The department offers the full range of degree programs—B.S., M.S. and Ph.D. The B.S. program consists of a computing science core curriculum with specialization in business applications, computer systems, scientific computation or computer architecture.

The department also has a cooperative education program. Cooperative education is the process of education that formally integrates college studies with work experiences in cooperating employer organizations. It blends classroom study with planned and supervised employment in an area relevant to the student's major. Students who are in their junior year may enter this program and will alternate semesters in the classroom with semesters on the job. A student will go into the work setting at least three times.

Most B.S. and M.S. graduates obtain positions in industry. Approximately half of the Ph.D. graduates take university teaching and research positions and half are employed in industry.

Computing facilities available include the University Computer Center computers, an IBM 3081K with 32 megabytes of primary memory and a VAX 11/780 and VAX 8350. The department also has six Intel 286/310s, two AT&T 3B2/300 microcomputers and 30 AT&T UNIX PCs, an AT&T 3B15 computer, four AT&T graphics terminals, as well as several microcomputers. These are available for instructional assignments and research projects. Faculty and graduate students also have access to a Perkin-Elmer 3230 (Concurrent XF610) which can be used for experimental software development.

The Department participates in the CSNET and USENIX networks for computing science research and UNIX users. (UNIX is a trademark of Bell Laboratories.)

Graduate Programs

The Department offers degree programs leading to the Master of Science degree, the Doctor of Education degree in higher education, and to the Doctor of Philosophy degree. These programs are designed to prepare an individual to pursue a career in either an academic or an industrial setting. In addition to taking a prescribed set of core courses, a student must take sufficient courses in one of four topic areas: computer organization and operating systems, information systems, numerical analysis and optimization, and programming languages. In addition to course work, a student must complete a thesis for an M.S. degree and a dissertation for a Ph.D. degree.

The core course requirement assures the student of breadth of knowledge in computing science; the freedom to choose one of four areas and additional research assures the student of enough depth in some facets of computing science to be able to carry out independent investigations in those areas and or put concepts and ideas learned to practical use.

For a master's degree, 30 hours of graduate credit, including a six-credit-hour thesis, are required. A master's degree student is required to pass an oral examination over the thesis. There is no foreign language requirement for the M.S.

For an Ed.D. or a Ph.D., 60 credit hours beyond a master's degree or 90 hours beyond a bachelor's degree are required. A dissertation of no more than 30 hours is required. The Ph.D. dissertation must describe original research while the Ed.D. dissertation may be expository. Ed.D. and Ph.D. students must pass (at an appropriate level) written preliminary examinations in areas of specialization. For Ed.D. students, one of the speciality areas must be computing science education. Master's students who pass these examinations at the Ph.D. level are encouraged to pursue a Ph.D. program of study. Reading knowledge of at least one foreign language is required for a Ph.D. but not for the Ed.D. Approximately 250 students graduate each year in the United States with Ph.D.'s in computing science. In general, many academic and industrial positions exist for each Ph.D. graduate.

The candidate's baccalaureate degree need not be in computing science in order to enter this program. Admission to the program does require: (1) an undergraduate degree; (2) successful completion of a 10-hour calculus sequence; (3) demonstrated competence in programming with some procedure-oriented programming language such as ALGOL, COBOL, FORTRAN, or PASCAL; (4) qualifying grade-point average and Graduate Record Examination scores.

English

Associate Professor and Interim Head Edward P. Walkiewicz, Ph.D.

The study of English literature and language is fundamental to any education. Not only does it provide familiarity with the literary works that shape cultural heritage, but it also develops the abilities to think analytically, to speak and write effectively, and to consider various points of view when dealing with people and ideas. Educated people in almost every career and lifestyle regard these skills as invaluable.

The Department of English prides itself on the diversity of its course offerings and on its small lecture and discussion classes. The B.A., M.A. and Ph.D. degrees are awarded through the Department and a full range of courses are offered in seven areas: literature, composition and rhetoric, technical writing, creative writing, linguistics, teaching English as a second language, and film. The number of students in any English class rarely exceeds 30; and in a writing class, including freshman-level classes, the enrollment cannot exceed 25.

An undergraduate English major has three options: a traditional English major, secondary education teaching certification, or an option in technical writing, each of which emphasizes literature and writing in varying proportions. English majors may choose from courses in all historical periods of British and American literature, from early to contemporary, and in all genres—novel, short story, poetry, and drama. Every literature course emphasizes literary appreciation and anal-

ysis and allows ample opportunity for discussion and writing. The student in the traditional major may also take creative writing from practicing, published writers and may specialize at the advanced level in fiction writing, poetry writing, and scriptwriting. Also available are courses in linguistics, which is the study of language, and technical writing, which is writing for science and industry.

Many English majors pursue careers directly related to their major, such as in technical writing or in teaching. An English major with a technical writing option would be well prepared to pursue a career in that field. Students who want to teach may earn secondary teaching certification in English through either the Department of English or the College of Education, or they may decide to go to graduate school in order to teach in a college or university. A great many English majors have found the teaching profession a rewarding and challenging one. More students are finding that an English major is excellent preparation for law school because it develops the analytical and language skills lawyers use. But one need not have definite career goals to major in English. English majors regularly pursue careers not only in education, professional writing, and law, but also in medicine, the ministry, publishing, government, and business. Professional schools and businesses value English majors both for their communication skills and for their broad-mindedness.

The Department of English serves a great many students other than those majoring in English. It offers a variety of writing courses to fullfill the University's composition requirements; and English courses in literature, technical writing, creative writing, and film are very popular electives for students in all majors. Many students find English such a good complement to their first major that they choose a second major or minor in English.

A Bachelor of Arts in English requires 39 hours of lower- and upper-division English courses. An English minor requires 18 hours of English, at least 9 of which must be upper-division. (These hours do not include Freshman Composition.)

Graduate Programs

Graduate study in English at Oklahoma State University allows students freedom of choice. Only one course—"Introduction to Graduate Studies"—is required of all graduate students, and only one additional course—"Teaching Freshman Composition"—is required of all graduate teaching assistants. As a result, all students, in cooperation with their advisers, design their programs in accord with career goals. In addition to American and British literature, the Department of English offers graduate work in composition and rhetoric, creative writing, film, linguistics, and literary theory. At the M.A. level, separate programs in teaching English as a second language (TESL) and in technical writing prepare teachers for the bilingual classroom and technical writers for industry. Ph.D. degree candidates have an additional interdisciplinary area that allows them to blend other disciplines with literary studies. The variety of choices and the flexibility built into the program prepare the graduate to meet the demands of a changing academic marketplace.

Stipends, Scholarships and Awards. All graduate assistants and associates, are charged in-state fees. Stipends for graduate assistants and associates are paid on a nine-month basis.

M.A. and Ph.D. Examinations. During their first year in the graduate program, all entering students are required to take a diagnostic examination which tests knowledge of literary terms and ability to perform a stylistic analysis of poetry or prose.



Upon completion of all course work, M.A. students take a three-part examination over American literature, British literature, and one of the following subjects: composition and rhetoric, film, linguistics, and literary theory.

Ph.D. students are examined in at least three of the five following subject areas (students may exempt, with permission, two of the five areas by virtue of course work):

American Literature to 1910
British Literature to 1660
British Literature from 1660 to 1910
Modern British and American Literature
Interdisciplinary Studies: American studies, composition and rhetoric, film, linguistics, literary theory, TESL, technical writing

One of these areas, with the exception of Interdisciplinary Studies, is designated as the student's primary area of study.

Teaching Opportunities. Graduate teaching assistants may enjoy a wide range of assignments, including teaching freshman composition and working individually with students in the writing laboratory. After requiring some classroom experience and demonstrating excellence, assistants may also teach introductory courses in literary genres, creative writing, or technical and report writing.

The Master of Arts Degree. Every M.A. degree student is required to take 24 credit hours of course work and six thesis hours. (Applicants who were not English majors may be asked to enroll in additional hours to sharpen skills.) ENGL 5013, "Introduction to Graduate Studies," is required of all M.A. candidates. The remaining 21 hours of course work will be chosen by students in consultation with their advisers.

In addition to 30 hours of work in English, a dictionary-reading knowledge of one foreign language is required. When appropriate, students may use six hours in linguistics or Old English to satisfy the language requirement.

Master's degree candidates prepare either a scholarly or a creative work for thesis credit. A thesis committee consisting of a thesis adviser and two other faculty members supervises this project. Students choose the faculty members with whom they work; the project should be a valuable experience for both candidates and supervisors.

The Master's Program in TESL. *Admission to Teaching English as a Second Language.* TESL is a program within English having its own course requirements and examinations. Applicants who speak English as a second language should have had an undergraduate concentration in English or the equivalent in practical experience. After initial testing and counseling, TESL students may be asked to enroll in a course designed to improve their command of English. Applicants who speak English as a first language need not have majored in English, but they must have completed at least six hours of upper-division foreign language training. Native speakers who have not done so should expect to complete two semesters of foreign language courses in addition to English requirements.

TESL Examinations. TESL examinations cover four areas: traditional English grammar, TESL methodology, and two areas chosen by the student.

TESL is especially relevant to the public school classroom as a result of recent legislation concerning bilingual education. Teachers in English and other areas of expertise will find this program especially useful. This program, however, does not serve as a substitute for teacher certification. (A special TESL brochure is available.)

Course work. Plan I: 24 hours of course work and a thesis for a maximum of six hours are required. Plan II: 33 hours of course work and a research project or substantial paper are required.

The Master's Program in Technical Writing. *Admission to the Technical Writing Program.* Technical writing is a program within English having its own course requirements and examinations. Applicants should have a background in a technical area and in technical writing. Following a review of previous academic and work experience, as well as the results of a diagnostic test, students may need to enroll in courses designed to improve their mastery of a technical area or technical writing or both. Students need not, therefore, have majored in technical writing or a technical area.

Examinations. Examinations in technical writing, in addition to the diagnostic examination, cover these areas: technical writing theory, and a choice of two from among language and linguistics, rhetoric and the development of style in technical and scientific literature, British or American literature, or a special field of technical knowledge. Special restrictions do apply to which examination areas the student may select and students should consult the special technical writing program materials.

Course work. Plan I: 24 hours of course work and a thesis for a maximum of six hours are

required. Plan II: 33 hours of course work and a research project or substantial paper are required.

The Doctor of Philosophy Degree. A master's degree in English from an accredited university, a graduate grade-point average of 3.50 (on a 4.00 scale), and positive letters of recommendation are the usual requirements for admission to the doctoral program. If one of these factors is not clearly present, admission may be granted with qualifications. The doctoral student is expected to earn 60 hours of credit beyond the hours required for the M.A. Of these 60 hours, a maximum of 20 hours may be devoted to the dissertation.

A dictionary-reading knowledge of two foreign languages is required of the doctoral student. When appropriate, students may use six hours in linguistics or Old English to satisfy one of the language requirements. The doctoral student may also fulfill this requirement by demonstrating mastery of one foreign language. Details about the foreign language requirement are found in the Department's *Guidelines for the M.A. and Ph.D. Programs in English.*

Doctoral candidates submit a dissertation based upon original research and prepared under the guidance of a dissertation committee composed of at least three faculty members from within the Department and one faculty member from outside the Department. Creative writing students may present as their dissertations original works in poetry, drama (including filmscripts), or prose fiction. The dissertation is defended orally by the candidate at a public examination in which the argument, credibility, and value of the work are challenged.

Course Requirement for Teaching Assistants. In their capacity as teachers, assistants are required to enroll in "Teaching Freshman Composition." This course appears on student transcripts and may be counted for English degree credit.

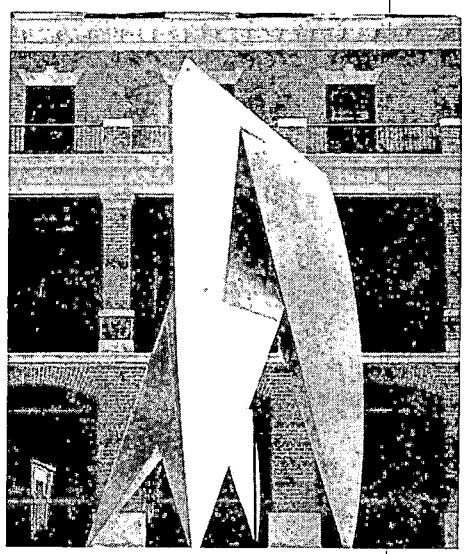
Foreign Languages and Literatures

Professor and Head John A. Schillinger, Ph.D.

The Department of Foreign Languages and Literatures offers French, German, Russian and Spanish as major fields of study. Minors may be earned in Chinese, French, German, ancient Greek, Japanese, Latin, Russian and Spanish.

In all languages offered by the Department, elementary courses are available for students with no previous experience. A special intensive course in Spanish (10 credit hours in eight weeks) is offered in the summer session. Students with high school or equivalent foreign language experience will be placed at levels commensurate with their individual proficiency. A major in a foreign language is often supported by study of another language or work in other fields. Many language majors choose to qualify for an international area studies certificate. Several certificates, such as Russian and East European Studies, Asian Studies, Latin American, and Ancient and Medieval Studies, are available. A freshman with a good high school background in language can usually pursue two languages to the level of a major.

The study of foreign languages is a vital and humanizing part of a general education. In a



rapidly changing and shrinking world, it offers new cultural insights, breaks down insularity, fosters discipline of thought and expression and leads to a better understanding of one's native language. Foreign language majors may expect to find openings in a wide variety of careers in law, medicine, government, industry and commerce, all of which require a good liberal arts degree. Job opportunities are greatly enhanced for those who combine foreign language study with a major or minor in other disciplines. Moreover, there is a growing demand for foreign language teachers in secondary education. Bachelor of Arts candidates may qualify for teaching licensure without increasing the number of hours required for graduation.

Additional options for study include literature, civilization and culture, and linguistics courses regularly taught in English. Courses are also offered in German for students who need only a reading knowledge of the language.

The M.S. degree in curriculum and instruction, with specialization in French or Spanish, is available for prospective teachers of foreign languages in elementary and secondary education.

Geography

Professor and Head Richard D. Hecock, Ph.D.

Geography is concerned with the surface of the earth and its immediate atmosphere. Geographers study the similarities, the differences and interactions among phenomena in this region. Geographers are interested in the economic, social, political and environmental qualities of places, and they are interested in how these attributes interact.

Geographers attempt to understand human behavior by answering such questions as: Where do people work? Where do they play? Where do they live? Why do people make these locational choices? What are the consequences of these decisions and behavior?

Because the physical environment is important in many explanations of spatial behavior and spatial patterns, geographers have traditionally concerned themselves with relationships between humans and their environment. What impact do people have on the land? What impact does the land have on people? How do people perceive their environment? How does this perception influence their activities?

Finally, geographers examine spatial patterns and behaviors in specific regional contexts. These analyses occur at many levels—world-wide, national and local. These kinds of studies lead to suggestions for change and improvement—the application of geography to contemporary rural, urban and regional problems. Thus many aspects of urban, regional and national planning are geographic in nature.

No academic discipline has broader interests than does geography, and the Department of Geography allows students the flexibility to pursue studies that lead to a wide range of educational goals and careers. Students with interests in environment, planning, real estate, economic development, international affairs, travel, area studies, management or education are among those which can be accomodated. A geography minor program is also available for those who see geography as complementary to another field of study.

Those who wish to study geography tend to be interested in their own surroundings and in other places. They also possess a curiosity for maps, the basic tool of the field. Students of geography will become familiar with remote sensing, computer graphics, statistics, information systems and cartography—tools which facilitate geographic analysis.

Many careers are available to the geography major or minor. Recent graduates have been employed in urban and regional planning, community development, locational analysis in both the public and private sector, resource planning and management, various forms of domestic and foreign service, cartography and teaching. Geography also provides an excellent foundation for a liberal education and is a good basis for a career in business, industry or government.

The Department possesses a cartographic laboratory, and access to a state-of-the-art remote sensing laboratory. It is directly linked to the University's computing facilities through both standard and graphics terminals. Strong support for the economic-business and urban-regional planning geography programs are provided by the College of Business Administration and the School of Architecture. Students with resources management, remote sensing or physical geography interests will find complementary course work in agricultural economics, forestry, geology, biology and civil engineering.

The Department of Geography offers the B.A. and B.S. degrees. An advanced program leading to the Master of Science degree is also available. Geography graduate students may want to be affiliated with the environmental science or historical preservation degree programs.

Graduate Programs

The Department of Geography offers work leading to the Master of Science degree. This degree program emphasizes preparation for employment in positions which are enhanced by an ability to recognize and to interpret spatial distribution, and to analyze regions.

Particular emphasis is placed on the applied aspects of geography, with many graduates employed by city, regional, state and national planning agencies. Interdisciplinary work is strongly encouraged, particularly in environmental science, resource management, urban and regional studies, and historic preservation. Recipients of the

M.S. in geography have also gone on to a variety of successful careers in other fields, including retail store location analysis, banking, and university teaching and research.

The Master of Science Degree. Admission to the master's program in geography is granted to college graduates with superior academic records. An undergraduate geography major is not required. Majors from the social, physical, and behavioral sciences and from the humanities are encouraged to apply. Incoming graduate students must demonstrate competency in cultural geography, physical geography, statistics, cartography, and other geographic concepts. If deficiencies are apparent, they will have to be corrected, possibly increasing the time needed to complete the degree.

Two basic plans of study exist for the master's degree. Each plan is flexible but includes directed research experiences involving both data generation and the analysis of existing data. One of the plans requires a minimum of 30 credit hours including a thesis; the other requires a minimum of 32 credit hours and a research project culminating in a report. All candidates must satisfy a statistics requirement.

Plans of study can be developed to accommodate many specialities including regional planning, historic preservation, remote sensing, resource management, physical geography and social geography.

School of Geology

Sun Chair and Head Wayne A. Pettyjohn, Ph.D.

Geology is the science of the earth. As such, it utilizes information from the other physical and biological sciences, mathematics and engineering. In many ways it is a common meeting ground for these disciplines. Within geology are many different specialties, for example economic geology, petroleum geology, ground-water geology and paleontology. However, to specialize in any area normally requires graduate study.

To achieve success in geology a student must become reasonably proficient in the information acquired from basic courses in physics, chemistry, mathematics, and, to a lesser degree, statistics and computer science.

Geologists are employed extensively in applied and pure research and in teaching. Applied research includes the exploration for and development of oil and gas fields, metallic and nonmetallic mineral deposits and reservoirs of ground water. The geologist is well-prepared to pursue and direct environmental studies. Careers in research may be found with private employers, governmental agencies or universities. Teaching positions in geology are available at all levels beginning with secondary education. As with most other sciences, more employment opportunities will be available to students with advanced training and a broad background. In general, careers as teachers at the college and university level and in research are open only to those with graduate training.

The School of Geology at OSU offers a broadly-based rather than a specialized undergraduate program. The program leads to a B.S. degree in geology, which prepares the student for employment with industry or for graduate study.

Graduate Programs

Prerequisites. The student should have at least 39 credit hours in geology, including all those courses listed as requirements for the B.S. degree in geology at Oklahoma State University. These additional requirements are minimal: a minimum of nine credit hours of chemistry, eight hours of physics, four credit hours of zoology or botany, ten credit hours of calculus, and three credit hours of computer science. Deficiencies in course work must be made up by the student after entering the program. The Graduate Record Examination is required for admission to the program.

The Master of Science Degree. Emphasis in the master's program is placed on classical geology and various aspects of applied geology, such as economic geology, engineering geology, environmental geology, hydrogeology, and petroleum geology.

Each candidate must complete at least 30 semester credit hours of work beyond the prerequisites. As many as 12 of these may be taken in other departments of the University upon approval by the candidate's advisory committee. Each candidate is required to write a thesis. A final defense of the thesis and the research that it documents is required of all students.

School of Health, Physical Education and Leisure

Professor and Director George H. Oberle, P.E.D.

The School of Health, Physical Education and Leisure (HPEL) is a multi-faceted organizational unit encompassing three academic departments: health, physical education, and leisure; four leisure service programs: recreation, intramurals, sports clubs, and outdoor adventure; and the Health and Fitness Center. (See "Campus Recreation" in the "Student Life" section.) The programs of the School provide a complex of curricular and cocurricular endeavors emphasizing the dual role of meeting the continuous need for enriching and broadening the scope of the individual, and at the same time, preparing the individual professionally for useful service to mankind.

Health

Professor and Coordinator James H. Rogers, Ph.D.

The program in health offers students a selection of two major undergraduate professional preparation tracks.

Track one, school health, prepares the student to teach health in a public or private school setting. After successfully completing all course work, including a student teaching internship and the health curriculum examination, the student would be qualified for state licensure to teach in grades K-12.

Track two, community wellness, is a non-teaching track that provides the student with expertise in developing health and wellness programs within school, university, hospital, and industrial settings, as well as community and public health agencies. Community wellness students will culminate their experience with an internship. In addition to the two major tracks, an emphasis in athletic training is offered that will meet state licensure.

The program in health also offers courses which can contribute to a student's general education, as well as supporting degree requirements for selected disciplines across the campus.

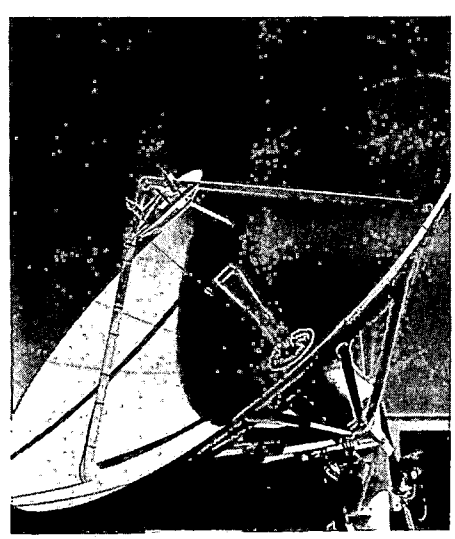
Leisure

Associate Professor and Coordinator Lowell Caneday, Ph.D.

The program in leisure provides students with three basic services: (1) students may earn a Bachelor of Science degree in leisure, (2) students from other disciplines may earn a minor in leisure as a generalist offering, and (3) students from throughout the University may enroll in leisure course offerings to meet their particular needs and interests related to fitness and the wise use of leisure time.

The Bachelor of Science degree in leisure is designed to give students a professional foundation for careers in recreation and leisure services. The program is accredited by the National Recreation and Park Association in two areas: therapeutic recreation, and administration and management. The curriculum prepares students for professional opportunities in recreation program services for Armed Forces, camps, outdoor recreation areas, churches, colleges, unions, fitness centers, schools, youth-serving agencies, and institutions serving special populations such as the ill, disabled, handicapped, aged and incarcerated.

The purpose of the general studies courses in leisure is to assist individuals in the development of capabilities for use of personal leisure. Courses are designed to provide individuals with the knowledge and skills necessary to appreciate the importance of activity and physical fitness for everyday living in both working and leisure time pursuits; to assist them in developing a satisfactory level of performance in such leisure time activities as sports, dance and aquatics, and to give a basic understanding of the body and its functions.



Physical Education

Associate Professor and Coordinator Sandra K. Gangstead, Ph.D.

The program of physical education includes a curriculum designed for professional preparation in physical education in one of two areas: certification for teaching physical education and health in grades K-12; and sports science.

An Oklahoma State University coaching certificate (24 hours) and a program for licensure in athletic training (24 hours) are also available. The teacher education, K-12 certification option qualifies students to teach physical education, grades kindergarten through 12.

For students not interested in teaching physical education, sports science is offered. The sports science program is designed to educate the student about the fundamental nature of human movement from a scientific perspective. It prepares the student for further study at the post-baccalaureate level in either the physiological or phychological dimension of human performance (exercise physiology, biomechanics, sport medicine, or sport psychology).

Core courses for all physical education students include an introductory course for the discipline, eight hours of sport and dance activities, courses in anatomy, kinesiology, biomechanics, motor learning, exercise physiology, and motor development. Students are required to demonstrate proficiency in reading and writing and have a cumulative grade-point average of 2.00 before being admitted to a degree program in physical education. A 2.50 cumulative grade-point average is required for admittance into the teacher education program and for graduation in all School of HPEL programs.

Graduate Programs

OSU's School of Health, Physical Education, and Leisure offers graduate programs at both the master's and doctoral level. The Master of Science degree has three major emphasis areas: health, physical education, and leisure sciences with emphases in each area. In cooperation with the Department of Educational Administration and Higher Education, an Ed.D. in higher education with a specialization in health, physical education, and/or leisure is offered. Based on an analysis of the student's previous professional preparation and experience, an individual program, consisting of course work, practical experience and research, is designed to meet the student's future needs and interests.

The Master of Science Degree. Emphases are available in health, physical education and leisure.

The Master of Science degree is not a teacher certification program. Undergraduate requirements for certification would have to be satisfied before the student is eligible for certification from the State Department of Education.

The program in health offers a master's degree with a specialization in applied health sciences (exercise and fitness, biomechanics/kinesiology, wellness) and other allied health science areas.

The program in leisure offers a master's degree program with a specialization in leisure which has four areas: administration and management, outdoor recreation, therapeutic recreation and campus recreation.

The program in physical education offers a master's degree with a specialization in physical education which has three areas: administration, pedagogy, and generalist.

Admission Requirements. Depending upon the area of emphasis, a bachelor's degree in physical education, health education, leisure or a related area is required. Applicants without an approved undergraduate program will be required to make up deficiencies by taking the specified prerequisites. Applicants must have a GPA of at least 3.00; if not, they may be admitted on a provisional basis, depending upon recommendation from the Department. Students are required to meet one of the following two requirements: (1) a GRE score of 950 or an MAT score of 35, or (2) successfully complete a writing sample test administered by the School. Three letters of recommendation must be submitted.

General Requirements. A minimum of 32 hours of graduate credit must be taken for the master's degree program or 30 hours with six hours for a thesis, including 21 hours of courses at the 5000 level and 15 hours in the School. Graduate students normally carry an academic load of 9-12 semester hours.

Core Courses. Requirements for the master's degree programs include a basic statistics course and a research design course.

The Doctor of Education Degree. Specializations are available in health, physical education, and leisure.

Admission Requirements. Students entering this program should have a bachelor's degree and/or master's degree in health, physical education, or recreation/leisure from an accredited institution; if not, additional course work may be required. Application for admission in this program should be made to the head of the Department of Educational Administration and Higher Education, Gundersen 309, Oklahoma State University. The applicant should have an undergraduate GPA of at least 2.70 and a graduate GPA of at least 3.20. Students are required to take the Miller Analogies Test.

General Requirements. A minimum of 60 hours above the master's degree or 90 hours above a bachelor's degree is required for the Doctor of Education degree. Students must have completed all prerequisites and are required to complete 15 hours specified in higher education. The remainder of the program is individualized and interdisciplinary according to the goals of the student. Ten hours of credit are allotted on the study plan for the dissertation and comprehensive examinations in higher education and in the student's area of specialization are given twice annually, near the completion of course work.

Graduate teaching and research assistantships are available. For further information and application forms, write to the coordinator of graduate studies, School of HPEL, 103 Colvin Center.

History

Associate Professor and Head W. Roger Biles, Ph.D.

History is the record, explanation and interpretation of the totality of man's activities. The study of history is unique in its concern for the time factor in man's development. History enhances the individual's knowledge of himself and gives perspective and deeper meaning to contemporary events. Courses in the Department of History are intended to give the student a broad understanding of the evolution of civilizations, peoples, countries and institutions, and an insight into the meaning of this evolution, as well as to prepare graduates for many types of employment.

Because history is basic to many special fields, the Department's instruction is designed to aid students interested in education, law, journalism, scientific and technical disciplines, public service and business administration. Students in colleges other than the College of Arts and Sciences who wish to pursue the study of history are encouraged to enroll in courses of interest. The Department of History offers a number of courses that satisfy General Education requirements in the social sciences and the humanities. It participates actively in the Honors Program and offers to its majors the option of pursuing a special plan of study leading to a departmental Honors certificate. The Department of History also participates actively in the Area Studies Certificate program.

Graduate Programs

The Department of History offers programs leading to the M.A. or Ph.D. in history. In addition to the general Graduate College requirements, the candidate for the Master of Arts or Doctor of Philosophy degree with a major in history is expected to have prerequisites of approximately 30 semester credit hours (including 18 upper-division hours) of undergraduate history courses, with an undergraduate grade-point average of at least 2.50 overall or 3.00 in the last 60 hours of undergraduate work. A student whose undergraduate preparation is deficient or minimal may expect to spend somewhat longer than one year's study for the master's degree.

The Master of Arts Degree. Admission to the master's program requires submission of scores for the verbal and quantitative aptitude and analytical sections of the Graduate Record Examination. Candidates for the Master of Arts degree choose one of three alternative plans. Requirements common to all three plans include completion of a course (HIST 5023) in historical methods of research and writing, several graduate seminars, and a two-hour oral examination at the end of the program. Students must maintain at least a 3.00 ("B") grade-point average. An advisory committee will be appointed for each student during the first semester of enrollment. The three plans are designed for different careers, and the distinctive requirements of each are summarized below:

Plan I—(This plan is recommended for those planning to continue graduate studies at the doctoral level.) Students must complete a minimum of 30 hours of graduate courses in three fields (at least one in United States history and one in non-United States history). These hours must include at least nine hours of seminar offered by the department (reading and/or research), Historical Methods (HIST 5023), and six hours of thesis (HIST 5000). With the consent of the advisory committee, a student may substitute a broad thematic historical field. With the approval of the student's advisory committee, as many as six hours may be taken in related disciplines.

Fields of study include:
Ancient Mediterranean World
Medieval Europe
Early Modern Europe to 1789
Europe since 1789
East Asia
England
Latin America
Russia
United States to 1877
United States since 1877

Students must demonstrate satisfactory reading knowledge of one foreign language or competency in statistical and quantitative methods.

Plan II—(Students must be pursuing applied history.) Students must complete a minimum of 33 hours of graduate courses. These hours must include at least three hours of research seminar, six additional hours of seminar offered by the department (reading and/or research), Historical Methods (HIST 5023), an internship (HIST 5030), and three hours of report (HIST 5000). With the approval of the student's advisory committee, as many as 15 of these hours may be taken in related disciplines.

Plan III—Students must complete a minimum of 33 hours of graduate courses in three fields, at least one in United States history and one in non-United States history. (See "Fields of Study" listed under Plan I.) These hours must include at least three hours of research seminar, nine additional hours of seminar offered by the department (reading and/or research), and Historical Methods (HIST 5023). At least six hours of the course work must be in United States history and at least six hours in non-United States history. With the approval of the student's advisory committee, as many as nine of these hours may be taken in related disciplines. Students must submit a copy of a research paper acceptable to all members of the advisory committee to satisfy the creative component requirement.

The Doctor of Philosophy Degree. Admission to the doctoral program requires a satisfactory score on the Graduate Record Examination, including the Advanced Examination in History. Each applicant must also meet Oklahoma State University requirements for the M.A. degree in history, with a grade-point average of at least 3.20 (on a 4.00 scale) in previous graduate work in history.

No definite course requirements apply to all students. Work necessary to prepare the student for his or her written and oral examinations will be indicated in a plan of study which is prepared and approved by an advisory committee appointed by the dean of the Graduate College. Generally, a minimum of 60 semester graduate credit hours beyond the M.A. degree with a "B" grade average for all courses is required.

The prospective doctoral student must offer four fields for examination, one of which may be a pertinent field outside of history. Students specializing in United States history must offer for examination:

1. the United States history field.
2. one chronological or topical field from the following:

United States Colonial, 1600-1787
Nineteenth-century United States, 1787-1877
Modern United States, 1877-present
United States Economic
United States Social and Intellectual
United States South
United States West

3. two fields from the following:
Ancient Mediterranean World
Medieval Europe
Early Modern Europe to 1789
Europe Since 1789
East Asia
England
Latin America
Russia

With the consent of the advisory committee, a student may substitute for one of these fields a pertinent field outside history. At least 12 hours of graduate course work in a field outside history would normally be expected.

Students specializing in non-United States history must offer for examination:

1. four fields from the following:
Ancient Mediterranean World
Medieval Europe
Early Modern Europe to 1789
Europe since 1789
East Asia
England
Latin America
Russia
United States
2. One of these must be United States history.
3. With the consent of their advisory committee, students may substitute for one of these fields (except United States history) a pertinent field outside history. At least 12 hours of graduate course work in a field outside history would normally be expected.

Upon admission to do graduate work at the doctoral level, the student's temporary adviser is the departmental director of graduate studies. Before the middle of the student's second semester, an advisory committee is appointed to assist the student in preparing the plan of study. This committee will consist of four members of the departmental graduate faculty (one from each of the examination fields), including the student's major adviser, who acts as chairman.

No student is admitted to candidacy until he or she has (1) demonstrated a reading knowledge of two foreign languages (proficiency in statistical and quantitative methods of research may be substituted for one of these languages); (2) completed all course work on the plan of study; (3) completed with a "B" grade graduate courses in historical methods and historiography; (4) obtained approval of a proposed dissertation topic; and (5) passed comprehensive written and oral examinations in each of the areas of concentration.

Upon admission to candidacy, the student begins work on the dissertation. Supervised by the major adviser and members of the advisory committee, the dissertation provides the student an opportunity to do original research on a topic within the major area of study. The final dissertation must be submitted to the Graduate College in accordance with the regulations contained in the "Graduate College" section of the *Catalog*. Upon completion of the dissertation, the student undergoes a final examination. Oral in nature and no more than two hours in length, the examination is primarily a defense of the dissertation.

School of Journalism and Broadcasting

Professor and Director Marlan D. Nelson, Ed.D.

At Oklahoma State University, the professional areas of mass communication are grouped in the School of Journalism and Broadcasting (SJB). These areas seek to complement each other with a minimum of duplication.



A modern democratic society cannot live by its ideals if its mass media practitioners are merely competent technicians who worry less about *what* is reported to the people than *how* it is reported. Citizens must have accurate information about social, political and economic problems as well as knowledge of actions taken by government agencies at all levels. From village council to Supreme Court, there can be no exception from the rule that public business *is* the public's business.

To speak to people through radio, television or the printed page requires a knowledge of the people to whom one wishes to speak and an understanding of the world in which they live. Therefore, the curricula of the School of Journalism and Broadcasting are designed to offer more than training in communication techniques. Three-quarters of the SJB student's time at the University is devoted to a liberal education in the arts and sciences. At the same time, the student gains competence in a professional field through courses in the School.

In brief, then, the purposes of the School of Journalism and Broadcasting are:

1. To provide thorough, broadly-based professional education for the mass-media professions.
2. To encourage liberal and cultural background in the arts, literature, languages, and social, biological and physical sciences.
3. To promote scholarly research and professional performance.
4. To provide future media leadership through the preparation of high school and college educators and their participation in professional communication associations.
5. To emphasize high standards of ethics and responsibility in mass communication.

Special Requirements

Any student who elects a specific option from those listed in succeeding pages should meet with an SJB faculty adviser as soon as possible. The ability to type a minimum of 30 words a minute is required for registration in all writing courses beginning with "Newswriting I" (JB 2393). In addition, competence in typing is expected of all majors in the School. Prospective students are advised to prepare for this requirement before enrolling at the University. Proficiency in typewriting can be demonstrated by a high school grade of "C" or better in typewriting or by passing a School typewriting test.

Advertising

Ideas ranging from the introduction of new products and services to public service messages are communicated to mass audiences through advertising. Advertising also provides the economic base for mass media—newspapers, radio and television, magazines, cable—thus freeing them from the political control found in many countries.

Upon a strong liberal arts foundation, majors in advertising build educational experiences which prepare them for work in copywriting and layout, production, management, media selection, market analysis, sales and campaign planning. Basically, the program focuses on decision-making and problem-solving, and includes courses in marketing, psychology, sociology, management and economics. Opportunities for part-time jobs, summer internships and participation in the Advertising Club round out the student's experience.

The Oklahoma State University advertising curriculum is accredited by the Accrediting Council on Education for Journalism and Mass Communications. This means it has the approval of leaders in both education and the advertising profession. The program is affiliated with the American Association of Advertising Agencies, the Advertising Federation of America and the Point of Purchase Advertising Institute.

Journalism

News coverage today has gone beyond routine reporting on police and city hall activities. The modern newspaper or broadcasting station tries to spotlight the diverse components of our complex society. This objective calls for writers with broad interests and special knowledge in politics, religion, science, business, economics, art and public welfare. From the ranks of these reporters come the future print and broadcast journalists.

Programs offered in journalism are:

News-editorial—This program prepares students for writing and editing positions on newspapers, magazines, trade journals, in radio and television news departments, in book editing and publishing.

Teaching licensure—This program, taken in the College of Education, prepares students to teach journalism at the high school level.

Technical communication—Students may combine agriculture and journalism or home economics and journalism to prepare for specialized work in technical writing and editing. These programs are developed in cooperation with the Colleges of Agriculture and Home Economics.

Community journalism—This option, for those who plan eventually to own or manage weekly or small daily newspapers, requires experience in news, advertising and management, and thus requires a wide range of courses both within and outside the School of Journalism and Broadcasting. This program is an individualized one and should be entered only with the advice and consent of the SJB director.

Journalism majors assist in the publishing of a campus newspaper, *The Daily O'Collegian,* and in the newsroom of radio station KOSU. Many juniors and seniors find this work a source of revenue to assist them in the cost of their education. Advanced news-editorial students also spend one summer on an internship with a commercial newspaper or broadcasting station, and some spend the spring or fall semester on a daily newspaper. Some hold part-time jobs as campus correspondents for various publications or work for media in the Stillwater area. Part of the laboratory work in JB 2393, 2413, 3413, and 4413 is done on the *O'Collegian* or other publications.

The news-editorial curriculum is accredited by the Accrediting Council on Education for Journalism and Mass Communications, and this approval is endorsed by the American Newspaper Publishers Association, American Society of Newspaper Editors, Southern Newspaper Publishers Association and other highly regarded media groups. The journalism program is affiliated with the Oklahoma Press Association, Southwestern Journalism Congress, Society of Professional Journalists, Association for Education in Journalism and Mass Communications and the Graphic Arts and Technical Foundation.

Public Relations

Public relations practitioners perform a variety of tasks. As writers, they prepare news releases, speeches, trade-paper and magazine articles, texts of booklets, radio and television copy, product information and stockholder reports. They may supervise the company newspaper, magazine or newsletter, or other company communication programs.

The public relations option is related to and draws upon the news-editorial curriculum, as do the public information departments of government, business and industry. The program is accredited by the Accrediting Council on Education for Journalism and Mass Communication. The public relations program is affiliated with the Society of National Association Publications, International Association of Business Communicators, and the Public Relations Society of America.

Radio-TV-Film

The programs in radio-television-film are designed to prepare students for careers in broadcasting. They offer graduates a chance to develop abilities in announcing, production, copywriting, news, documentary, sports, sales and management.

The undergraduate degree is offered in these professional options:

Production and performance—For students who wish to hold on-the-air jobs in broadcasting or who desire to prepare for positions as directors and producers of radio and television programs.

Broadcast Journalism—For students who wish to write, edit and produce news, discussion and documentary programs for broadcasting stations, networks and cable companies.

Sales and management—For students who wish to write, sell and produce commercial messages, and to move into management and/or ownership positions on radio and television stations.

The facilities of the University's color-equipped Telecommunications Center, and a full-time radio station, KOSU, and an electronic news-gathering laboratory (ENG), make it possible for majors to acquire experience along with professional studies. Radio-television-film is affiliated with the National Association of FM Broadcasters, Radio Advertising Bureau, Oklahoma Association of Broadcasters, National Association of Broadcasters, Radio-Television News Directors Association, Broadcast Education Association and National Public Radio.

Graduate Programs

The School of Journalism and Broadcasting offers courses leading to the degree of Master of Science in mass communication. The School also cooperates with the College of Education in planning and supervising study leading to a Doctor of Education degree with emphasis in mass communication.

Prerequisites for unqualified admission to the master's program include a bachelor's degree in an area of mass communication with an overall grade-point average of 3.00. Potential doctoral candidates must have a bachelor's or master's degree in a mass communication area, in addition to professional experience. A graduate of a non-mass communication discipline may enter the Master of Science program, with stipulation that he or she completes, without graduate credit, foundation courses relevant to career interests.

Basic emphasis is on application of current communication theories and research methods and designs to the professional aspects of mass communication. Electives in the behavioral sciences are encouraged.

Mathematics

Professor and Head Marvin S. Keener, Ph.D.

Contemporary mathematics is concerned with investigations into far-reaching extensions of such basic concepts as space and number and also with the formulation and analysis of mathematical models arising from varied fields of application. Mathematics has always had close relationships to the physical sciences and engineering. As the biological, social and management sciences have become increasingly quantitative, the mathematical sciences have moved in new directions to develop interrelationships with these subjects.

Mathematicians teach in high schools and colleges and work in industry and government. In industry mathematicians usually work in research, although they have become increasingly involved in management. The firms employing the largest number of mathematicians are in the aerospace, computer, electronics and communications industries. In industry a mathematician typically serves either in a consulting capacity, giving advice on mathematical problems to engineers and scientists, or as a member of a research team composed of specialists in several fields. Among the qualities which he or she should possess are breadth of interests and outlook, the ability to think abstractly and a keen interest in problem solving.

An undergraduate specializing in mathematics will begin with calculus or sometimes with college algebra and trigonometry. Well-prepared students are encouraged to establish credit in elementary courses by passing advanced standing examinations. All majors take courses in differential equations, modern algebra and analysis. The remainder of the field of concentration is determined by the student's interests and future plans. Courses are available that serve as preparation for graduate work, for high school teaching and for employment in industry. Students are encouraged to acquire proficiency in computer programming and to take substantial work in related fields in which they have a special interest.

Many of the more challenging positions in mathematics require study beyond a bachelor's degree. In particular, teaching in a junior college requires at least a master's degree and possibly



a doctorate. Approximately 25 percent of the students receiving a bachelor's degree in mathematics go on to graduate work.

Graduate Programs

The Department of Mathematics offers programs leading to the Master of Science and Doctor of Philosophy degrees and also cooperates with the College of Education in supervising a program leading to the Ed.D. degree with emphasis in mathematics.

Prerequisites. A student beginning graduate study in mathematics is expected to have had, as an undergraduate, at least 18 semester hours in mathematics beyond elementary integral calculus including courses in differential equations, linear algebra and modern algebra. An applicant whose preparation is deficient may be admitted to the program, if otherwise qualified, but will be required to remove the deficiency, increasing somewhat the time required to complete work for the degree. Prospective graduate students are advised to take at least introductory courses in related fields such as physics, statistics, and computer science.

The Master of Science Degree. A Master of Science degree requires 32 credit hours of course work in mathematics and related subjects, although some of the course work may be replaced by a master's thesis. Each student must pass a master's examination on basic graduate courses in mathematics. The Department offers a major in applied mathematics designed as preparation for mathematical work in industry and government.

The Doctor of Philosophy Degree. Admission to the Ph.D. program is granted only to students with superior records in their previous graduate study. A minimum of 90 semester credit hours of graduate credit beyond the bachelor's degree is required for the Ph.D. degree. This may include a maximum of 24 hours credit for the thesis. Each student has an individual doctoral committee which advises the student in the formulation of an approved plan of study for the degree. Candidates for the Ph.D. in mathematics must demonstrate, by examination, a reading knowledge of one foreign language, usually French, German or Russian.

The most important requirement for the Ph.D. degree is the preparation of an acceptable thesis. This thesis must demonstrate the candidate's ability to do independent, original work in mathematics.

Departments of Military Studies

Coordinator Smith L. Holt, Ph.D.

In agreement with the U.S. Air Force and the U.S. Army, OSU recognizes separate departments of Aerospace Studies and of Military Science as integral academic and administrative departments of the University. These two departments are administered within the framework of the College of Arts and Sciences. The two departments provide instruction under the basic and advanced Reserve Officers' Training Corps (ROTC) programs.

Scholarships

Both the Army and Air Force ROTC offer full scholarships each year for students enrolling in the program. ROTC scholarships provide full payment of tuition, fees and books and $100.00 per month subsistence allowance. Applications for 4-year scholarships may be obtained through local high school principals or advisers and the ROTC departments. Information concerning 2- and 3-year scholarships (male and female) may be obtained by direct contact with the ROTC departments located on campus in Thatcher Hall.

Degree Programs

A Bachelor of Science degree in aerospace studies or military science is offered in the College of Arts and Sciences upon completion of 127 semester credit hours. It combines ROTC training with the College's general education and degree requirements and the opportunity to develop strong programs in a wide variety of other fields. The curricula for these degrees prepare the student for further professional work and for duty with the Armed Forces.

Flexibility

ROTC at OSU offers a variety of programs, giving the student considerable flexibility in charting a path to commissioning in the Army or the Air Force. Programs are designed so that individuals in all OSU colleges, departments and majors can tailor their academic/ROTC curriculum in order to attain commissioned status. Opportunities also exist in both Army and Air Force ROTC for the student to "test the water" early in his or her academic program by participating in basic familiarization courses. Those interested in learning more about ROTC at OSU, or in enrolling, are urged to contact the professor of Aerospace Studies or professor of Military Science in Thatcher Hall on campus.

Aerospace Studies

Professor of Aerospace Studies and Head
Col. Albert M. Silva, M.S.

The Air Force ROTC basic program consists of one classroom hour and one leadership laboratory period per week for one credit hour per semester during the freshman and sophomore years. The advanced AFROTC program (junior and senior years) is open on a competitive basis to any student having two years of enrollment remaining. The advanced courses each include three classroom hours per week and one hour of leadership laboratory for three semester hours of credit. Class work and laboratory involvement are designed to prepare the student for his or her future role as a leader in the U.S. Air Force. No military obligation is incurred for non-scholarship students enrolling in the freshman and sophomore courses. Students in the advanced program must successfully complete at least three hours of English composition and a mathematics reasoning course. Those students accepting an AFROTC scholarship must successfully complete at least one semester of a modern foreign language.

Students (male and female) completing the advanced Air Force ROTC program are commissioned as second lieutenants in the U.S. Air force. Candidates for flight training incur an active service duty commitment of seven or eight years, commencing with completion of flight training. Nonflying officers have a four-year commitment. During their initial active duty, officers compete for the opportunity to attain career status.

Military Science

Professor of Military Science and Head LTC
Conrad J. McHugh, M.M.A.S.

Students desiring to expand the scope of their education, while preparing for a dynamic and rewarding career as an officer in the United States Army, active duty, National Guard, or Army Reserve, choose the Army Reserve Officer Training program (ROTC) as an adjunct to their chosen field of study. With courses dealing in a wide range of subjects from leadership to tactics, taught both indoors and out, the Army ROTC program produces 8,000 second lieutenants each year.

The Army ROTC program consists of a basic course and an advanced course. Students desiring to see what the program is like may enroll in up to ten hours of military science with no commitment to the United States Army. During this basic course, emphasis is placed upon leadership, war gaming, individual tactics and skills, rappelling, and land navigation. All lower-division ROTC courses are open to the entire university community regardless of year in school.

Students committing themselves to a commission in the United States Army are permitted to enroll in the Army ROTC advanced course upon completion of the basic course or equivalent. The advanced course consists of 10 hours of academic work taken during the junior and senior year. In addition, participation in a six-week summer camp is mandatory. The advanced course emphasizes further development of leadership skills, offensive and defensive tactics, physical conditioning, ethics, military law, professional and basic military knowledge and skills. Additionally, advanced course students are responsible for use of required military skills as they act as assistant instructors during laboratory periods, plan leadership laboratories, plan and conduct field training exercises and are responsible for coordinating and supervising departmental extracurricular activities.

Students interested in the Department of Military Science are encouraged to visit with departmental faculty members at any time for further information concerning departmental course offerings and class sequence. A number of two- and three-year scholarships are available through the Department. Prior enrollment in military science is not a prerequisite for departmental scholarship application.

Music

Professor and Head Gerald D. Frank, D.M.A.

The music program at OSU serves students who plan careers in the field of music as well as those who desire to participate in any element of a comprehensive music program. Professional instruction prepares students for careers in performance, teaching, or the music industry. The OSU underdgaduate degrees are also excellent preparation for graduate school and for church positions.

The student planning to major in music at the university level should consider his or her background carefully. It should include a strong interest in music during high school years and a talent for performance in vocal or instrumental music. Individual lessons, fundamental theory knowledge, and basic piano ability will also be helpful.

The music major may choose from the following degrees: (1) Bachelor of Music (B.M.) in performance, (2) B.M. in instrumental/vocal music education, (3) B.M. with elective studies in business, and (4) Bachelor of Arts (B.A.) in music. In addition, the Bachelor of University Studies allows the interested music student to major in music while earning a second major in an outside field.

The student majoring in a discipline other than music may participate with music majors in all ensembles (choirs, opera, orchestra, wind ensemble, marching band, concert band, jazz bands, and chamber groups) and courses, as well as individual lessons for academic credit.

An active scholarship program provides assistance to music majors as well as non-majors. Students are invited to write for audition information.

Faculty members, students and ensembles present over 100 concerts and recitals annually. The Department also supports an active program of extension and outreach opportunities.

The Department of Music is accredited by the National Association of Schools of Music. Students wishing to major in music should contact the Department of Music to arrange for an entrance audition and interview.

Natural Science

Professor and Program Director, L. Herbert Bruneau, Ph.D.

Graduate Programs

This interdepartmental program leading to the M.S. degree is for science teachers and other individuals who desire a broader program than often given in departmental programs. The reduced emphasis on the methodology of research may more nearly meet the needs of many persons than a concentrated program in a specific area of the sciences.

Purpose. The goal of this program is to provide the student with a breadth of training in science and related subject areas, while concentrating in one area of science. While research methodology is not a principal component, a scholarly and creative activity is an essential part of the degree plan. Courses must be sufficiently advanced in the recognized discipline to provide contact with research in the discipline while providing a review of the fundamental principles involved.

Administration. The program is administered by the dean of the Graduate College with the assistance of the program director. A graduate advisory committee of three faculty members, one of whom will serve as the student's major adviser, will be named by the dean of the Graduate College for each student admitted to the program. The graduate advisory committee will be responsible for seeing that the plan of study for the degree is properly prepared and followed by the student, and must approve the topic and content of the creative and scholarly component, report or thesis.

Admission Requirements. The student must have a minimum of 30 semester hours of science, with biological, physical and earth sciences represented. An undergraduate grade-point average of 3.00 is required for unqualified admission. Students with a grade-point average below 3.00 but 2.50 or better may be admitted on a probationary basis. Students admitted on a probationary basis must receive a grade of "B" or better in at least 10 credit hours of course work at the 4000 or 5000 level in their first semester as graduate students.

Curriculum and Requirements. Three degree plans are available in this program. The student must complete a 30-credit-hour plan with a six-credit-hour research thesis, a 32-credit-hour plan with a two-credit-hour report, or a 36-semester-credit-hour plan with a well-defined creative and scholarly component if neither a report or thesis is written. A minimum of 21 credit hours taken at OSU must be at the graduate level (5000) in a recognized discipline of the biological, physical, or earth sciences.

Selected courses from science-related areas may be used on the plan of study with the approval of the graduate advisory committee and the dean of the Graduate College. No specific courses are required for the degree. However, not more than two-thirds of the courses for the degree may be taken in any one of the areas of biological, physical, or earth sciences.

Philosophy

Associate Professor and Head Edward G. Lawry, Ph.D.

Philosophy is an intellectual activity to be practiced and a subject matter to be studied. As an activity, philosophy seeks to analyze, evaluate, and often reformulate the ideas, principles and arguments by which experience is understood and explained and by which behavior is directed and justified. No area of experience or behavior—aesthetic, political, religious, scientific or moral—is immune to philosophical consideration. The writings produced by great philosophers are worthy of study as models of thought and as artifacts of historical influence and cultural significance. In this latter role philosophy is historically related to the development of every academic discipline.

Courses offered in philosophy fall into three general groups: broad introductory courses which cover a variety of topics, historical courses which proceed chronologically through a sequence of thinkers, and special topic or field courses. Some offerings combine the latter two characteristics. No undergraduate course is intended primarily for majors. Juniors and seniors often find that an upper-division philosophy course related to their area of concentration can supply needed breadth and depth to their studies.

Students may pursue work in philosophy as part of their general education, as a support to their major area of concentration, as a minor, as a major leading to a B.A. degree, as a second major or in connection with a graduate program. Philosophy majors have an excellent educational base from which to pursue careers in teaching, the ministry, law, government service and private business of many sorts. They have available to them one of the most flexible programs offered at the University, for the minimum philosophy requirements include only two lower-division introductory courses, two upper-division historical survey courses and 21 hours of additional unspecified philosophy courses numbered 3000 or above which permit up to 38 hours of related and elective study in other areas. A minor or a second major in philosophy will complement any other area of study. A philosophy minor requires 18 hours of unspecified philosophy courses, 12 of which must be numbered 3000 or above.

Graduate Programs

The Department of Philosophy offers a Master of Arts degree in philosophy. Under the auspices of the Department of Educational Administration and Higher Education (EAHED) and with the cooperation of the Department of Philosophy, a student can earn the degree of Doctor of Education in higher education with special emphasis in philosophy.

The Master of Arts degree will be especially valuable to persons interested in pursuing predoctoral studies in philosophy, religious studies, or some other area of the humanities; to persons who already possess an advanced degree and who simply wish to expand their field of professional competence; and to college graduates who simply wish to broaden their own educational horizons.

The degree may be earned through any one of three options: with thesis (usually eight three-credit-hour courses and a six-credit-hour thesis); with report (usually ten three-credit-hour courses and a two-credit-hour report); and with neither a thesis nor report (usually 12 three-credit-hour courses). Thus the thesis degree requires 30 hours, the report degree requires 32 hours, and the courses-only degree requires 36 hours.

Prerequisites for admission to the program are 24 semester credit hours (at least 18 at the upper-division level) in philosophy including courses in the history of ancient, medieval, and modern philosophy (PHILO 3113 and 3213 or equivalents) and a course in logic (PHILO 1313 or 2303 or equivalents). Students without these prerequisites, but otherwise admissible, may be granted "qualified" or "provisional" status until the prerequisites are satisfied. (Consult the "Master's Degree Programs" section of the "Graduate College" in the *Catalog* for general regulations and requirements relating to admission.)

All candidates for the Master of Arts in philosophy degree are required to pass a four-hour written examination on selected major Western philosophical works. This exam must be passed before a student will be allowed to begin work on either a thesis or the report, and normally will be taken about two-thirds of the way through the required course work for the degree. In every case, this examination will be arranged,

administered, and supervised by the three-person advisory committee appointed for, and in consultation with, each student, during the student's second semester of enrollment. This committee will also be responsible for determining the student's plan of study, thesis or report topics, if any, and any other special requirements that may need to be fulfilled.

Master of Arts in Philosophy, with thesis.

1. 24 hours of course work in classes and seminars approved by the student's advisory committee.
2. 6 hours of PHILO 5000, in which a well-reasoned, substantial piece of research on a narrowly defined topic will be written as a thesis.
3. An oral examination and defense of the thesis for the graduate faculty of the department.

Master of Arts in Philosophy, with report.

1. 30 hours of course work in classes and seminars approved by the student's advisory committee.
2. 2 hours of PHILO 5910, in which two research papers will be prepared. These papers typically will have their origin in graduate seminars taken as part of the plan of study.
3. An oral examination and defense of these reports will be required in a formal presentation to the departmental faculty.

Master of Arts in Philosophy, without thesis or report.

36 hours of course work in classes and seminars approved by the student's advisory committee.

A student may also, in accordance with the policies of the Graduate College, select a graduate minor in connection with any of the three programs, thus permitting a concentration of work in broad areas such as social thought, cognitive science, or religious or political thought.

General requirements concerning the Ed.D. in higher education are listed in the 'Doctor of Education" and "Educational Administration and Higher Education"sections. The basic prerequisite is a significant background in philosophy (ordinarily at least 24 semester hours of upper-division and graduate-level work). Depending on the student's record, 40-60 credit hours of philosophy, excluding the dissertation, are normally required, in addition to specific EAHED courses.

Departmental acceptance is required for admission to the M.A. program and the Ed.D. program. Persons who meet the stated prerequisites for the M.A. degree are encouraged to apply directly to the Graduate College for admission. Applications will be forwarded to the Department for evaluation and recommendation of admission status. Persons interested in the M.A. program but who do not meet the prerequisites should contact the head of the Department prior to application. Application for admission to the Ed.D. program must be initiated through the Department of Educational Administration and Higher Education.

Students pursuing a master's or doctor's degree in another field may elect philosophy as a graduate minor. Selected courses and seminars in philosophy can broaden and complement work in such areas as economics, education, engineering, English, history, psychology, and sociology.

Physics

Professor and Head Larry E. Halliburton, Ph.D.

Cosmology and the physical origin of the universe, the use and development of lasers, the nature of the fundamental particles that make up an atomic nucleus, the properties and development of new and exotic materials, and the formulation of predictive theoretical models to describe nature are some of the subjects pursued by physicists. A professional physicist needs to possess critical skills of observation and evaluation. The development of these skills in both experimental and theoretical work provides the focus of the undergraduate program and prepares a student for a career in either applied or pure physics. Physics majors acquire a versatility which makes them highly competitive for careers in industrial research and development, national laboratories and academia.

The physics program provides a common set of experiences in physics, mathematics and other sciences during the first two undergraduate years. A physics major continues beyond these courses in an individually tailored program in the Department's options program. The final two years are designed to suit the student who anticipates graduate research, as well as those who will seek employment immediately after graduation. The choices offered to undergraduates reflect their career goals. Programs exist in pure physics, materials science, biophysics, engineering physics, chemical physics and geophysics. Many of these include selected courses in engineering, computer science, biological science and mathematics. With this versatility students can choose (in consultation with their advisers) a program which will suit their evolving career goals in the latter part of their undergraduate studies. Continued communication, beginning with the student's first semester in the Department of Physics, establishes a productive rapport between the physics major and his or her faculty adviser. A physics minor is also possible and the requirements can be obtained from the department head.

Graduate Programs

Prerequisites. Thirty semester hours of physics beyond the elementary course work and mathematics courses through advanced calculus or differential equations are required.

The Master of Science Degree. The requirements for the master's degree in physics include the successful completion of 30 semester credit hours beyond the B.S. and the submission of an acceptable thesis based on original and independent research. The following physics courses are required: PHYSC 4163, 5313, 5413, 5453, 5613. In addition, nine semester credit hours of electives must be completed in physics, mathematics, or an allied field. These must be chosen in consultation with the student's adviser. For example, an advanced course in mathematics along with Solid State I and II in physics might be reasonable choices for someone interested in a materials specialization. For others, one or more courses from electrical engineering might be preferable. A maximum of six credit hours of PHYSC 5000 may be applied toward the M.S. thesis. The student must successfully defend the thesis in an oral examination.

The Doctor of Philosophy Degree. Prior to the appointment of the advisory committee, as described in the general requirements of the Graduate College, a comprehensive written examination must be taken. This examination will cover the content of the course work required up to and including the M.S. degree and will be given once a year. It will be given in four parts of three hours each. The results of this examination will be included in a review by the Department of Physics to determine whether the student should be admitted to Ph.D. candidacy.

The following physics courses are required: PHYSC 5213, 5313, 5413, 5453, 5613, 6313. Also, four of the following six courses must be taken: PHYSC 5133, 5263, 5663, 5713, 6213, 6713. Additional courses reflecting the candidate's specialization will be required by the advisory committee. Ninety semester hours of credit beyond the bachelor's degree are required, of which a maximum of forty-five can be dissertation research credits. A minimum of two-thirds of the graduate course credits must be in physics. No more than six credit hours of physics at the 4000 level can be counted toward graduate credit and no more than 12 total credit hours in all subjects at the 3000 or 4000 level can be counted toward graduate credit. Courses taken at another institution will be evaluated by a faculty committee to determine whether they satisfy any requirements.

The most important single requirement for the Ph.D. in physics is the presentation of an acceptable dissertation which represents original research work by the student and which demonstrates the student's ability to do independent study as well as to plan and carry out future research in his or her field.

Political Science

Professor and Head Anne L. Schneider, Ph.D.

Political science is the study of politics, government and public policy at the local, state, national and international levels. It is concerned with struggles for power and the exercise of power in the form of institutions, laws and public policies.

Political science seeks to reveal the patterns of behavior associated with politics, to discern the decision-making process in government, to explain the functioning of political and governmental institutions, to appraise alternative public policies and to assess government's role in society.

The principal fields of study in political science are political theory, public law, comparative politics, international relations, public administration, public policy, and American political behavior. Students may receive the Bachelor of Arts or Bachelor of Science degree in political science with a concentration in any of the fields of study.

Political science graduates enjoy a variety of career opportunities—staff positions with international, federal, state and local government agencies; teaching positions in college and high school; policy analysis and research positions with govern-

ments, businesses, civic groups and foundations; positions in journalism, public relations, political consulting or lobbying; and, via law school, the legal profession.

Graduate Programs

The Department of Political Science offers a program leading to the Master of Arts degree in political science. Candidates for the M.A. degree may choose from two plans. Plan A permits specialization in three areas of political science chosen from American politics, comparative politics, international relations, public administration, and public policy, or some other field of specialization offered under the faculty mentoring program. Plan B permits concentration in public administration and public policy. Both programs are designed to prepare men and women for future work in Ph.D. programs as well as policy analysis, general administration and public management careers in government, the nonprofit sector, the private sector and research organizations.

Admission Requirements. Admission requirements include a 3.00 GPA; two letters of recommendation; and STAT 2013.

Degree Requirements. In addition to the general requirements of the Graduate College, requirements for the Master of Arts degree with a major in political science are listed below.

Plan A:

1. A minimum of 33 credit hours in political science or closely related courses, including three hours methods; 18 hours of political science graduate seminars (seminars numbered 5000 or above); either a thesis (six hours) or a three-hour creative research paper; and additional graduate-credit courses in POLSC or closely related fields to complete the 33-hour requirement. Students offering a field from outside political science may use up to six hours of non-political science seminar courses to complete their 18-hour seminar requirement.
2. Satisfactory completion of two-hour comprehensive exams administered in the last semester of the student's program, covering three of the five fields (American, comparative, international, policy, public administration). One field offered under the faculty mentoring program or based on courses from outside political science may be substituted for examination purposes.
3. A minimum grade-point average of 3.00.

Plan B:

1. A minimum of 36 credit hours in political science or closely related courses which includes a three-course required theory component (nine hours), a two-course required methods component (six hours), a three-credit-hour required internship, a three-credit-hour required creative component (masters research paper) and 15 hours in an area of specialization.
2. Satisfactory completion of a four-hour comprehensive exam administered in the last semester of the student's program.
3. A minimum grade-point average of 3.00.

Pre-law. Many degrees are applicable. See "Arts and Sciences Special Academic Programs—Pre-law."

Premed and Pre-vet. Many degrees are applicable. See "Arts and Sciences Special Academic Programs—Preprofessional Programs in the Health Professions."

Psychology

Associate Professor and Head Vicki Green, Ph.D.

Undergraduate study in psychology provides a background which may be of value to students in personal, social, educational and vocational situations. Many students are better able to understand and deal with their own behavior and that of others as a result of such training. Moreover, the course of study involves examination of some of the major social problems of our time and explores ways of coping with these problems.

A bachelor's degree in psychology is useful in a wide number of occupations in business, education and industry. The range of positions obtained by graduates covers almost all occupations requiring direct personal contact with other people. Some examples are supervision, training, sales, public relations and interviewing. Also included are positions with city, state and federal agencies, and in applied research. Although there is no licensure or certificate to teach psychology in the schools, it is possible to get a teaching certificate or licensure in social studies education with endorsement in psychology while pursuing a major in psychology. Persons interested in such teaching should contact the Office of Teacher Education. (See "Teacher Education Programs" in the "College of Education" section of the *Catalog.)*

Graduate Programs

Employment in the professional field of psychology almost always requires a graduate degree. Psychologists with advanced degrees have relatively exclusive claim to some professional positions.

The Department of Psychology offers programs of study leading to the degree of Doctor of Philosophy. Students applying for the doctoral degree should have the following prerequisites: introductory psychology, quantitative psychology, physiological psychology, and experimental psychology.

Students in the doctoral program first work toward a Master of Science degree. In addition to meeting the general requirements of the Graduate College, for completion of the Master of Science, students must also:

1. Complete both semesters of a proseminar in general psychology and two semesters of quantitative psychology along with other course credits totaling 32 credit hours.
2. Perform a satisfactory research project, supervised and reviewed by appropriate faculty members.

Following the completion of the master's degree, the student may be admitted to doctoral status in clinical psychology or experimental psychology.

Religious Studies

Adjunct Assistant Professor William Ivy, Ph.D.

Courses in religious studies are a vital part of a liberal arts education. The field involves the objective study of religious belief, literature and practice around the world. Opportunity is given for serious and objective study of these aspects in relation to major religions of past and present cultures. Special attention is given to the historical bases of world religions as well as to their effect upon present-day societies, in both the East and West. The courses offered are varied enough for concentrated work in several world religions, biblical studies, religious thought, and religion and culture.

Courses are open to all students without regard to personal views or affiliations. No attempt is made to indoctrinate or to force a particular view upon the student. Emphasis is always placed on the academic study of religion rather than the practice of a particular form of religion.

The undergraduate courses enable students to satisfy humanities requirements and also provide an excellent background for many types of graduate professional programs. The wide variety of course offerings makes possible quality preparation for further work in seminaries and graduate schools. The training and experience of the faculty in varied academic traditions both in this country and abroad make possible the broadest type of counseling on advanced programs leading to careers in religion.

A degree program in religious studies is available for the student desiring a major or minor in the field of study. Interdisciplinary approaches provide for study in the field of religion either as preparation for further advanced work, as specific preparation for teaching, or as an attempt to understand the phenomenon of religion in its complexity.

The curriculum is not designed exclusively or even primarily for those seeking careers in religion. It meets the need of all who desire a well-rounded education which explores and appreciates the human search for deeper meaning to finite life in terms of relationship to the infinite.

Sociology

Professor and Head Charles Edgley, Ph.D.

Sociology is the study of people as they live their lives in society. The emphasis is on understanding why people act as they do in a particular society, community or social group.

Many different points of view are represented in the departmental faculty. Some believe that a scientific explanation is central to understanding people in society; others believe that human values and subjective understandings should be the major emphasis in sociology. In all cases, there is an agreement that sociology is an exciting field of study.

The courses in sociology are designed to help the student understand the influence of society on individuals, and find ways to interpret this understanding in real-life working situations. Topics covered include anthropology, corrections, social problems and deviance, research methods, social organization, social psychology, social work and theory. Many undergraduate majors elect to have a supervised work-related intern experience in a social agency of their choosing. A full-time adviser is available to assist undergraduate students in the selection of courses and to answer their many questions related to career planning. Faculty members are also available to assist and advise students.

B.A. and B.S. degrees are offered in sociology. Both B.A. and B.S. degrees include programs in corrections, pre-social work, social gerontology, and juvenile treatment. The general sociology degree has career paths including social

aspects of law, social aspects of medicine, organizations and administration, social research and analysis, urban/population trends and issues, and minorities.

Anthropology

Anthropology is the study of humankind in all its similarities and differences, both biological and behavioral. As an academic discipline it covers a wide range of subject matter ranging from fossil remains related to early human forms and the biological characteristics of contemporary human populations (physical anthropology) to scientifically excavated remains of past societies (archaeology) to behavior within contemporary human societies (cultural anthropology). Offerings in anthropology provide students with a basic introduction to the concepts and principles found in these three subdisciplines.

Regular course offerings include an emphasis on North American Indian cultures and archeology. Other courses deal with anthropological methods and theory.

Graduate Programs

The Department of Sociology offers the Master of Science and Doctor of Philosophy degrees. Programs are available to prepare students for appointments to the staffs of sociology departments in colleges and universities, and for research positions in universities, businesses, social agencies, and various levels and units of government. The Department offers concentrations in social psychology, deviance/social problems, social organization, theory, methods-statistics, corrections/criminology, social ecology/demography, social gerontology, family, and urban and rural studies.

The Department also offers a Master of Science degree in corrections. This program is suitable for students wishing to specialize in juvenile or adult corrections, as administrators, case managers, counselors, researchers, and as probation and parole supervisors.

The Department offers employment to qualified graduate students as graduate assistants who may teach introductory courses, assist senior professors in the conduct of courses, or participate in ongoing research programs. These teaching and research experiences constitute an invaluable part of the student's professional preparation.

Students seeking admission to graduate programs in the Department must be accepted by the admissions committee, chaired by the graduate student adviser, prior to official admittance and meet the following requirements:

1. Master's level students must have earned an overall grade-point average of 3.00 (on a 4.00 scale) in an undergraduate program and have at least 12 semester credit hours in sociology. Students seeking admission to the Ph.D. program must have earned an overall grade-point average of 3.50 (on a 4.00 scale) in the master's program in sociology or a closely related field. Deficiencies in either degree program may be corrected through course work, without degree credit for such courses, as determined by the graduate student adviser and admissions committee.
2. Those not meeting the grade criteria must take the general aptitude section of the G.R.E. and score a total of 1000 from the verbal and quantitative sections.
3. Three recent letters of reference from academic persons qualified to evaluate the applicant's ability to perform graduate work must be received.
4. All Ph.D. applications should be accompanied by a statement of professional goals and evidence of academic ability (such as thesis or term papers).

Applicants who have deficiencies in any of the above areas, may submit the results of the Graduate Record Examination in support of their application, and that score may be substituted at the option of the faculty.

Detailed information on each program is available by writing to the Department or coming by the departmental office and requesting a *Graduate Student Manual.*

Speech Communication

Associate Professor and Interim Head Paul D. Harper, Ph.D.

The Department of Speech Communication affords a variety of opportunities for students who wish to become involved in the excitement of a changing world. Not only does the Department offer academic subjects leading to both undergraduate and graduate degrees, but students are afforded an opportunity to gain practical experience in interpersonal and public communication.

In speech communication, students are prepared for positions in industry and business and are qualified to work with interpersonal communication problems. Graduate work in this area increases the student's career opportunities in the field of communication consulting. In addition, the Department's concern with related areas, such as sociology, business and psychology, allows the admission of graduate students with undergraduate preparation in some of these fields.

Graduate Programs

Prerequisites. To enter the program, the student should have a minimum of 12 semester credit hours of undergraduate courses in speech communication or the equivalent.

Admission Requirements. Applicants normally should have at least a "B" grade-point average at the undergraduate level and strong recommendations from those familiar with the student's previous academic background. Beyond that, the number of students admitted will depend on the number of places available in the program.

Program Requirements. The complexity of today's society requires an individual capable of solving a wide range of problems. In order to meet this need, the speech communication graduate program aims at producing: (1) individuals capable of fulfilling the role of a communication consultant or interventionist within governmental, business and industrial, public service, educational and community organizations; (2) individuals capable of using methods and procedures of the behavioral sciences in investigating and solving practical as well as theoretical problems in communication; (3) individuals with the background to pursue doctoral programs in communication; and (4) competent teachers of communication for two-year and four-year colleges as well as the common schools.

The student may earn the Master of Arts degree under one of the following plans:

Plan I—A minimum of 24 semester hours of speech communication courses and a thesis for which six credit hours is earned.

Plan II—A minimum of 30 semester hours, no fewer than 24 of which must be in speech communication, and a project for which two hours may be earned.

Plan III—A minimum of 36 semester hours, no fewer than 24 of which must be in speech communication, with no thesis or project.

The plan that a student chooses must be approved by the graduate faculty of the Department.

Examinations. Every student must pass a written and oral comprehensive examination. The student following Plan I or II must also pass an oral examination over his or her thesis and related materials.

Speech and Language Pathology and Audiology

Professor and Head John M. Panagos, Ph.D.

The Department of Speech and Language Pathology and Audiology prepares students through the master's level to serve handicapped individuals of all ages who exhibit speech, language and/or hearing disorders. The undergraduate program is a preprofessional degree program. It first emphasizes the study of the development and functioning of the individual who presents normal speech, language and hearing. It also stresses academic and clinical practicum experiences in the nature, symptoms and treatment of those who possess various kinds of communication disorders.

The master's level program is designed to provide students with intensive course work in the various communication disorders and exposure to a wide variety of challenging clinical activities. This includes a full time, off-campus clinical internship for at least eight weeks which serves as an excellent transition from on-campus practicum to an actual professional position after graduation. Students who graduate from this Department are prepared to take positions in public schools, hospitals, community speech and hearing centers, private practices and other related settings. All graduates meet the academic and practicum requirements for the Certificate of Clinical Competence of the American Speech-Language-Hearing Association and licensure by the state in speech and language pathology. In addition, almost all students elect to earn the state teaching certificate. The program is nationally accredited.

Graduate Programs

Prerequisites. Other than the general requirements of the Graduate College, no other prerequisites are required for the Master of Arts degree. The amount of course work taken at the undergraduate level in speech and language pathology and related areas will determine the amount of time required for the degree.

Admission Requirements. Applicants should have a grade-point average of 3.00 ("B") in all work and at least a 3.00 in the major, strong letters of recommendation from those familiar with the student's previous academic background, and GRE scores acceptable to the Graduate Faculty. Beyond that, the number of students admitted will depend on the number of places available in the program.

International students follow the same application procedure as U.S. students with one addition. If English is not the student's native language he or she is required to score a minimum of 550 on the Test of English as a Foreign Language (TOEFL) and a minimum of 220 on the Test of Spoken English (TSE). It is especially important that the student have readily intelligible spoken English, because he or she will be conducting therapy sessions in English. International students are eligible to apply for graduate assistantships which also qualify them for in-state tuition. The International Student Services Office is available on campus to assist international students.

Program Requirements. The program leading to the Master of Arts in speech provides a thorough exposure to the nature and causes of communication disorders and to clinical procedures, including extensive practical experience within the OSU clinic and in a variety of off-campus settings, including a full-time internship for at least eight weeks toward the end of the program. All practicum experiences are supervised closely by faculty members or by other highly qualified and certified speech and language pathologists and audiologists. The program leads to the certificate of clinical competence of the American Speech-Language-Hearing Association, state teacher certification, and state licensure in speech pathology.

The student may earn a degree under one of the following plans:

Plan I—A minimum of 27 semester credit hours in courses that examine the nature, causes and treatment of communication disorders and related areas, and a minimum of nine semester credit hours in clinical practicum courses. This includes an eight-week off-campus internship for which the student may receive up to six semester credit hours.

Plan II—A minimum of 21 semester credit hours in courses that examine the nature, causes and treatment of speech communication disorders and related areas including six credit hours for a thesis; a minimum of nine semester credit hours in clinical practicum courses including the eight-week internship.

The plan that a student follows will be determined by the student in consultation with the adviser and with the approval of the graduate faculty in the area of speech and language pathology. Regardless of the plan chosen the student must complete the academic and clinical practicum requirements necessary for clinical certification by the American Speech-Language-Hearing Association. Further, these plans assume that the student will enter with an undergraduate background comparable in depth and breadth to that obtained at Oklahoma State University. For students with other backgrounds, the listed plans may be altered quantitatively and/or qualitatively in order to better accommodate the educational needs of the student.

Examinations. Students following Plan I must pass comprehensive examinations before graduation. Students following Plan II will not be required to take comprehensive written examinations, but must pass an oral examination over the thesis. All students are required to submit a report at the termination of the internship which critically evaluates the experience.

Nontraditional Students. Part-time graduate study is encouraged for those who cannot be in residence. Courses are scheduled conveniently in the evenings and during the summer term to accomodate nontraditional students who commute to campus. Students who hold bachelor's degrees and who are already employed as speech and language pathologists will be given special assistance. Students holding undergraduate degrees in other fields are encouraged to apply for admission.

Statistics

Professor and Head J. Leroy Folks, Ph.D.

Statistics is the science of learning from data. It is concerned with the development of theory and with the application of that theory to the collection, analysis and interpretation of quantitative information.

Because statistics is important in many scholarly disciplines, a degree in statistics provides the opportunity to enter not only the statistics profession but also many other fields which make extensive use of statistics. The areas of application include agriculture, the biological sciences, engineering, the physical sciences, the social sciences, education, business and home economics, among others. Statistics also promises to be important in emerging endeavors such as pollution and environmental research, energy utilization and health-care administration.

Those who pursue the study of statistics should be interested in scientific inquiry and should have a good mathematical background. In addition it is desirable that they have a genuine interest in some other subject which uses statistics.

Careers in government, industry and education, involving the disciplines previously mentioned, are open to the statistics graduate. In government and industry a statistician usually serves as a researcher or as a consultant to research scientists and decision-makers. In education, of course, the teaching function is added to those of research and consultation. In almost all careers, the statistician uses the computer.

The Statistical Laboratory operates within the Department to provide statistical consulting to researchers—both faculty and student—across the campus.

The Department of Statistics offers the B.S. and M.S. degrees to those interested in applications of statistics, and the Ph.D. degree to those who wish to make original contributions to the theory of statistics.

Graduate Programs

Admission Requirements. It is necessary to have an undergraduate degree, not necessarily in statistics or mathematics, to begin a program of study toward the master's degree in statistics. In some instances, it may be advantageous to have an undergraduate degree in another field. However, the student should have acquired a good mathematical background as an undergraduate. This should be equivalent to the required mathematics courses in the bachelor's program (MATH 2265, 2365, 2613, 3013, 4013). Students admitted to the program with deficiencies will be required to remedy such deficiencies.

The Master of Science Degree. The Master of Science degree in statistics may be completed by following one of the three plans listed in the "Graduate College" section. Normally, the all-course work plan will be initiated at the suggestion of the faculty. Each student will be required to attain an introductory knowledge of some field of application outside of statistics, mathematics and computer science. This requirement may be satisfied by having taken a three-hour graduate course in an approved field of statistical application. Each student is required to have completed COMSC 2113 or to have demonstrated competence in a procedure-oriented language such as FORTRAN.

The Doctor of Philosophy Degree. The Ph.D. requires the completion of 90 hours beyond the B.S. degree. A maximum of 30 of these credit hours may be earned by research for the dissertation. Each student will be required to attain an introductory knowledge of some field of application which may be satisfied by taking two three-hour graduate courses outside the fields of statistics, mathematics and computing. Each student is required to have completed COMSC 2113 or to have demonstrated competence in a procedure-oriented language such as FORTRAN.

Theater

Professor and Head Kenneth Cox, Ph.D.

The program in theater provides the student with course work and practical experience in all areas. The degree programs are broadly based with academic, humanistic and artistic approaches to the subject matter. Training typically involves not only the most obviously theatrical disciplines such as acting, but also considerable technical skills, literary and historical knowledge, artistic expression, and self-discipline.

Study of theater can lead to many careers besides those in the performing arts. Fields where theater study can be especially helpful include business management, salesmanship, law, politics, teaching, counseling, ministerial professions, or any career area where self-awareness and effective personal communication are essential.

Ambitious seasons of varied productions offer practical experience for both majors and non-majors. A vigorous student organization, the University Theater Guild, develops theater-related projects and provides many services to the production program.

Students with a major interest in theater choose a Bachelor of Arts degree. Students interested in preparing to teach theater and speech in grades 7-12 may choose the B.S. degree in speech/drama education. A strong component of theater courses may also be included in the individualized curriculum leading to the Bachelor of University Studies degree.

Graduate Programs

The Department offers work leading to the Master of Arts degree in speech. The enrollment in the program is typically small, allowing a great deal of individual contact with faculty members and considerable latitude in developing the plan of study.

Students are trained in all aspects of the discipline with the aim of producing graduates: (1) who will be effective teachers and artists in two- and four-year colleges as well as secondary schools; (2) who are artists and/or technicians highly qualified for professional positions; or (3) who have the appropriate background to pursue further study toward M.F.A. or Ph.D. degrees.

The Master of Arts degree may be achieved in accordance with any of the three plans described in the section "Master's Degree Programs" in the "Graduate College."

A limited number of teaching and technical assistantships are available to highly qualified students. Information and application forms may be obtained from the department head.

Undergraduate credentials should be referred to the department head for evaluation to assist advisement and to determine any possible deficiencies which will affect the admission status.

Zoology

Professor and Head Jerry Wilhm, Ph.D.

The Department of Zoology offers degree programs in biological science, physiology, wildlife and fisheries ecology and zoology.

Biological Science

A B.S. degree in biological science is available for students wishing to obtain a broad program encompassing all of the life sciences. By including appropriate course work in their programs, students can obtain licensure to teach in the secondary schools. Requirements for admission to dental, medical and other health-related professional schools can be met through the biomedical option of the biological science degree.

Physiology

Physiology is a division of zoology that deals with the mechanisms and controls of the life processes of animals including man. Since its goal is to explain these processes on the basis of chemical and physical laws, the students of physiology must obtain a strong background in both the physical and biological sciences. The bachelor's degree in physiology requires participation in undergraduate seminars and course work in general biology, genetics, gross and microscopic anatomy, algebra, trigonometry, general physics, general chemistry, organic chemistry, biochemistry, and quantitative chemistry, as well as course work in mammalian and cellular physiology and pharmacology.

The undergraduate degree in physiology is intended primarily as preparation for graduate school or a medically-related professional school (human or veterinary). With its relatively large number of free electives, the B.S. degree in physiology is also an excellent liberal arts experience.

Wildlife and Fisheries Ecology

The wildlife and fisheries ecology program involves comprehensive study in the conservation of renewable natural resources, emphasizing an optimum balance between wild animal populations and habitat requirements. Courses in the wildlife program fulfill the requirements for many other applied and professional careers.

Undergraduates majoring in wildlife and fisheries ecology may choose from communications, fisheries, and management/research. Management/research emphasizes applied wildlife and fisheries ecology, and offers the best preparation for graduate study. In communication, biological training is combined with course work in journalism, social sciences and the uses of electronic media. All three lead to a B.S. degree in wildlife and fisheries ecology.

Assisting in graduate training is the Oklahoma Cooperative Fish and Wildlife Research Unit. Cooperatively funded by the Oklahoma Department of Wildlife Conservation, the U.S. Fish and Wildlife Service, the Wildlife Management Institute and Oklahoma State University, this unit conducts research and demonstration projects and disseminates information obtained through such research. The unit functions in cooperation with the Department of Zoology in which unit leaders hold academic rank and serve as members of the faculty.

Graduate Programs

Programs of research and study leading to the M.S. and Ph.D. are offered in wildlife ecology.

Prerequisites. Applicants must have completed a baccalaureate degree including 40 semester hours in biology and related areas. Applicants must complete the Graduate Record Examination including the advanced test in biology.

The Master of Science Degree. Students must take an oral examination over biological principles administered by the advisory committee during the first six months in order to diagnose weaknesses and to help in formulating a plan of study. In addition to the general requirements, students are required to show competence in a research technique by taking additional courses in statistics, mathematics or computer science. Students must prepare a research proposal and complete either a thesis or a report. If a report is written, 32 credit hours are required. The plan of study must include at least two credit hours in a seminar.

The Doctor of Philosophy Degree. Students must take an oral examination over biological principles administered by the advisory committee during the first six months in order to diagnose weaknesses and to help in formulating a plan of study. In addition to the general requirements, students are required to show competence in a reading knowledge of a foreign language and/or certain research techniques by taking additional courses in statistics, mathematics or computer science. This requirement is in addition to the competence demonstrated for the M.S. degree. The plan of study must include at least four credit hours in a seminar. Departmental courses at the 3000



level are generally recommended only to make up deficiencies. Students must pass written and oral qualifying examinations, prepare a research proposal, and complete a dissertation based on original research and worthy of publication. Students must complete at least 30 graduate dissertation credits which may include a maximum of six credit hours from the M.S. degree. Candidates must present a public seminar based on the completed dissertation.

Zoology

Zoology, the study of animals, provides a background for many applied and professional careers. The B.S. degree curriculum in zoology is designed to provide a background of basic biology and some specialization in that area of zoology in which the student wishes to develop his or her career. The B.S. degree requires courses in cell biology, ecology, evolution, genetics, and vertebrate and invertebrate zoology. To become a zoologist the student must also have a good foundation in the related fields of chemistry, physics, mathematics, statistics, and botany.

Graduate Programs

Programs of research and study leading to the M.S. and Ph.D. are offered in zoology with concentration and emphasis in wildlife and fisheries ecology and in cell physiology. Specializations of faculty include animal behavior, animal nutrition, cellular and molecular biology, developmental biology, ecology, evolution, fishery biology, invertebrate zoology, limnology, ichthyology, herpetology, ornithology, mammalogy and physiology.

Prerequisites. Applicants must have completed a baccalaureate degree including 40 semester hours in biology and related areas. Applicants must complete the Graduate Record Examination including the Advanced Test in Biology.

The Master of Science Degree. Students must take an oral examination over biological principles administered by the advisory committee during the first semester in order to diagnose weaknesses and to help in formulating the plan of study. In addition to the general requirements, students are required to show competence in a research technique by taking additional courses in statistics, mathematics, or computer science. Students must prepare a research proposal and complete either a thesis or a report. If a report is written, 32 credit hours are required. The plan of study must include at least two credit hours in seminars.

The Doctor of Philosophy Degree. Students must take an oral examination over biological principles administered by the advisory committee during the first semester in order to diagnose weaknesses and to help in formulating the plan of study. In addition to the general requirements, the student is required to show competence in a reading knowledge of a foreign language and/or certain research techniques by taking additional courses in statistics, mathematics, and/or computer science. This requirement is in addition to the competence demonstrated for the M.S. degree. The plan of study must include at least four credit hours in seminars. At least 25 hours must be 5000 or above, not counting ZOOL 5000 or 6000. Departmental courses at the 3000 level are generally recommended only to make up deficiencies. A student must pass a written and oral qualifying examination, prepare a research proposal, and complete a dissertation based on original research and worthy of publication. Students must take a minimum of 30-36 graduate dissertation credit hours which may include a maximum of six credit hours from the M.S. degree. Candidates must present a public seminar based on the completed dissertation.

Zoology—Physiology

Graduate Programs

Programs of Study. Programs of study leading to the M.S. and Ph.D. are offered in zoology with an emphasis in physiology. The programs are designed to develop and train physiologists for teaching and research positions in universities or colleges; research positions in government, foundations, or industry; and related administrative positions. Specializations of faculty include cellular physiology, comparative endocrinology, comparative gastro-intestinal physiology, developmental biology, ecotoxicology, invertebrate physiology, nutritional physiology, and membrane biology. No particular undergraduate major is preferred, but the student should have completed most of the following: histology or embryology, comparative anatomy, introductory physiology, one year of organic chemistry, quantitative analysis, biochemistry or cell and molecular biology, one year of physics, and calculus.



College of Business Administration

Robert L. Sandmeyer, Ph.D., *Dean*
John T. Bale, Jr., Ed.D., *Associate Dean*
Robert C. Dauffenbach, Ph.D., *Director of Business and Economic Research*
James G. Hromas, Ph.D., *Director of Extension*
Craig B. Robison, Ed.D., *Director of Student Academic Services*

Today's business world is one of excitement. It offers young men and women a challenging professional future as well as the opportunity for meaningful social involvement and civic service. A steadily increasing number of young people today are choosing careers in business as they seek to shape our nation's economic structure and deal with some of its social problems. New developments in automation, economics, and innovations in management techniques and social responsibility are constantly creating new and exciting opportunities. The College of Business Administration (CBA) at Oklahoma State University assists in preparing students for these opportunities.

The College of Business Administration seeks to accomplish three major objectives: (1) to provide students with a liberal education in a program which includes study in four general areas: behavioral and social sciences, communications, humanities and fine arts, and natural science and mathematics; (2) to provide students with an understanding of the functions of business and other economic units in the American economy, which includes study in the basic areas of accounting, economics, business law, finance, management, management information systems, marketing, production and statistics; and (3) to provide students with the opportunity for specialized study in selected major areas of business.

Accreditation

The College of Business Administration at Oklahoma State University is fully accredited by the Accreditation Council of the American Assembly of Collegiate Schools of Business, the only recognized accrediting organization for schools of business at the university level.

High School Preparation

Although a sound high school program is adequate preparation, prospective business students will benefit from a strong background in English and mathematics. Also, course work in history and government, science, geography, computer science, foreign language and public speaking will be quite valuable.

Scholarships

Oklahoma State University has an extensive scholarship program for entering freshmen, and applications should be sent to the OSU Financial Aids Office by February 1 during one's senior year in high school. College of Business Administration scholarships are mainly reserved for sophomores, juniors, and seniors. Scholarship awards are based on academic performance, leadership and need.

Academic Advisement and Enrollment Procedure

Freshmen will plan their study in conference with a staff adviser in the Office of the Dean of the CBA.

All students should tentatively select a major during their sophomore year. Each student will then be assigned to a faculty adviser from the major field of study. Thereafter, counseling will be provided by the assigned faculty adviser.

The dean and associate dean, as well as the director of the Office of Student Academic Services, are available to all students for counseling on special problems.

Academic Programs

Undergraduate Programs. The *Bachelor of Science in Business Administration* degree is offered by the five departments and one school of the College. Departmental majors are listed below.

Accounting, with a major in accounting.

Administrative services. with a major in general business.

Economics, with a major in economics and an option in business economics—quantitative studies.

Finance, with a major in finance.

Management, with majors in management with an option in personnel management; management information systems; and management science and computer systems.

Marketing, with a major in marketing.

Graduate Programs. *Master's Degrees.* Two types of master's degrees are available to students desiring to do advanced work in the business area. One of these is the *Master of Business Administration* degree (which allows concentrations in management, management science and computer systems, marketing or finance) and the other is the *Master of Science* degree, which requires completion of a graduate major in accounting or economics. Only persons admitted to a graduate degree program may take graduate courses in the College of Business Administration.

Doctor of Philosophy Degree. Graduate work toward the Doctor of Philosophy degree with a major in economics is offered in the Department of Economics. Graduate work toward the Doctor of Philosophy degree with a major in business administration is offered in the departments of Finance, Management, and Marketing and the School of Accounting.

Placement Service

Representatives of more than 100 business and industrial concerns and governmental agencies annually interview graduating seniors of the College of Business Administration.



General Education Requirements

The minimum campus-wide general education requirements are summarized as follows: not less than 40 semester hours, including six hours of English composition, and 34 hours in the breadth areas. These include: six hours in American history and government and at least one three-hour course in each of the four areas—Natural Science, Social and Behavioral Science, Humanities, and Abstract and Quantitative Thought. No more than 18 of the 34 hours meeting breadth requirements may be in disciplines directly supportive of the major.

Two other requirements include: an "International Dimension" and a "Scientific Investigation" component. These may be met in any part of the student's program, and thus do not necessarily add to the number of hours required. The International Dimension simply requires each student to learn something about cultures and societies outside the United States. The Scientific Investigation Requirement involves some kind of laboratory experience with student involvement. More detail concerning these and other requirements is found in the next section, "Lower-division Requirements."

Lower-division Requirements

Work in the freshman and sophomore years is planned in such a way as to give the student basic information in the general areas of (1) behavioral and social sciences, (2) communications, (3) humanities and fine arts, (4) natural science and mathematics, and (5) business foundation courses. In order to ensure study in each of these five areas, courses totaling up to 59

semester credit hours are required. The student also may select additional hours from courses in these areas, with the opportunity of achieving either further breadth or a certain degree of depth by concentrating these hours in a particular area of interest. As part of the student's general education, one course must be selected that is identified as satisfying the International Dimension requirement.

During the freshman and sophomore years the student will complete courses in each of the following areas:

Behavioral and social sciences: American history, three semester credit hours; American government, three hours; and six hours elected from at least two of the following fields: anthropology, geography (except physical geography courses), history, political science, psychology and sociology.

Humanities and fine arts: Six semester credit hours elected from two different fields identified by the University as satisfying humanities (H) credit.

Natural science and mathematics: A minimum of 10 semester credit hours with the specific number of required hours in mathematics and natural science varying with the major chosen. Specific requirements for each major are published by the University in the book *Undergraduate Programs and Requirements.*

Communications: English composition, six semester credit hours, and introduction to public speaking, three hours.

Pre-business core: For business students, a minimum GPA of 2.00 in the following 30-hour pre-business core is prerequisite for MGMT 3013, MGMT 3223, MKTG 3213 and FIN 3113: ENGL 1113 and 1323; ACCTG 2103 and 2203; ECON 2013 and 2023; MATH 1513; GENAD 2103; STAT 2023; and SPCH 2713. For non-business students, the University prerequisite for upper-division courses applies. (See "Academic Regulations" elsewhere in the *Catalog.*)

General electives: In addition the student may elect courses from any area except lower-division aerospace studies and military science and HPEL activity courses to complete lower-division requirements.

Credits earned during the freshman and sophomore years in another institution may not be substituted for junior and senior course requirements in majors in the College of Business Administration.

Departmental Clubs and Honor Societies

Alpha Kappa Psi (professional business organization)
Beta Alpha Psi (accounting honor society)
Beta Gamma Sigma (business administration honor society)
Beta Upsilon Sigma (professional business organization)
Business Student Council
Data Processing Management Association
Delta Sigma Pi (professional business organization)
Economics Club
Entrepreneurship Club
Financial Management Association
Graduate Students in Business Administration
Marketing Club
Mu Sigma Omicron (management)
Personnel Association
Phi Beta Lambda (business leadership)
Toastmasters

School of Accounting

Professor and Head Lanny G. Chasteen, Ph.D., CPA

The School of Accounting offers three degree programs in accounting: (1) B.S. in Business Administration with a major in accounting, (2) M.S. in accounting, and (3) Ph.D. in business administration with accounting as the major field.

The common objective of the B.S. and M.S. accounting programs is to educate students to commence and continue to develop in a wide range of professional accounting careers. The specific objective of the B.S. in accounting program is to provide basic conceptual and business knowledge as a foundation for accounting career development; the objective of the M.S. in accounting is to provide candidates with a greater breadth and depth in accounting than is possible in the B.S. program, in order to prepare graduates for careers as professional accountants in financial institutions, industry, nonbusiness organizations, and public practice.

Students who are considering a professional accounting career should have above-average aptitudes in mathematics and English, disciplined work habits, an interest in working with people and an attitude of service to mankind.

The B.S. in accounting, including an auditing course, is acceptable in lieu of three years of required public accounting experience required before a candidate may write the Oklahoma Certified Public Accountants' Examination. The M.S. in accounting earned at Oklahoma State University satisfies educational requirements for C.P.A. candidates in all jurisdictions of the United States.

Considerable electives are available in both degree programs. Specialization in auditing-financial accounting, cost-managerial, or tax is possible in the M.S. in accounting program.

Candidates for either of these degrees are encouraged to select some electives in quantitative and behavioral science areas.

Graduate Programs

The Master of Science Degree. The specific objectives of the M.S. in accounting are to provide candidates with a greater breadth and depth than is possible in the B.S. program, in order to prepare graduates for careers as professional accountants in financial institutions, industry, nonbusiness organizations, and public practice, and to develop judgmental ability in accounting and related areas. Advanced courses provide a theoretical base for insight into significant problems confronting the accounting profession. In addition, a specialty in taxation is available for interested candidates. The candidate receives assistance from the faculty in selecting a pattern of courses designed to prepare the student according to the chosen professional goals.

Graduates of recognized colleges and universities whose records indicate adequate intellectual capacity and desirable personal characteristics may qualify for admission. The typical applicant admitted to the program has a GMAT score of 525 or above and an undegraduate grade-point average of 3.25 or above.

Prerequisites. The following are required: 24 semester hours of advanced accounting; six semester hours of business law; business calculus; three semester hours each in finance, management, marketing, production, quantitative analysis, business policy, intermediate microeconomics and 6 semester hours in statistics. As many as eight semester hours of course deficiencies may be removed within the 32 semester hours required for the degree.

The Doctor of Philosophy Degree. The Ph.D. in the College of Business Administration with a major in accounting emphasizes flexibility to meet the particular needs and objectives of individual candidates. The program is designed to provide the highest degree of preparation for the individual student, enabling the student to make significant professional contributions in research, teaching, or in business or government positions.

Graduates of recognized colleges and universities whose records indicate adequate intellectual capacity and desirable personal characteristics may qualify if they have a good academic record and achieve satisfactory scores on the GMAT. Admission is competitive.

The Ph.D. program is designed so that a candidate may, at his or her option, specialize in one of the following accounting areas: auditing, managerial accounting, financial accounting, or taxation. All candidates are required to take a two-semester seminar which provides an overview of relevant academic literature. This seminar is restricted to Ph.D. candidates in accounting. Two minor areas, one of which may be outside the College of Business Administration, are required, in addition to competence in economics and quantitative analysis. The candidate's advisory committee is responsible for assisting in the development of a plan of study encompassing the above areas. Students in residence are required to do teaching or research on a quarter-time basis while earning the degree.

Administrative Services

Professor and Head Joe W. Fowler, J.D.

The Department offers an undergraduate major in general business.

The general business program gives students a broad, comprehensive type of business educa-



tion preparing them to enter employment in a wide range of administrative positions in private business, government, or non-profit organizations. The scope of their educational experience enables these graduates to assume management positions in organizations of varying sizes and ranges of operations.

Students majoring in general business will take general education or foundation course work in behavioral and social sciences, communications, humanities and fine arts, natural science, mathematics, and statistics, as well as business foundation courses in accounting, business law, economics, finance, management information systems, management, and marketing.

This major, which provides for a high degree of individual student choice, includes required upper-division course work beyond the business core in each of the business disciplines as well as substantial work in business or business-related courses, selected by the student in consultation with his or her major adviser.

Business Administration

M.B.A. Program Director Cynthia S. Gray

Graduate Programs

The Master of Business Administration Degree. The Master of Business Administration program provides graduate professional education for individuals preparing for administrative careers in either the private or public sector. It is a comprehensive, yet flexible program providing the knowledge and analytical tools to cope with the complexities of administration within diverse environments.

The program develops fundamental knowledge in the areas of accounting, finance, management, and marketing. Further, it provides critical analytical and research capabilities through research design and computer-based decision courses. The program is a 48-hour, self-contained program. The length of the program for a full-time student is normally two years, but the degree might be earned in less time by attendance in summer session courses. The individual course of study follows a personalized, interdepartmental curriculum developed in conjunction with the graduate adviser. Students may use elective courses either to continue broad managerial development or to emphasize studies in a functional area (finance, management, or marketing).

Outstanding students with baccalaureate degrees in any field of study may apply. No specific prerequisite courses are required for admission; however, it is assumed that students have good quantitative skills before entering the program. The M.B.A. is an advanced studies program that assumes a fair degree of sophistication in mathematics, statistics, computer science, accounting and economics. Admission is granted to those students whose potential for successful graduate study is clearly indicated by the undergraduate grade-point average, the score on the Graduate Management Admissions Test, and information obtained through letters of recommendation.

The Doctor of Philosophy Degree. The Ph.D. in business administration is an interdepartmental program in the College of Business Administration. The degree emphasizes flexibility to meet the particular needs and objectives of individual candidates. The program is designed to provide the highest degree of preparation for the individual student, enabling him or her to make significant professional contributions in research, teaching, or in business or governmental positions.

Requirements. Students select *one major* area of study from either accounting, finance, management or marketing, and *two minor* areas. The dissertation is usually written in the student's major area. One of the minor areas must be taken in the College of Business Administration. The second minor may be taken from another department within the College of Business Administration or from a department outside the College.

All candidates for the Ph.D. degree in business administration are expected to have a basic competence in all the major functional areas of business administration—accounting, economics, finance, management and marketing. In addition, basic competence is expected in finite mathematics, calculus and statistics. Students who possess a recent master's degree in business from a program accredited by the Accreditation Council of the American Assembly of Collegiate Schools of Business will generally have satisfied most of the basic competence requirements in these areas.

Administration. The program is administered by the dean of the Graduate College and the department in which the student enrolls with the assistance of a faculty advisory committee.

Major and Minor Areas. The candidate's advisory committee is responsible for assisting in the development of a plan of study that assures competence in the major and minor areas and in economics and quantitative analysis. All Ph.D. students in residence are required to do teaching or research on a quarter-time basis, for at least one semester, while earning the degree.

Economics

Professor and Head Ronald L. Moomaw, Ph.D.

Economics is a science of choice. The study of economics centers around individuals' attempts to improve their living standards. It provides a comprehensive view of how a society is organized to transform the limited resources available into want-satisfying goods and services. It investigates the principles underlying the operation of the economic system, and seeks to determine its weaknesses and to prescribe policy measures that will improve its operation. In the process it ranges over a host of the most important problems confronting contemporary society—the causes of and remedies for depression and inflation, the determinants of and methods for improving income distribution, poverty problems and welfare measures, the role of the government in economic activity, the requisites for economic growth and development, pollution and congestion and their control.

The primary objectives sought in the undergraduate curriculum are to develop a broad understanding and perspective of the economic aspects of man's activities, coupled with thorough training in the fundamental tools of economic analyses. Toward these ends, the development of elementary mathematical and statistical skills is highly



desirable, as is complementary study in the social and behavioral sciences, accounting and business administration.

A major in economics prepares students for positions with business firms, nonprofit private organizations and government agencies. It provides an excellent background for the study of law. It qualifies competent students to undertake the graduate work necessary for professional positions in economic research and college or university teaching. A degree option in business economics and quantitative studies is offered to provide additional training in analytical methods and communication skill for both public and private sector occupations.

Graduate Programs

The Department offers work leading to the Master of Science degree and the Doctor of Philosophy degree. The graduate program in economics prepares economists for academic careers as well as research and administrative positions in business and government agencies.

Graduate fields of specialization include monetary economics, public finance, international economics, economic development, econometrics, labor and human resource economics, industrial organization, and urban and regional economics. In addition, graduate courses are offered in the history of economic thought and in mathematical economics.

The initial admission to graduate programs is determined by an elected graduate studies committee on the basis of the applicant's previous academic record; verbal, quantitative and analytical scores of the Graduate Record Examination; and letters of recommendation.

The Master of Science Degree. Admission to the master's program in economics is granted to college graduates with superior academic records whose preparation has been broad and thorough. They need not have majored in economics as undergraduates but must be well grounded in economic fundamentals. A good background in one or more such fields as history, philosophy, mathematics, statistics, political science, English, sociology, accounting, finance, psychology, or management is particularly helpful to the graduate student in economics. An applicant whose prior preparation is deficient in some respect, may, if otherwise qualified, be admitted to the program but will be required to remove the deficiency, increasing somewhat the time needed to complete work for the degree.

Each graduate student is guided in the preparation of a program of study by a graduate studies committee. At the master's level, there are two options. One option provides the student with a well-rounded program that avoids premature specialization in some particular area of economics. The candidate for the master's degree is required to show competence in basic economic theory and statistical methods, together with an understanding of the fundamental institutional operations of the United States economy. The second option is in applied economics which stresses communication skills, quantitative analysis and course work from other disciplines related to their career objectives.

Each program contains enough electives to permit considerable choice among areas of emphasis. A research report is required of all students who take only the M.S. degree. Those accepted for the Ph.D. program have the option of applying for and receiving the M.S. degree without the research report upon successful completion of the Ph.D. qualifying examination and the filing of an approved Ph.D. thesis topic with the Graduate College. A foreign language is not required.

The Doctor of Philosophy Degree. Admission to the doctoral program in economics is granted to college graduates who have satisfactorily completed at least one year of graduate work in economics and who have superior academic records.

This program stresses balanced preparation in economic theory and in mathematics and statistics, as well as competence in subject-area fields of specialization. The student is required to pass qualifying examinations in the theory core and in two fields of specialization. (The theory core is not considered a field of specialization.) Competence must be demonstrated in a third field of specialization, either through course work or by passing a qualifying examination in the field. An advisory committee helps the student plan a program of study to achieve these objectives. A foreign language is not required.

A dissertation based upon original research is required of the candidate for a Ph.D. degree in economics. A final oral examination deals principally with the dissertation and fields to which it is most closely related.

Finance

Professor and Head W. Gary Simpson, Ph.D.

The primary objective of the undergraduate curriculum is to develop a broad understanding and perspective of the financial aspects of man's activities, coupled with thorough training in the fundamental tools of financial analysis. Toward these ends, the development of elementary mathematical and statistical skills is highly desirable, as is complementary study in economics, accounting and business administration.

The major in finance is intended to prepare students for positions with organizations that require a special understanding of financial problems and financial systems. Students who major in finance are employed by organizations such as banks; the finance, accounting, or systems departments of business corporations; and other organizations that have need of financial expertise. Examples of topics covered in the finance program include financial management, investment theory, securities markets and financial institutions.

Graduate Programs

Concentrations in finance are offered through the Master of Business Administration and Doctor of Philosophy degrees.

The Master of Business Administration Degree. (See "Business Administration.")

The Doctor of Philosophy Degree. The Ph.D. as offered by the Department of Finance provides intensive study in finance, preparing students for significant professional contributions in university teaching and research or staff positions in business or government.

The program is designed to meet the needs and objectives of individual students, but all students will seek an in-depth understanding of the theoretical foundations of financial economics and develop research skills in finance.

Students will select finance as their major area of study. One or two minor areas are also to be selected. A minor area must be taken in the College of Business Administration from accounting, economics, management, management science, or marketing. The second minor area (if any) may or may not be taken outside the College of Business Administration. As support for the major and minor field of study, each student is required to attain graduate level competence in economic theory and quantitative methods.

Prerequisites for admission to the program are appropriate basic courses in calculus, statistics and computer science.

Competence in planning and executing research is demonstrated by a dissertation. In addition, each candidate must pass comprehensive qualifying examinations and a final oral examination on the dissertation itself.

Outstanding students with degrees in any field of study may apply. Applications for admission are evaluated on the basis of (1) undergraduate and graduate grade-point averages, (2) score on the Graduate Management Admissions Test, (3) a two- or three-page statement describing goals and academic interests, (4) three letters of recommendation, (5) evidence of research potential, and (6) a personal interview when feasible. It is the applicant's responsibility to see that all materials related to these criteria are received by the Department of Finance.

Management

Professor and Head Wayne A. Meinhart, Ph.D.

The majority of accomplishments in contemporary society are created through the modern organization. Whether the goals are to realize success in business or solve the pressing problems of civilization, organizational systems must be effectively managed in order to maximize the probability of success.

As an area of study, the field of management offers dynamic, exciting possibilities to students interested in business careers, careers with complex nonbusiness organizations, and to students who seek the challenge of working on relevant, real-world problems. The field of management is concerned with the analytical process and the application of relevant theory and research to solving business and organizational problems. Examples of such problems include creating organizational structure, systems and policies; motivating people; planning courses of action; and efficiently allocating and utilizing resources. Since people in the field of management deal with real-world problems, the student should have a deep interest in applying knowledge in problem-solving situations. Examples of the kinds of knowledge applied include, but are not limited to, behavioral science, economics, mathematics and statistics, management information systems, communications skills, accounting, and necessary knowledge of theory and methods in management and management science. It is not necessary for students to have interests in each of these areas since the field offers substantial opportunities for specialization.

The curriculum for the bachelor's degree requires of all students a common foundation of work in the disciplines listed above. Students are then guided into advanced work in these areas and in their applications of courses in management and management science. Four degree programs are available for choice based upon the student's interest in specialized work. Each program emphasizes analytical tools, the scientific method and essential theory that will be useful in a rapidly changing world.

Management

The major in management is designed to prepare students for leadership careers with business or nonprofit organizations as managers. It emphasizes the study of management systems and problems. Students with interests in international management may elect a special option under the management major. Majors are typically employed by organizations of all types and sizes as managers, management trainees or staff specialists. The field of management has much to offer those interested in leadership roles in business and public sector organizations.

Personnel Management

The option in personnel management is designed to prepare students for careers in human resources management. Anything that concerns the work force of an organization is the concern of the personnel manager. This includes working with labor relations and collective bargaining, forecasting the demand for personnel, attracting potential employees, orienting them and then



developing the careers of those employed. For those who enjoy working with both data and people, a career in personnel management offers many opportunities and the chance for personal growth and development.

Management Information Systems

The major in management information systems (MIS) prepares students for work in information systems development and maintenance. Both applications of computer systems technology and understanding of data and information flows among the functional areas of business are emphasized. The continuing integration of the computer in all aspects of business and the critical need for responsive management information systems has created a strong demand for graduates who are knowledgeable about both information systems and business. The first two years of study involve the study of mathematics, statistics, and computer science as well as English, accounting, economics, psychology and other courses designed to develop a broad educational background. The junior and senior years focus on aspects of information systems and computer technology including mainframe and microcomputer programming languages, data base management, management information systems, systems analysis, data communication systems, and management science methods. Coverage of functional areas prepares MIS graduates to understand the information needs of complex business organizations for which information systems are developed.

Management Science and Computer Systems

The major in management science and computer systems is designed to prepare students for careers as staff managers in complex businesses or nonprofit organizations. There is a high demand for persons with advanced computer competency with a knowledge of business systems. Many students have a special interest in building concentrations in management systems and computer science. The management science and computer systems program is ideal for this purpose. Examples of topics covered include managerial decision theory, operations research, systems analysis, management information systems and operations management. The study of management science and computer topics may be combined with advanced work in related disciplines for those with appropriate interests. Management science and computer systems majors typically enter business or public organizations as management systems analysts, computer systems analysts, or management trainees. Many also undertake graduate study to further their professional education.

Graduate Programs

The Department of Management offers work leading to the Master of Business Administration and the Doctor of Philosophy in business administration degrees.

The Master of Business Administration Degree. (See "Business Administration.")

The Doctor of Philosophy Degree. The Ph.D. in business administration program through the Department of Management provides intensive study in management, management science and management information systems. It prepares the student for significant professional contributions in university teaching and research, or staff positions in business or government.

The program is quite flexible and individually structured to meet the needs and objectives of each candidate. Emphasis is placed on an astute understanding of analytical and theoretical foundations of the business environment and development of research capabilities in the area.

The student will select as his or her major area management/management science. Two minor areas are also to be selected. One of the minor areas must be taken in the College of Business Administration from the fields of accounting, economics, finance, or marketing. The second minor area may or may not be taken outside the College of Business Administration. As support for the major and minor fields of study, each student is required to attain graduate level competence in economic theory and quantitative methods.

As prerequisites to the program, all candidates are to have completed appropriate basic courses in calculus and statistics. Likewise, candidates are expected to have a basic competence in the major functional areas of business—accounting, finance, management, and marketing. Competence in the functional areas is usually assumed for candidates having recently completed an appropriate graduate course in each area through a program accredited by the American Assembly of Collegiate Schools of Business.

Competence in planning and executing research must be demonstrated in a dissertation. In addition, each candidate must pass a series of comprehensive qualifying examinations, both written and oral, and a separate, final oral examination on the dissertation itself. To enhance teaching skills, all Ph.D. students in residence are required to teach on a quarter- or half-time basis for at least one semester while earning the degree.

Outstanding students with master's degrees in any field of study may apply. Applications for admission to the program are evaluated on the basis of (1) undergraduate and graduate grade-point averages, (2) score on the Graduate Management Admissions Test, (3) a two- or three-page statement describing goals and academic interests, (4) three letters of recommendation, (5) evidence of research potential, and (6) a personal interview when feasible. It is the responsibility of each applicant to insure that all material related to the above criteria is received by the Department.

Marketing

Associate Professor and Interim Head
Raymond P. Fisk, D.B.A.

Marketing is an exciting field of study in which a wide variety of job opportunities exist. It is also an excellent foundation study for eventual movement to top management within an organization.

Marketing is concerned with the identification of wants and needs by consumers and the development of products, distribution channels, price and communication methods to best satisfy those wants and needs. Our economic system is dependent on the ability of organizations to match resources with needs. As such, firms become more marketing-oriented every year.

A marketing graduate will likely be involved in performance and management of many different



traditional areas of decision-making—sales, advertising, logistics and marketing research. In addition, one will frequently assist in product planning, developing marketing information systems and general management.

The effective marketing executive today must develop a perspective and capability that reflect a four-dimensional program of study: (1) a liberal education in the sciences, humanities, behavioral and social sciences, mathematics and communications; (2) an adequate knowledge of the major functional areas of business; (3) a high-level competency in marketing; and (4) study in a supportive field. Liberal education is emphasized during the freshman and sophomore years. The study of the functional areas of business begins in the sophomore year and continues into the junior year. During the junior and senior years, the focus is on marketing. In addition to the introductory course, which provides an overview of the field of marketing, the student will take courses in consumer behavior, promotion, sales management, marketing research, channels and marketing policy. While studying marketing, one typically selects courses in fields such as management finance, statistics, advertising/public relations and other fields to support a particular career choice within the marketing field.

Graduate Programs

The Department of Marketing offers work leading to the Master of Business Administration and the Doctor of Philosophy in business administration degrees.

The Master of Business Administration Degree. (See "Business Administration".)

The Doctor of Philosophy Degree. The Ph.D. in business administration program through the Department of Marketing provides intensive study in marketing. It prepares the student for significant

professional contributions in university teaching and research, or staff positions in business or government.

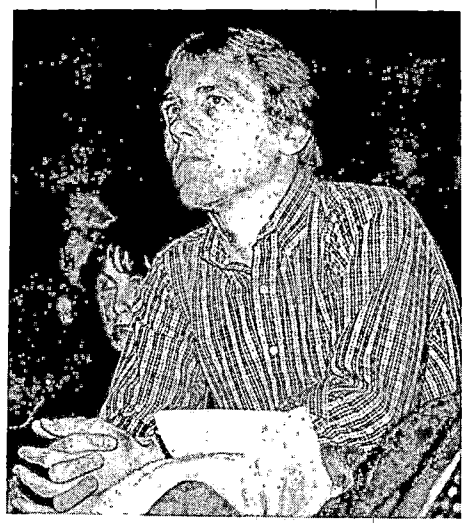
The program is quite flexible and individually structured to meet the needs and objectives of each candidate. The program is designed to create scholars and researchers in the field of marketing. Highly student oriented, the program focuses on training individuals in current marketing theory and research techniques. Collaboration between students and faculty is strongly encouraged.

Program Content. The student will take fifteen hours of Ph.D. seminars in marketing. The student must also complete a nine-hour minor in another discipline, such as economics, management, sociology or psychology. As support for the major and minor fields of study, extensive course work (normally 18 credit hours) in the area of quantitative/research methodology is required. In addition, each student must attain graduate level competence in economic theory.

Each candidate must pass a series of comprehensive qualifying examinations, both written and oral, that address knowledge in the major and minor fields. A separate final oral examination will be held on the dissertation itself. To enhance teaching skills, all Ph.D. students who plan to teach in the United States are required to teach on a quarter-or half-time basis for at least one semester while earning the degree.

As prerequisites to the program, all candidates are to have completed appropriate basic courses in calculus and statistics. Likewise, candidates are expected to have a basic competence in the major functional areas of business: accounting, finance, operations management, organizational theory, economics, and marketing. Competence in the functional areas is usually assumed for candidates having recently completed an appropriate graduate course in each area in an M.B.A. program accredited by the American Assembly of Collegiate Schools of Business.

Application Procedure. Outstanding undergraduate or graduate students from any field of study may apply. For those with an M.B.A., the program will normally consist of two years of course work



and one year (or more) of dissertation work. For those without a master's degree, the plan of study for the Ph.D. degree will typically allow for the granting of an M.B.A. prior to completion of the Ph.D. degree. The program normally takes four years to complete for those without a master's degree. Applications for admission to the program are evaluated on the basis of (1) undergraduate and graduate grade-point averages. (2) score on the Graduate Management Admissions Test or Graduate Record Examination. (3) a two- or three-page statement describing goals and academic interests. (4) three letters of recommendation. (5) evidence of research potential, and (6) a personal interview when feasible. It is the responsibility of each applicant to ensure that all material related to the above criteria is received by the Department of Marketing. Application forms and detailed explanation of the Ph.D. degree in business with a major field in marketing are available through the Department. Students considering this degree are encouraged to contact the coordinator of the Ph.D. program early in the application process.

College of Education

Kenneth L. King, Ed.D., *Dean and Director of Teacher Education*
Kenneth H. McKinley, Ph.D., *Director of Education Research and Projects and Interim Director of Education Extension*
Steven K. Marks, Ed.D., *Coordinator of Clinical Experiences*

The College of Education administratively includes the departments of Applied Behavioral Studies, Aviation and Space Education, Curriculum and Instruction, Educational Administration and Higher Education, and the School of Occupational and Adult Education. The College offers a wide range of undergraduate and graduate programs to prepare individuals for careers in teaching, administration or research in the professional field of education either in the common schools or in institutions of higher learning. Additionally, programs in adult education and technical education prepare individuals for careers as human resource development specialists in business, industry and agency settings. There are a variety of degrees within the College at the bachelor's, master's, specialist and doctoral levels (see the "Degrees Offered" section of the *Catalog*).

There are increasing opportunities in business, industry and in state and federal agencies for persons with unique preparation in the several education specialties who do not desire to teach in the schools. Individuals interested in a nonteaching major in education should contact the College of Education Office of Student Services for further information.

The College also provides academic preparation for a wide range of specialties:

I.

School Service Personnel—Certification Areas
Administrator (elementary school principal)
Administrator (school superintendent)
Administrator (secondary school principal)
Library media specialist
School counselor (elementary and secondary)
School psychologist
School psychometrist

II.

Teaching Specialities—Certification Areas
Elementary school certificate (K-8)
Elementary education
(Middle school math)
(Middle school science)
(Special education)
Elementary-secondary school certificate (K-12)
Art
Foreign language
Physical education/health
Reading specialist
Special education
(emotionally disturbed, learning disability and mental retardation)
Secondary school certificate (7-12)
Business professions
English
Industrial technology
Journalism
Mathematics
Marketing education
Middle school math
Middle school science
Science
Social studies
Speech/Drama
Technical education
Trade and industrial education

III.

Other Specialties—Noncertification Areas
Adult and continuing education
Aviation and space education
College teaching
Community counselor
Community education coordinator
Counseling psychology
Curriculum and teaching
Curriculum supervision
Educational research and evaluation
Educational technologies
Educational/instructional psychology
Gifted and talented
Higher education administration (junior college, 4-year college, and university)
Higher education counseling
Higher education student personnel
Human development
Human resources development
Instructional systems
Marriage and family therapy
Microcomputer applications
Occupational education administration
Rehabilitation counseling

Accreditation

All College of Education programs are accredited by the Oklahoma State Regents for Higher Education, the National Council Accreditation for Teacher Education (NCATE), the Oklahoma State Board of Education, and the North Central Association of Colleges. The M.S. degree program in Rehabilitation Counselor Education in the Department of Applied Behavioral Studies is accreditated by the National Commission on Accrediting through the Council on Rehabilitation Education.

High School Preparation

Students are expected to satisfy the high school curriculum requirements as determined by the Oklahoma State Regents for Higher Education. It is recommended that the student be involved in clubs and organizations as well as have had some experiences working with children and/or youth depending on the chosen teaching field.

Admission Requirements

Freshman students are admitted to the College of Education consistent with criteria published for admission to the University. For continuing enrollment in good standing, the College of Education requires a minimum of a 2.50 GPA for admission to Teacher Education, student teaching, and graduation. This standard is consistent with state requirements for students in the state of Oklahoma who complete teacher education programs and seek licensure. All student grades are reviewed at the end of the spring semester to determine whether appropriate academic progress is being made.

For graduation with recommendation for Licensure/Certification the following are required: (1) a 2.50 overall GPA; (2) a 2.50 GPA in the Major Requirements; and (3) a 2.50 GPA in Professional Education Requirements. The student must earn grades of "C" or better in each course in both the Major Requirements and Professional Education Requirements, and must earn grades of "B" or better in all sections of student teaching for recommendation for Licensure/Certification.

Scholarships

The College of Education offers several scholarships for undergraduate and graduate students. The following are scholarships offered by the College of Education:

Ray E. Brown Memorial Scholarship
College of Education Special Leadership Award
Education Student Council Scholarship
Future Teachers Scholarship
Frank E. and Harriet E. Hedrick Scholarship
Ora A. Henderson Memorial Scholarship
Daniel and Mary L. Herd Memorial Scholarship
J. Andrew Holley Memorial Scholarship
John Leslie Lehew III Scholarship
Locke, Wright, Foster, and Cross Graduate Scholarship
Mable Marietta Macy-Oaks Memorial Art Scholarship
Leon L. Munson Memorial Scholarship
Percy W. Oaks, Sr. Memorial Art Scholarship



Outstanding Freshman Aviation Education Student
Technical Education Alumni and Faculty Scholarship
James Vandegrift Scholarship
Amy Louise Wagner Memorial Scholarship
Hoyt E. Walkup Scholarship

In addition to these scholarships, Oklahoma State University is allocated, on an annual basis, a large number of Oklahoma State Regents for Higher Education scholarships. These scholarships are available in teaching fields identified by the State Board of Education as critical shortage areas and are only available to Oklahoma residents attending or desiring to attend OSU.

Nominations from OSU for the Regents' scholarships will be based upon established criteria which include a concise written statement of career goals, academic performance, and an interview with the Scholarship Nomination Committee. Those applicants scoring highest on all criteria will be nominated to the Oklahoma State Regents for Higher Education. Recipients of the scholarships are expected to teach in the major field of preparation at least one year for each year of scholarship support.

Academic Advising

Academic advisement for undergraduate students is coordinated through the Office of Student Academic Services, 102 Gundersen, in the College of Education. Students with fewer than 28 earned semester hours are advised by academic counselors in the Office of Student Academic Services. Students with 28 or more earned semester hours are assigned to a particular academic adviser, in the Office of Student Services or to the faculty in the academic departments, based on the student's declared major. Faculty academic advisers are nominated by their department heads and appointed by the dean of the College. Academic advisers may confer with their advisees on such matters as vocational counseling, course selection, academic problems, long-range professional goals and semester by semester enrollment.

Special Academic Programs

The College of Education utilizes the Bachelor of University Studies degree program along with the other colleges in the University. Unique career objectives can be met by working with academic advisers in selecting a specially-tailored program which ultimately leads to a degree.

General Education Requirements

All undergraduate degrees in the College of Education require a minimum of 50 semester hours in general education which includes the following: communication skills, mathematics, United States history and government, science, behavioral studies, arts and humanities, and electives. All degrees are consistent with the University General Education requirements and the Oklahoma State Department of Education standards.

Lower-division Requirements

Degrees in the College of Education contain essentially 60 semester hours which are in the area of general studies and the major. In addition to lower-division requirements, the College is consistent with the other colleges in the University by requiring at least 40 semester hours of upper-division course work.

Departmental Clubs and Honor Societies

Collegiate Distributive Education Clubs of America
Education Student Council
Kappa Delta Pi (education honor society)
Student Art Education Association
Student Council for Exceptional Children
Student Education Association
Technology Education Collegiate Association

Applied Behavioral Studies

Professor and Head Dale R. Fuqua, Ph.D.

The Department of Applied Behavioral Studies in the College of Education serves the University Teacher Education program and offers degree programs at both the undergraduate and graduate levels. Areas included in the Department are special education, counseling and student personnel, educational psychology and educational research and evaluation. A primary mission of the Department is to apply knowledge derived from psychological and related behavioral studies to the provision of educational and social services.

The Bachelor of Science Degree. Two undergraduate degree programs leading to careers in special education are available. In the Department of Applied Behavioral Studies, the undergraduate student can work toward a Bachelor of Science in Special Education, which includes an option in mental retardation. A joint undergraduate program is also available through the departments of Applied Behavorial Studies and Curriculum and Instruction. This joint program provides the student an opportunity to combine elementary education, mental retardation, and either learning disabilities or emotional disturbance in a five-year program.



Graduate Programs

Special Education Programs. *M.S. Programs.* Master's level emphasis is available through the M.S. in applied behavioral studies. The academic preparation program in the special education area includes special techniques and arrangements to facilitate the education of exceptional individuals. At the master's level, students may pursue subarea emphases in learning disabilities, emotionally disturbed, mental retardation, gifted/talented, and general special education.

Ph.D. Programs. Doctoral level emphasis in special education is available through the Ph.D. in applied behavioral studies. Graduates of this program pursue careers in university teaching and in the administration of special education programs in public and private settings.

Counseling and Student Personnel Programs. *M.S. Programs.* The counseling and student personnel area includes the following comprehensive specializations leading to master's degrees: community counseling, marriage and family therapy, school counseling (elementary and secondary), and student personnel. The M.S. program in community counseling is intended for individuals who wish to serve as professional counselors in a variety of human service rehabilitation and community mental health agencies. Students may choose elective courses in selected areas of specialization such as youth counseling, substance abuse counseling, mental health counseling and rehabilitation.

The M.S. program in marriage and family therapy is an inter-departmental effort of the Department of Applied Behavioral Studies and the Department of Family Relations and Child Development. This program is designed to provide those who are beginning careers in marital and family therapy with the basic knowledge, skills, and professional identity essential to the practice of marital and family therapy at the entry level.

The M.S. programs in elementary/middle school and secondary school counseling are intended for individuals who wish to provide counseling services to children, youth, and consulting services to their teachers and parents in the school setting.

The programs meet academic requirements for state certification as a school counselor. The M.S. programs are designed to meet academic requirements for licensure in professional counseling. Applications for all M.S. programs are due and will be reviewed March 1, June 1 and October 1.

The M.S. in student personnel services prepares students for entry level positions in service delivery and administration in colleges and universities. This program offers practical experience in various student personnel areas to enhance the student's professional development.

Ed.D Programs. The Ed.D. degree in counseling and student personnel is available with a specialization in either counseling and development or student personnel administration. These programs are designed to meet accreditation standards of the Council on Accreditation for Counseling and Related Educational Programs (CACREP).

The Ed.D. in counseling and development is intended to prepare individuals to function in counseling positions in public schools, junior colleges, vocational-technical schools, college and university counseling centers, mental health and a vari-

ety of community agencies. In addition, individuals may prepare to teach in counselor education programs in colleges or universities. A minimum of a 36-week counseling internship is required.

Students in the Ed.D. in student personnel administration are prepared to administer a student personnel program at institutions of higher education. The curriculum is sufficiently flexible to permit individuals to develop an area of expertise, such as training and development, organizational behavior, or computer applications. A minimum of a 36-week student personnel administration internship is required.

Ph.D. Programs. The Ph.D. degree offers specializations in counseling psychology, counseling and development, and student personnel administration. The didactic and experiential components of the counseling and development and student personnel administration programs are similar to those in the Ed.D. degree. The 105-graduate-credit-hour Ph.D. degree however, is designed to meet the needs of practicing professionals who have a strong interest in research. The counseling psychology program leads to the Ph.D. degree in applied behavioral studies and provides professional preparation in psychology as a behavorial science and in counseling as a specialty. The program is organized to meet the accreditation standards of the American Psychological Association. The program is designed to prepare students for counseling, consulting, training and research roles in various settings such as university counseling services and academic departments, child guidance centers, youth services, community mental health clinics, rehabilitation centers, and family services. Students are required to follow a specified sequence of study in which academic course work and practicum experiences are integrated. Students must complete a one-year full-time internship (or a two-year half-time internship). Applications for all doctoral programs are due by February 1 for the following fall enrollment.

Educational Psychology Programs. *M.S. Programs.* A master's degree is available through the M.S. in applied behavioral studies with one of three emphases: general educational psychology, instructional systems, or school psychometry.

The general educational psychology emphasis focuses on the application of psychological theory and research to the field of education. It is built around courses in learning, instructional psychology, and human development.

The instructional systems emphasis introduces individuals to instructional systems design and prepares them for entry placement in applied settings. Suggested courses include program evaluation, instructional systems, and learning theory.

The school psychometry emphasis prepares individuals to provide psychometric services to schools, youth agencies and other organizations working with children and youth. The school psychometry program may include state certification requirements.

Ph.D. Programs. A doctorate in educational psychology is available through the Ph.D. in applied behavioral studies. The role of educational psychology is to bring together basic behavioral research to serve the practice of education. Although educational psychology is part of the science of psychology, generally an effective scientist-practitioner must draw from all behavioral studies to meet the needs of society today. Students in the program will complete a set of core courses in educational psychology and will also



complete course work in one of three areas of specialization: instructional systems, school psychology, or teaching and research in educational psychology.

The instructional systems specialization provides the individual with a broad set of knowledge and skills which support the analysis, development, evaluation, and implementation of instructional systems. This specialization prepares the individual for careers in areas such as human resource development, instructional technology, and training program development.

The school psychology specialization prepares individuals to be effective school psychologists. Course work focuses on skills and knowledge necessary for state certification and licensure. School psychology certification requirements may be met by completing a psychology master's degree and a 30-hour course sequence. The Ph.D. program includes the requirements for state licensure.

The teaching and research in educational psychology emphasis is designed to prepare the graduate for the traditional academic roles of teacher and researcher. Within this emphasis, students might focus on one (or a combination) of the following areas: instructional psychology, human development, education of gifted and talented.

Research and Evaluation Programs. *M.S. Program.* The M.S. degree in applied behavioral studies provides master's level study in educational research and evaluation. The academic preparation program in the educational research and evaluation area includes courses focusing on research and evaluation and courses selected to facilitate the development of a collateral area of expertise in another graduate area of education such as special education, curriculum and instruction, occupational education, or school administration. This M.S. program prepares students for entry level positions in research and evaluation units in school districts, government agencies, and private corporations and foundations.

Ph.D. Program. Doctoral level study in research and evaluation is available through the Ph.D. in applied behavioral studies and provides advanced graduate level preparation in applied educational research and evaluation. This program is designed to include advanced graduate training in two collateral areas, one of which must be in an area of education. The student may select the second collateral area in an adjunct field that provides course work conducive to the development of skills in educational research and evaluation. The second collateral area might be focused in an area such as curriculum evaluation, mathematical statistics, computer science, or program administration. A required practicum/internship provides an opportunity for practical applications of skills developed during the doctoral program. Graduates of this program will be prepared for positions such as college or university faculty members or directors of education, government agencies, private test corporations, or education foundations.

Aviation and Space Education

Professor and Head Kenneth E. Wiggins, Ed.D.

Aviation Education

The aviation education program offers both flight training courses and aviation theory courses for academic credit. The Department is administered by the College of Education; however, it serves students from all colleges of the University in meeting their aviation needs.

The program consists of basic and advanced aviation theory courses, aviation management, aviation safety, aviation law, and flight training which prepares individuals to qualify for certificates as private pilots, commercial pilots with instrument ratings, flight instructors and multi-engine ratings. In addition to the aviation courses, the program includes courses in natural science, business, management and liberal arts. The courses in aviation theory are conducted on campus; the laboratory portion of flight instruction is conducted at the Stillwater Municipal Airport in cooperation with approved flight program operators. Flight training is conducted under Federal Air Regulation Part 141.

Flight training and theory courses in aviation offer a number of valuable benefits. The private pilot can utilize the airplane for business or pleasure. In jobs where executive travel is required, the ability to pilot an airplane can definitely increase one's potential. The commercial pilot can choose a career in various kinds of challenging and rewarding piloting jobs including flight instructor, corporate pilot, charter pilot, or agriculture pilot. These jobs can be used to gain experience and necessary flying hours to become an airline pilot.

Space Science Education

A major responsibility of the Office of Space Science in the Department of Aviation and Space Education is the coordination of the Aerospace Education Service Project. Oklahoma State University, under contract to the National Aeronautics and Space Administration (NASA), provides aerospace education specialists and support staff for the delivery of educational visits to public schools throughout the nation. In addition to school pro-

grams, the specialists also conduct teacher workshops, and work with professional organizations and civic groups. The specialists are often involved in the production and delivery of television and radio programs.

The Office of Space Science also serves regional teachers with in-service programs as well as serving as a resource center for reference and printed materials, videotapes, films, and slides pertaining to NASA's research in aviation and space sciences. On-campus space science education includes resource support for existing pre-service education for teachers.

The Department of Aviation and Space Education also provides technical support and personnel talent for the delivery of space-related information via satellite. The videoconferences are interactive, with the opportunity for the student-teacher audience to pose questions to the program presenters. The programs usually involve a live feed from a NASA research center coupled with a broadcast from the OSU Educational Television facility.

Curriculum and Instruction

Professor and Head Douglas B. Aichele, Ed.D.

The Department of Curriculum and Instruction offers bachelor's, master's, specialist and doctoral degrees. Through its programs, it is directly involved in the education and certification of teachers and specialists in several instructional/professional areas. Specific areas of emphasis include preparation of elementary and secondary teachers, reading specialists, instructional media and technology specialists, and supervisors/curriculum coordinators.

Completion of the Bachelor of Science degree in Elementary Education qualifies the student for an elementary Oklahoma license (K-8). This program of study includes course work in general education, in a field of specialization, and in professional education motivated by substantial field-based practicum experiences.



The Bachelor of Science in Secondary Education degree is available in the following discipline areas: English, foreign language, journalism,mathematics, science, social studies and speech/drama. Completion of this program emphasizing one of these areas qualifies the student for a secondary (7-12) Oklahoma license. Students emphasizing art, foreign language, or physical education/health also receive a degree in secondary education and qualify for an elementary/secondary (K-12) Oklahoma license. Each of these secondary degree programs includes general education courses, extensive specialization course work in the discipline area, and professional education courses motivated by substantial field-based practicum experiences.

Programs leading to an Oklahoma license as a curriculum administrator, reading specialist and as an audiovisual specialist are also available through the Department.

In addition to these degree/certification offerings, the department sponsors the Reading and Mathematics Learning Center jointly with the Education Extension office. This clinic provides a valuable service to the community as well as opportunities for research and practicum experiences for graduate students and faculty members.

The Department also sponsors the Microcomputer Technology Instructional Laboratory, the Reading and Mathematics Learning Center, and the Natural Resources and Environmental Education Center.

Graduate Programs

The Department of Curriculum and Instruction offers graduate degree programs at the master's, specialist and doctoral levels. While specialization is required, maximum program flexibility enables students to meet their individual goals. These degree programs are designed to prepare persons to enter public or private elementary and secondary schools as teachers, curriculum directors, department heads, directors of learning resource centers, reading coordinators, team leaders, and research specialists. In addition, they prepare persons to assume teaching positions in colleges and universities where they become methods instructors and/or researchers in the discipline-related areas of education.

The Master of Science Degree. A student may earn the degree of Master of Science (M.S.) in curriculum and instruction with emphasis in curriculum/supervision, elementary education, information/communication technology, reading, and secondary education. Within these degree emphases, a student can further specialize in such areas as art, curriculum/instruction, early childhood education, foreign language, language arts, mathematics, science, and social studies. Students planning an emphasis in secondary education must incorporate graduate course work from an academic discipline.

The master's degree program is also frequently designed to qualify persons for an OSU recommendation for state licensure in a specific area. In addition to state licensure in those programs listed above, course work leading to an OSU recommendation for state licensure in school administration may be incorporated into a master's degree program.

Course work leading to the Master of Science degree in curriculum and instruction with emphasis in curriculum/supervision, elementary education, information/communication technology, or reading is available through the University Center at Tulsa (UCT). OSU course work taken through UCT qualifies as residence credit course work.

In completing the master's degree, students elect one of three plans:

Plan I (30 hours)—The student completes a minimum of 24 credit hours of approved course work and writes a master's thesis for which six semester hours of credit are granted.

Plan II (32 hours)—The student completes a minimum of 30 credit hours of approved course work and writes a master's report for which two semester hours of credit are granted.

Plan III (36 hours)—The student completes a minimum of 36 credit hours of approved course work which includes a creative component . The creative component must be explicitly identified on the plan of study.

Unqualified admission to the master's degree program is granted to a graduate of an accredited college or university who has made application to the Graduate College (described under "General Regulations" in the "Graduate College" section and who has achieved an acceptable grade-point average, i.e., a grade-point average of at least (1) 3.00 for all undergraduate course work; or, (2) 3.25 for all undergraduate upper-division and graduate course work; or, (3) 3.50 for OSU graduate course work included in the initial nine hours of study.

Provisional admission to the master's degree program is granted to a graduate of an accredited college or university who has been admitted to the Graduate College and who has achieved a grade-point average less than the minimum required for unqualified admission but at least (1) 2.60 for all undergraduate course work; and, (2) 2.80 for all undergraduate upper-division and graduate course work, or 3.00 for OSU graduate course work included in the initial nine hours of study.

Provisional admission is granted for a minimum enrollment in six credit hours of CIED course work to be determined through advisement and taken during one calendar year. A student admitted provisionally must earn a grade-point average of at least 3.50 in this course work to be admitted (unqualified). Dismissal from the program at the end of this probationary period is automatic if the student fails to satisfy this stipulation.

Further information about this degree may be found in the departmental publication *Master's Degree Policies and Regulations* available in 302 Gundersen Hall and under "Master's Degree" of the "Graduate College" section of the *Catalog*.

The Specialist in Education Degree. A student may earn the degree of Specialist in Education (Ed.S.) in curriculum and instruction with emphasis in curriculum/supervision, elementary education, information/communication technology, reading, and secondary education. Students emphasizing secondary education must incorporate graduate course work from an academic discipline. This degree program is designed for teachers in public schools, two-year and four-year colleges, and universities. The Specialist in Education degree requires a minimum of 60 semester hours beyond the bachelor's degree.

Unqualified admission to the Ed.S. degree program is granted to a graduate of an accredited college or university who has made application to the Graduate College and who has (1) submitted

the completed departmental folder which includes a score on the Miller Analogies Test and other pertinent information, (2) provided evidence of at least one year of experience in a professional position in an education institution if not the holder of a master's degree, (3) received favorable recommendations from area faculty members who have evaluated the personnel folder, and (4) identified qualified faculty members who have agreed to serve on the program committee and in the chairpersonship role.

Further information about this degree may be found under "Specialist in Education" in the "Graduate College" section of the *Catalog.*

The Doctor of Education Degree. A student may earn the degree of Doctor of Education (Ed.D.) in curriculum and instruction with emphasis in curriculum/supervision, elementary education, information/communication technology, reading and secondary education. Within these degree emphases, a student can further specialize in such areas as curriculum/instruction, early childhood education, language arts, mathematics, science and social studies. Students planning to emphasize secondary education must incorporate graduate course work from an academic discipline.

The Doctor of Education degree requires a minimum of 90 semester hours beyond the bachelor's degree.

Unqualified admission to the doctoral degree program is granted to a graduate of an accredited college or university who has made application to the Graduate College and who has (1) submitted the completed departmental folder which includes a score on the Miller Analogies Test and other pertinent information, (2) provided evidence of at least one year of experience in a professional position in an education institution if not the holder of a master's degree, (3) received favorable recommendations from area faculty members who have evaluated the personnel folder, and (4) identified qualified faculty members who have agreed to serve on the advisory committee and in the chairpersonship role.

Further information about this degree may be found under "Doctor of Education" in the "Graduate College" section of the *Catalog.*

Colloquium Series. Many opportunities exist for graduate students to become involved in ongoing departmental research projects and activities while studying in residence at Oklahoma State University. In particular, graduate students are expected to participate in the Colloquium Series sponsored by the Department.

Educational Administration and Higher Education

Professor and Head Thomas A. Karman, Ph.D.

Graduate Programs

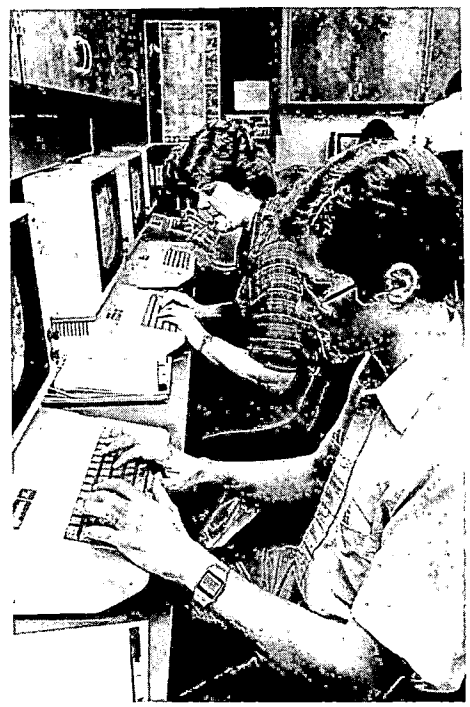
Advanced graduate work is offered at the master's, specialist, and doctoral degree levels. Higher education degree programs prepare persons for careers as faculty members and/or administrators in colleges, universities, and other educational agencies. Public school educational administration degree programs and educational administration non-degree certificate programs prepare persons for positions in federal and state education agencies, for leadership careers as elementary or secondary principals and as school superintendents, and for staff positions in central offices and attendance centers. Students in educational administration may also develop competence in community education for positions in local school districts, community colleges, and state departments of education.

The educational administration program at Oklahoma State University focuses on developing professional educational leaders at both the public school and the higher education levels and stresses: (1) a thorough foundation in administrative theory; (2) a multidisciplinary approach to understanding the administrative process, including contributions from industrial management, political science, economics and organizational sociology; (3) extensive consideration of administrative functions and problems unique to particular educational levels; and (4) the preparation of leaders who can establish, develop, and maintain programs of community education.

The college teaching program focuses on developing skilled college and university instructors and stresses the combination of high-level competence in the appropriate subject area with the study of those facets of higher education which are important to functioning effectively in contemporary college and university settings. Persons interested in the college teaching program should contact the head of the Department for further information about specific cooperative arrangements with teaching fields. The higher education component includes the study of (1) the development of American higher education; (2) the roles, functions, and problems associated with various types of institutions of higher learning; (3) the essentials of curriculum development; and (4) the principles and procedures underlying effective college and university instruction.

Prerequisites. Educational administration majors are expected to have a minimum of 16 semester credit hours of undergraduate study in education. Higher education college teaching majors are expected to have an undergraduate major in the discipline they plan to teach at the college level.

Admission Requirements. Persons interested in degree or certificate programs should apply through the Graduate College. All applicants must submit transcripts of prior academic work. In addition, those persons seeking admission to a graduate degree program must submit a Graduate Record Examination or a Miller Analogies Test score at the time of application. Once granted provisional admission to the Graduate College, and within the first four weeks of the initial term of study, all degree program applicants are expected to provide the Department with specific information that is used by the faculty to reach a decision regarding admission to a degree program. Since applicants are not considered for admission to the doctoral program until they are enrolled in, or have completed, the seminar EAHED 6003, "Educational Ideas," they should enroll in that course during their first term. When a person is admitted to the program, a permanent adviser and an advisory committee are appointed. The committee, working closely with the student, develops an individual plan of study. Prior to the appointment of a permanent adviser, the department head serves as a temporary adviser.



The Master of Science Degree. A student may earn the degree of Master of Science (M.S.) under one of three plans:

Plan I (30 hours)—the student completes a minimum of 24 credit hours of approved course work and writes a thesis for which six hours of credit are granted;

Plan II (32 hours)—the student completes a minimum of 30 credit hours of approved course work and writes a master's report for two hours of credit;

Plan III (32 hours)—the student completes a minimum of 32 credit hours of approved course work, which includes a creative component (e.g., a special report, an annotated bibliography, a project in research or design). The creative component must be explicitly identified on the plan of study.

After completing the plan of study, master's students in all departmental programs write a comprehensive examination.

Further information about this degree may be found under "Master's Degree" in the "Graduate College" section of the *Catalog.*

The Specialist in Education Degree. The student may earn the degree of Specialist in Education (Ed.S.) in educational administration or in higher education. The degree is designed for teachers and administrators in public schools, colleges, and universities. The specialist program in higher education offers a unique opportunity for persons preparing to serve the junior or community college. The Specialist in Education program requires a minimum of 60 semester hours beyond the bachelor's degree. Further information about this degree may be found under "Specialist in Education" in the "Graduate College" section of the *Catalog.*

The Doctor of Education Degree. The program in educational administration focuses on the development of education leaders for the public schools. It employs a multidisciplinary approach to administrative processes, incorporating knowledge from industrial management, political

science, economics, organizational sociology, and other fields as well as from education.

Programs in higher education focus on the preparation of administrators and faculty. The administrator preparation program utilizes knowledge from many fields of administration and allows the student to make appropriate application to higher education. The program for two- and four-year college teachers stresses an interdisciplinary approach and allows the student to develop a strong competence in an academic area. The professional education component emphasizes the philosophies, roles, functions, and problems of various types of institutions of higher learning and incorporates the latest findings in curriculum development and effective college teaching. Cooperative programs for the college teaching degree have been developed in conjunction with many departments on campus. The Doctor of Education programs require a minimum of 90 credit hours beyond the bachelor's degree.

Further information about this degree may be found under "Doctor of Education" in the "Graduate College" section of the *Catalog*.

School of Occupational and Adult Education

Professor and Director Melvin D. Miller, Ed.D.

The School of Occupational and Adult Education (OAED) has as its central focus teachers of occupational programs and leadership personnel for these programs, together with personnel for human resource development and adult and continuing education. Just as the School of OAED is a part of the College of Education, occupational and adult education is a significant element in America's system of education. The School seeks to serve teachers, supervisors, and administrators of vocational-technical programs at the middle school and secondary levels, area vo-tech schools, community and junior colleges, and technical schools; trainers and mid-management personnel in business, industry, and other private and public agencies; and adult educators employed by any of these. Accordingly, the goals of the School are:

1. To develop both undergraduate and graduate programs which prepare individuals to serve present and future needs of educational agencies, business and industry and other agencies in areas related to the field of occupational and adult education.
2. To provide extended services and non-traditional programming to the School's clients on both a pre- and in-service basis.
3. To provide specialized leadership development opportunities for individuals who seek to serve as educational or training specialists in public and private schools and in business and industry in areas related to the field of occupational and adult education.
4. To conduct quality research in occupational and adult education and to disseminate research findings through local and national publications as well as through the OSU teleconferencing system.
5. To provide service to other departments and programs on campus through general interest courses and activities.
6. To provide programs and service at the international level, assisting in the development and advancement of programs related to the School's mission.
7. To be recognized within the state, nationally and internationally, for leadership in the various aspects of occupational and adult education.

The School of Occupational and Adult Education offers several degree programs including teacher certification and noncertification. Teacher certification programs are available in business education, industrial technology education, marketing education, technical education, and trade and industrial education. Certification for any of the above may be met while completing one of the bachelor's or master's options available in OAED. Noncertification programs are available in each of the above. The masters and doctorate in OAED offer specializations in adult and continuing education, human resource development, and vocational-technical education.

Graduate Programs

The School of Occupational and Adult Education offers graduate programs leading to the Master of Science degree in the specific areas of industrial technology education, marketing education, technical education and trade and industrial education, as well as the general area of occupational and adult education. The School also offers programs leading to the Specialist in Education degree and Doctor of Education degree to prepare individuals for leadership roles in the broad areas of occupational and adult education. At the Ed.S. and Ed.D. levels, individuals may specialize in administration, curriculum and teaching, teacher education, or educational research, as each relates to the total field of occupational and adult education. Additionally, both degrees offer an emphasis in adult and continuing education or human resource development. Admission to any of these graduate programs requires a degree in an appropriate field with a high scholastic standing and the normal requirements of the Graduate College. In all cases, applications are considered on an individual basis and only a limited number of candidates will be accepted. For additional requirements, see "Prerequisites" under each program.

Business Education

Business education teachers continue to find excellent employment opportunities in secondary schools, area vocational-technical schools, and post-secondary schools. Society's move toward a service economy will further expand opportunities for vocationally-trained teachers in this field.

Persons seeking certification in the field of business education will complete the teacher certification and bachelors degree programs in the College of Education with specialized education courses being taken in the School of OAED under the BUSPR (Business Professions) and OAED prefixes. Additionally, the student will complete course work in the College of Business Administration related to specific subject areas to be taught.

Graduate Programs

Graduate program opportunities for the business educator are available as an area of emphasis under OAED's Master of Science and Doctor of Education degrees. Specialized work in BUSPR is available to be included in the candidate's degree plan.

Industrial Technology Education

Teaching in industrial technology is a fascinating career which permits one to help others to prepare for living in today's technological society. It is currently one of the areas that is experiencing a severe shortage of certified teachers in public schools. Industrial technology education is a comprehensive, action-based instructional program concerned with technology—its evolution, utilization, and significance; and with industry—its organization, personnel, systems, techniques, resources, and products and their social and cultural impact.

The industrial technology education curriculum is designed to prepare teachers for industrial arts and technology education classes in the public schools, grades 7-12.

The program is divided into General Education, Professional Education and specialized industrial technology education. Specialized courses are designed to develop teaching competency for middle-school and high school exploratory programs in each of four areas: construction, manufacturing, communication and power and energy.

In developing technical competencies for an area of additional specialization or supporting areas, the student may select from courses taught in engineering technology.

Graduate Programs

The industrial technology education curriculum for the M.S. degree is planned specifically for those desire a greater degree of expertise in industrial



technology education and for those who are teaching in industrial arts or technology education in the middle, junior, and high school levels. The curriculum content is directed toward helping individuals to develop a higher level of competence in both instructional and technical skills in order to improve their classroom teaching effectiveness.

Prerequisites. Sixteen semester credit hours of undergraduate industrial technology education course work and approval of an adviser are necessary.

Marketing Education

Emphasis upon vocational training in the field of marketing has received greater emphasis in recent years because of the importance of the marketing function to the economic growth of the country. If the marketing function fails to achieve maximum efficiency, the U.S. will fall short of reaching full economic potential.

The demand for qualified vocational marketing education teachers across the country exceeds the supply. Marketing educators earn above-average salaries because of the nature of the training program and the emphasis being placed in society on the importance of vocational preparation. The recent emphasis on career education has indeed dramatized the need for vocational educators in all fields.

A marketing education major will complete core requirements in business administration, including courses in marketing, management, business law and business finance. Additional specializations may include courses in promotional strategy, consumer behavior, administrative communication, marketing research, advertising copy and layout, and merchandise display essentials.

Graduate Programs

The marketing education curriculum for the M.S. degree is designed for individuals who are preparing for employment in comprehensive high schools, area vocational technical schools, businesses, and junior colleges. The goal of this graduate curriculum is to help individuals develop higher-level competencies in both instructional and occupational skills in the distributive and marketing education fields.

Prerequisites. An undergraduate degree in marketing education or a related field is necessary.

Occupational and Adult Education

Graduate Programs

The M.S., Ed.S., and Ed.D. programs in occupational and adult education are intended for individuals who wish to prepare for broader educational roles relating to all vocational education disciplines, adult and continuing education, and employee development and training. Major program concentrations are available in adult and continuing education, human resource development, and vo-tech education. The emphasis in human resource development prepares trainers, training managers, human resource executives, and related personnel in business, industry, government, military, health care service agencies, and other environments to improve organizational performance by improving human performance. The emphasis in adult and continuing education prepares teachers and administrators in public schools, vocational-technical schools, community/junior colleges, universities, medical, correctional, and religious organizations as well as volunteers to facilitate effective learning for continuing education and returning adult students.

These degree programs are a cooperative, interdisciplinary effort among all Graduate Faculty of the School of Occupational and Adult Education with substantial contribution from Graduate Faculty members in other departments on campus.

Prerequisites. An undergraduate degree in an appropriate field, together with academic qualification indicative of potential success at the graduate level, are necessary. Experience related to the degree sought is desirable, but not necessary, except in the vocational-technical education emphasis.

Technical Education

The technical education curriculum is designed to prepare instructional personnel for technical programs of community junior colleges, technical institutes and industry. Graduates from this program also accept technical employment of various types in business, industry and government. The program includes an option which will provide the student with the academic requirements necessary for certification to teach in area vocational-technical schools.

The Bachelor of Science in Technical Education degree is designed primarily for graduates of technical programs in technical institutes and community junior colleges. Qualified students from preprofessional programs also are accepted into the program with advanced standing. In addition, students desiring to prepare for careers in this field may enter the program directly from high school and complete their technical major requirements at OSU.

Graduate Programs

The technical education curriculum for the M.S. degree is offered for persons who are preparing for employment in junior/community college or technical institute technician education programs and for those who aspire to positions in training programs for employee development. The overriding goal of this graduate curriculum is to help individuals improve their instructional and occupational skills for greater effectiveness in the educational setting.

Prerequisites. An adequate background in a major field of technology with an undergraduate program which included specialized technical course work at the junior or senior level at an accredited college or university, and approval of an adviser are necessary.

Trade and Industrial Education

The trade and industrial curriculum is designed to prepare teachers, supervisors and coordinators for vocational trade and industrial education classes. Programs leading to the bachelor's and master's degrees are offered for those who wish to qualify for teaching under the approved state plan for vocational education as well as industrial training opportunities.

Students completing the degree program will be qualified to teach in the vocational departments of high schools and area vocational schools, or to be employed in industry.

The student's area of specialization is selected from the industrial fields of air-conditioning, heating and refrigeration, auto mechanics, bricklaying, cabinetmaking, carpentry, commercial art, cosmetology, diesel engines, drafting, electricity, electronics, interdisciplinary cooperative education, machine shop, photography, printing, plumbing, sheet metal, small engines, tailoring, upholstering, welding and other industrial fields. The specific field is determined by the trade proficiency and teaching aspirations of the student. Since trade competency normally is required for admission to the program, students are accepted into this field of study only by consent of the program faculty. The required trade competency may be acquired by completing a vocational trade program in an approved high school or junior college, or by apprenticeship training, by actual experience in the field of specialization, or a combination of these.

Graduate Programs

The trade and industrial education curriculum for the M.S. degree is designed for instructors of a wide variety of trade areas in comprehensive high schools, in industries, and in area vocational and technical schools. The curriculum helps students build and increase competence in instructional, occupational, and supervisory skills for advancement opportunities in trade and industrial instructional situations whether in the public or private sector of trade and industrial education.

Prerequisites. Educational preparation in a specialized trade area and adequate occupational experience to meet minimum provisions of the State Plan for Vocational Education, and approval by adviser are necessary.

Teacher Education Programs

Officers of the Teacher Education Council
Kenneth L. King, *Chairman and Executive Secretary*
N. Jo Campbell, *Faculty Chairwoman*

Early Childhood/Elementary Education Faculty Group
Vernon E. Troxel, *Chairman*

Secondary Education Faculty Group
Deke Johnson, *Chairman*

Elementary—Secondary Faculty Group
Sandra Gangstead, *Chairwoman*

All Teacher Education programs are coordinated by the director of teacher education through the Office of Teacher Education, 101 Gundersen Hall. Upon completion of an approved program, passing the appropriate curriculum examination(s), and upon the recommendation of the University, the candidate will be eligible for licensure/ certification to serve in the schools of Oklahoma. All candidates completing an approved program or applying for teaching license since February 1, 1982, are subject to all rules and regulations specified by the Oklahoma Teacher Reform Bill of 1980.

Programs are offered at various levels, but all

require the earning of at least a bachelor's degree for recommendation for a standard certificate. Graduate programs leading to the master's degree, the education specialist degree, and both the Doctor of Education and the Doctor of Philosophy degrees are offered in several areas. In addition, there are programs at the graduate level which lead to certification but which may or may not lead to graduate degrees.

In addition to state approval, Teacher Education programs at Oklahoma State University have the approval of the National Council for Accreditation of Teacher Education (NCATE), the national agency responsible for accrediting high-quality programs throughout the United States. Students who complete NCATE-approved programs will find certification in other states easier to secure, and employment opportunities increased.

Some undergraduate Teacher Education programs are offered in the College of Education as well as in the colleges of Agriculture, Arts and Sciences, and Home Economics. The student may choose the college in which the degree is to be earned; however, the student must meet the requirements of the University's Teacher Education program as well as the degree requirements of his or her particular college. Each student who desires to enter a Teacher Education program must make formal application to do so and must meet the admission standards specified.

The requirements for the degree being sought are made known to the student when he or she first enrolls at Oklahoma State University. While the curriculum may change many times before a student graduates, a student who makes normal progress toward graduation (no more than two years beyond the normal four-year bachelor's degree requirements) will be held responsible only for the degree requirements at the time of matriculation, and any changes that are made, so long as these changes neither result in semester credit hours being added nor delay graduation. Elective hours may need to be replaced by new program requirements. Changes in teacher certification may result in additional course requirements for certification.

In general, undergraduate programs of teacher preparation consist of three parts: general education of approximately 50 semester credit hours; professional education, the amount of which varies with the curriculum selected, but with a minimum requirement of 30 semester credit hours; and a subject matter specialization or major of 40 to 60 hours, depending upon the field of specialization.

Undergraduate Programs

Undergraduate programs are offered in the following areas: agriculture; art; business professions; early childhood; elementary education; English; foreign language (French, German, Spanish); health education; home economics; industrial technology; journalism; marketing education mathematics; music-instrumental; music-vocal; occupational agriculture; occupational home economics; physical education; reading specialist; science; social studies; special education emotionally disturbed, learning disabilities, and mentally retarded; speech and drama; technical education; and trade and industrial education. There are also numerous teaching endorsements available.

Inquiries concerning any aspect of the Teacher Education program at Oklahoma State University should be addressed to the Office of Teacher Education or the head of the department offering the program.

Criteria for Admission to Undergraduate Teacher Education Programs

The criteria for admission to undergraduate Teacher Education programs are based on University-wide policies recommended to the director of teacher education by the Council on Teacher Education. Requirements are applicable to all teacher certification programs of the colleges preparing teachers. *The student is not considered a fully qualified participant in a Teacher Education program until he or she has been formally admitted to Teacher Education.*

Declaration of Intention to Pursue a Program in Teacher Education

During the first semester of the academic program, the student must complete the *Declaration of Intention to Pursue a Program in Teacher Education.* This form can be obtained in the College's Office of Student Services or in the office of the department head if the student is enrolled in the Teacher Education program in the colleges of Agriculture, Arts and Sciences, or Home Economics.

Provisional Admission to Teacher Education

The form *Retention Data Part I: Provisional Admission* should be completed as well as the following: scheduling of the Teacher Education Interview; registration for the National Teachers Examination (NTE) Communications Skills Test; and submission of ACT scores (English, math, science and social studies) and/or grades in these four areas.

The NTE Communications Skills Test measures listening, reading, English grammar and essay skills. Information and registration for the (NTE) Communications Skills Test can be obtained from the University Testing and Evaluation Service, 109 North Murray Hall. A study guide for the test is available in the Reserve Room in the Library. To prepare for the listening portion of the test, a cassette tape and study guide are available in the Non-book Room in the Library.

After Provisional Admission to Teacher Education, the student may elect to enroll in course work in the following preprofessional education areas (which must be completed before student teaching):

1. sociological foundations;
2. exceptional child;
3. human development;
4. laboratory and clinical experiences (45-clock hours minimum);
5. media.

Full Admission to Undergraduate Teacher Education

The student should complete *Part II: Full Admission to Teacher Education* and meet the following criteria:

1. *ACT Scores.* The student must achieve a score of 18 or above in each area (English, mathematics, science and social studies) on the ACT, or achieve the current state average for college-bound high school seniors (whichever is higher), or must have earned a cumulative GPA of 2.00 in the area(s) at the time of admission to Teacher Education. If not, additional courses or retakes must be completed in the area(s) until a GPA of 2.00 is achieved.
2. *National Teachers Examination (NTE)—Communications Skill Test.* This test is required of all Teacher Education students and is composed of reading, written essay and grammar, and listening. If a student does not attain the established national average of 658, the adviser in consultation with the student will suggest remedial course work. The student will retake the Communication Skills Test when recommended by the adviser.
3. *Interview for Admission to Teacher Education.* All candidates for full admission to undergraduate Teacher Education must be formally interviewed by a committee selected from the OSU Teacher Education faculty.
4. *Orientation to Teacher Education and Laboratory and Clinical Experiences.* An appropriate orientation to Teacher Education course and laboratory and clinical experiences (45-clock hours) must be completed with a grade of "C" or better or grade of "P."
5. *Minimum Cumulative GPA of 2.50.* A minimum cumulative GPA of 2.50 must be earned, is based on no fewer than 40 credit hours of courses which are expected to include lower-division general education requirements as specified in the student's program. For students not seeking certification, see "Grade-point Average for Graduation" in the "Academic Regulations" section of the *Catalog.*

The student must apply for and be granted full admission to the Teacher Education program prior to enrolling in course work in the professional sequence consisting of evaluation, philosophical foundations, learning theory, methods, and student teaching.

A student may not be permitted to enroll in the remaining courses in the professional sequence if full admission to the Teacher Education program has not been earned. Certain vocational programs may vary from this requirement due to state guidelines. Students should apply for full admission to Teacher Education as soon as possible. This usually occurs no later than the end of the second semester of the sophomore year.

Transfer students must work toward meeting the criteria for full admission to Teacher Education established by Oklahoma State University as soon as possible during the first semester at OSU.

Appeals

Decisions regarding admission/retention in Teacher Education are described in the *Guidelines of the Council on Teacher Education.* Information pertaining to the appeals process is available through the Office of Teacher Education, located in Gundersen Hall, Room 101.

Retention in Undergraduate Teacher Education

For continued acceptability and recommendation for a license or certification, the student must maintain all specified requirements for admission to the undergraduate Teacher Education program.

Application for Student Teaching Placement

The application for Student Teaching Placement must be completed by the student during the semester prior to the time of student teaching. The application form and Student Teaching Profiles are distributed at a meeting called by the coordinator of clinical experiences and through the Office of Teacher Education. Students are notified of this meeting through consultation with advisers,

through the *O'Collegian,* signs on bulletin boards across campus and in residence halls, and by announcements made in teacher education classes. Students must submit their Student Teaching Profiles to the Office of Teacher Education prior to specified dates in November and March. These dates will be announced to students in the same manner as mentioned above. Students will be notifed in writing of their placements as soon as the coordinator of clinical experiences has received confirmation from the cooperating schools.

Criteria for Student Teaching for all majors in Teacher Education are:

1. Must have achieved *full* admission to a Teacher Education program;
2. Must have achieved an overall grade-point average of *at least 2.50;*
3. Must have a grade-point average of at least 2.50 in courses listed on the current approved program for licensure/certification in the areas of professional and major requirements. No grade lower than a "C" will be accepted in either of these areas.
4. In determining grade-point averages for admission to teacher education, only the last grade is considered for repeated courses (exact repeats, not substitutions).
5. All pre-professional education course work must be complete and must include at least one course in sociological foundations, early laboratory and clinical experiences, exceptional child, and human development, with no grade lower than "C" accepted in any of these courses.

Out-of-Area/Out-of-State Placements. In extenuating circumstances, a student requesting an out-of-area/out-of-state placement must have the approval of the coordinator of Clinical Experiences and the department program coordinator, and will be required to pay the following fees:

1. All necessary and appropriate fees required in securing and finalizing the placement (e.g., reimbursement for cooperating teacher, supervisor, etc.). These fees are payable to the Office of Teacher Education at least one month prior to the beginning of the semester in which the placement is sought.
2. If a recommendation for licensure/certification is to be made by Oklahoma State University, the student will be responsible for reimbursing OSU for at least one visit by an OSU supervisor in addition to the visitations performed by the cooperating institution. The student must achieve grades of "B" or better in all sections of student teaching in order to be recommended for a license and a standard certificate upon completion of the program. A grade of "C" in any section of student teaching will result in a recommendation for provisional certification after the licensure period and upon completion of the program. A student assigned the grade of "D" or lower in any section of student teaching will not qualify for a recommendation for a license or any level of certification.

Oklahoma Certification Testing Program

All students who graduate from a Teacher Education program after January, 1982, are required to complete the Oklahoma Teacher Certification Test(s) in his or her teaching field(s) with a score of "70" or above before a license can be issued. The examinations are administered by the state of Oklahoma four times each year. Registration booklets are available in the Office of Teacher Education, 101 Gundersen Hall. To qualify to take the Examination(s) the student must:

1. be fully admitted to Teacher Education;
2. have 90 hours of college credit completed on his or her transcript; and
3. meet minimum requirements for the standard teaching certificate and endorsements teaching credentials as presented by the State Department of Education.

Personnel in the Office of Teacher Education will process and deliver the registration form and required fees to the Oklahoma State Department of Education.

Copies of the *Objectives and Study Guides for the Oklahoma Teacher Certification Test(s)* have been placed in the library, listed as *Objectives for Oklahoma Certification Testing Program.*

Any person who graduated from an accredited college of education prior to February 1, 1982, and seeks certification or endorsement to teach a subject area which the teacher was not certified to teach following completion of the necessary college credit hours, shall be required to pass the curriculum examination for such subject area prior to receiving such certification or endorsement.

An Oklahoma State University student must pass the Oklahoma Curriculum Examination in his or her major teaching area(s) before taking any tests in endorsement areas outside the major.

Recommendations for License and Certification

Oklahoma State University will not make a recommendation for a license or any level of teacher certification until all criteria have been met that pertain to the approved Teacher Education program and a passing score has been achieved on the Curriculum Examination. Applications for an Oklahoma license or certificate can be obtained in the Office of Teacher Certification, 101 Gundersen Hall.

Entry-year Assistance Program

A candidate with a license will serve at least one, and in some cases two years, as an entry-year teacher under the guidance of an Entry-year Assistance Committee consisting of a teacher consultant, an administrator of the local district, and a higher education instructor. Upon completion of the entry-year teaching experience (120-180 days) the candidate may be recommended either for certification by the Entry-year Assistance Committee or for an additional year of teaching under the guidance of a new Entry-year Assistance Committee. If the candidate does not complete the second year as an entry-year teacher satisfactorily, the Entry-year Assistance Committee will recommend noncertification for the candidate.

Graduate Programs

Post-bachelor's certification programs are offered in the undergraduate program areas listed previously. In addition, post-bachelor's certification programs are available for library media specialists, psychometrists, school counselors, speech pathologists, and in special education—emotionally disturbed and learning disabilities. Master's degrees are available in virtually all of the above programs and doctorates are available in many. Areas of concentration in several of these fields may be included as part of a master's degree program if approved by the department head and the dean of the Graduate College.

Post-master's level certification programs are available for: (1) elementary school principal; (2) school superintendent; (3) secondary school principal; (4) school psychologist; and (5) school counselor.

Inquiries concerning any aspect of Teacher Education programs at Oklahoma State University should be addressed to the head of the department offering the program or the Office of Teacher Education.

Admission to Graduate (Post-baccalaureate) Teacher Education Programs. Graduate (post-baccalaureate) students must file the form *Declaration of Intention to Pursue a Teacher Education Program—Post-Baccalaureate* and meet one of the following criteria for full admission to Teacher Education:

1. The student must have completed an approved Teacher Education program and hold a valid Oklahoma license or Provisional, Standard, or Professional Certificate; or
2. Students in a master's program must (a) satisfy the departmental requirements for unqualified admission to the master's degree program; (b) have a minimum overall GPA of at least 2.50; (c) pass the National Teacher Examination (NTE) Communications Skills Test; (d) complete the Interview to Teacher Education; and (e) complete at least one semester hour of laboratory and clinical experiences (45-clock hours minimum) and an orientation to Teacher Education course with a grade of "C" or better or a grade of "P"; or
3. Students classified by the Graduate College as "special" or provisionally admitted must (a) have a minimum overall GPA of at least 2.50; (b) have either a standard score of 18 in each area of the ACT (English, math, science, and social studies) or a minimum GPA of 2.00 on the transcript in English, math, science, and social studies. (If not, additional courses or retakes must be completed in the deficient area(s) until a 2.00 GPA is achieved; (c) pass the National Teachers Examination (NTE) Communication Skills Test; (d) complete the Interview to Teacher Education; and (e) complete at least one semester hour of laboratory and clinical experiences (45-clock hours minimum) and an orientation to Teacher Education course with a grade of "C" or better or a grade of "P."

The student must apply for and be granted full admission to the Teacher Education program prior to enrolling in student teaching methods and the student teaching internship. A student may not be permitted to enroll in the remaining courses in the professional sequence if full admission to the Teacher Education program has not been earned. Certain vocational programs may vary from this requirement due to state guidelines. Students should apply for full admission to Teacher Education as soon as possible.

Appeals. Decisions regarding admission/retention in Teacher Education are described in the *Guidelines of the Council on Teacher Education.* Information pertaining to the appeals process is available through the Office of Teacher Education, 101 Gundersen Hall.

Graduate Teacher Education. For continued acceptability and recommendation for a license or certification, the student must maintain all specified minimum requirements for the undergraduate Teacher Education program.

College of Engineering, Architecture and Technology

Karl N. Reid, Sc.D., P.E., *Dean*
Bennett L. Basore, Sc.D., P.E., *Interim Associate Dean*
Allen E. Kelly, Ph.D., P.E., *Interim Associate Dean for Research*
Bill L. Cooper, Ed.D., *Director of Extension*
Larry D. Zirkle, Ph.D., P.E., *Director of Student Academic Services*
Jerry D. Rackley, B.B.A., M.S., *Manager of Support Services*

The professionals and semi-professionals who will be largely responsible for the shape of the world in the year 2000 and beyond are just starting their higher education. The power they will exercise makes an exciting prospect and presents a sobering responsibility. Many of the easy problems that are usually solved first are now a part of history. Many difficult problems remain. The need for well-qualified and well-trained people is obvious; one will be embarking on a lifetime of challenge if he or she decides to prepare for a career in engineering, engineering technology or architecture while at Oklahoma State University.

Most of the work of engineers, technologists and architects is concerned with the conception, design and fabrication of devices and installations, and processes and systems that serve human needs. This work provides ample opportunity to express creativity. It requires an ability to make decisions.

Engineers and architects, working side by side and supported by technologists, constitute one of the most powerful agents for change in our society. New ways are found to control the environment, to utilize the resources and forces of nature, to increase productivity of needed goods, and services, in short to improve the quality of life for all.

The College of Engineering, Architecture and Technology (CEAT) offers a complete spectrum of educational opportunities designed to give graduates the capability and the flexibility to meet the ever-changing requirements of society—a society heavily committed to technological innovation. To be prepared to make continuing contributions, engineers, architects and technologists must have at their command not only the modern tools and processes of industry, but a firm and rigorous education in mathematics and the physical sciences. In order that those contributions be sensitive to genuine human needs, the engineer, architect or technologist must also be schooled in the social sciences and humanities that provide the understanding of non-technical factors that must shape technological innovation.

The curricula are continuously evolving to assist the student first to master the enduring principles upon which future practice will be based, and second to acquaint him or her with current applications of these principles. With such a bridge built between theory and practice, the educational experience will support one's following diverse interests and opportunities throughout the productive years of his or her life span.



Accreditation

The following undergraduate engineering programs are separately accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET):

Architectural engineering
Agricultural engineering
Chemical engineering
Civil engineering
Electrical engineering
General engineering
Industrial engineering and management
Mechanical engineering
Mechanical engineering (aerospace option)

The following undergraduate engineering technology programs are separately accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology:

Construction management technology
Electronics technology
Fire protection and safety technology
Manufacturing technology
Mechanical design technology
Mechanical power technology
Petroleum technology

The following programs in architecture are accredited by the National Architectural Accrediting Board:

Bachelor of architecture
Master of architecture

The Engineering Curricula

The traditional four-year bachelor's degree programs in engineering remain available at OSU. However, in order to meet the ever-changing and complex needs of a technological society, one who expects to enjoy a lasting and successful career in the practice of engineering should obtain a background in mathematics, the basic sciences and in engineering that cannot readily be acquired in four years. To meet this primary objective of an engineering education, the Schools of Engineering encourage every qualified student to pursue a curriculum leading to a master's degree over a period of approximately five years, even though it is expected that there will be many entry-level job opportunities available for the graduate with the bachelor's degree. Furthermore, the bachelor's program in engineering is an excellent preparation for professional training in law or medicine, since it provides a student with maximum flexibility in career choices.

Academic Programs

Academic programs offered in the College of Engineering, Architecture and Technology culminate in the following degrees:

Schools of Engineering:

Bachelor of Science in Agricultural Engineering, Chemical Engineering (petroleum and premedical options), Civil Engineering, Electrical Engineering (computer engineering option), General Engineering, Industrial Engineering and Management, Mechanical Engineering (aerospace, petroleum and premedical options).

Master of Agricultural Engineering, Environmental Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, General Engineering, Industrial Engineering and Management, Manufacturing Systems Engineering, and Mechanical Engineering.

Master of Science in agricultural engineering, engineering, chemical engineering, civil engineering, electrical engineering, environmental engineering, general engineering, industrial engineering and management, and mechanical engineering.

Doctor of Philosophy in agricultural engineering, chemical engineering, civil engineering, electrical engineering, general engineering, industrial engineering and management, and mechanical engineering.

Division of Engineering Technology:

Bachelor of Science in Engineering Technology.

School of Architecture:

Bachelor of Architecture, Bachelor of Architectural Engineering, Master of Architecture and Master of Architectural Engineering.

High School Preparation

Beginning students who have completed two units of algebra and one each in plane geometry

and trigonometry/analysis in high school should be prepared to enter at the expected level in mathematics. In addition, it is recommended that students planning an engineering degree obtain high school credit in one unit of general chemistry, one unit of general physics as well as one-half unit of graphics, if available.

Oklahoma State University offers course work in algebra, trigonometry and preparatory chemistry for students who were unable to obtain this work during high school. However, such credit does not count toward the minimum number of semester hours specified for the B.S. degrees.

The selection of the initial chemistry and mathematics courses for an entering student in the College of Engineering, Architecture and Technology is determined by his or her score on placement tests administered at enrollment, the amount of mathematics or chemistry completed in his or her high school program and ACT test scores. When appropriate, students with a strong background can obtain academic credit by advanced standing examination or by College Level Examination Program (CLEP) tests.

The Professional School Concept

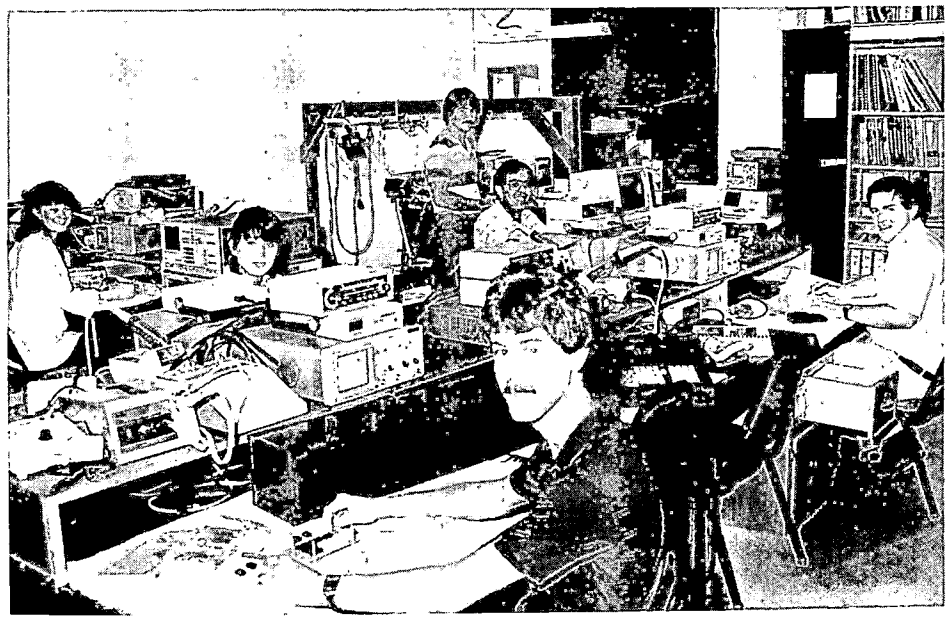
In accord with the professional nature of a career in engineering, students entering OSU are admitted into the pre-engineering program, consisting of the course work normally taken the first two years of an engineering curriculum. Near the completion of the pre-engineering course work, the student applies for admission to one of the professional schools of the College to continue in the upper-division program. Students meeting admission standards then pursue a two-year curriculum leading to the B.S. degree or a three-year curriculum leading to a master's degree in their discipline.

Pre-engineering Program. The pre-engineering program is comparable to the freshman and sophomore levels in other disciplines. The content of the pre-engineering program is uniform for all engineering specialities except architectural engineering, and includes course work devoted to mathematics through calculus and differential equations, communication skills, general chemistry, general physics, the engineering sciences commonly referred to as mechanics, thermodynamics and electrical science, and the social sciences and humanities.

Admission Requirements

Admission to Pre-engineering. In order to maintain a high quality, the professional school concept for admission to the engineering and architecture programs is utilized. Students must first be admitted to the pre-engineering or pre-architecture program and complete certain minimum requirements as outlined under "Lower Division Requirements" in order to be considered for admission to a professional school and allowed to pursue the upper-division curriculum. Transfer students are normally first admitted to pre-engineering regardless of the number of hours completed but may be permitted to take selected upper-division courses prior to admission to a professional school as appropriate.

Oklahoma residents may be admitted to pre-engineering, pre-architecture or technology if they meet OSU admission requirements stated elsewhere in the *Catalog.*



Nonresident students applying for admission to pre-engineering as freshmen must meet the following requirements:

Make a composite standard score of 19 or higher on the ACT or a comparable score on a similar battery of standardized national exams. When it is not practical to take such exams (e.g. international students), the student's high school grades should demonstrate comparable competency and the potential for success in an engineering major.

Nonresident freshmen not directly admissable to pre-engineering but those who meet OSU requirements for admission may be admitted to Freshman Programs and Services for one or two semesters in order to fully evaluate their qualifications for admission to pre-engineering. After grades are received each semester, such students will be evaluated and, if qualified, will be admitted to pre-engineering.

Minimum requirements for admission to pre-engineering from Freshman Programs and Services are:

1. an overall grade-point average (GPA) of 2.30, and
2. a GPA of at least 2.30 at OSU in mathematics, physical science and English courses applying toward the degree, and
3. ability to make satisfactory progress toward an engineering degree.

Nonresident transfer students will be admitted directly to pre-engineering if they meet the following requirements:

1. an overall GPA of at least 2.70 on a 4.00 scale, and
2. a GPA of at least 2.50 over all mathematics, physical science, engineering science and engineering courses, and
3. a GPA of at least 2.00 (in at least 12 hours if a full-time student) in the most recent semester completed, and
4. ability to make satisfactory progress toward an engineering degree.

International student applications must be received by June 15, November 1 and April 1 for the fall, spring and summer terms, respectively, to be considered for admission to pre-engineering. All GPA's are calculated using only the last grade in any repeated course.

The College of Engineering, Architecture and Technology, in implementing the policy for admission to engineering programs at Oklahoma State University, provides special consideration for members of U.S. minority populations, veterans, and educationally or economically disadvantaged citizens who show reasonable promise for successful completion of the undergraduate engineering curricular requirements. All special admissions under these exceptions will be approved by the Office of the Dean of Engineering to ensure that the policy will not affect adversely the admission of students from minority backgrounds. Transfer students will not be admitted if in their most recent semester of transfer credit, their performance would have them on probation if enrolled at Oklahoma State University. Students transferring to pre-engineering from another major at OSU must meet the same requirements for admission as a student transferring from another college or university.

Admission to the Professional Schools. A student who will have completed, including his current enrollment, not fewer than 60 semester credit hours of study at an accredited institution of higher learning, and who has demonstrated satisfactory competence in the pre-engineering curriculum described above, is eligible to apply for admission to the professional school of his or her choice. The requirements for such admission are described in detail under "Lower-division Requirements."

In addition, if the number of qualified professional school applicants to a given professional school exceeds the number that can be provided a quality program with the resources available, the number admitted each semester to that professional school will be limited. In that event, priority for admission will be given first to Oklahoma resident pre-engineering students and second to the nonresident students in pre-engineering on a best qualified basis as determined by the grade-point average in courses taken and completed at OSU. This practice will preserve the high standards demanded of a quality educational experience sought by students and necessary so that OSU graduates will continue to be highly regarded.

A common prerequisite for any student to enroll in upper-division course work offered by the

professional schools of the College is competence equivalent to that required for admission to the schools, as described above. For students who have not been admitted to a professional school, competence will be evaluated on an individual basis by the head of the school or a designated representative.

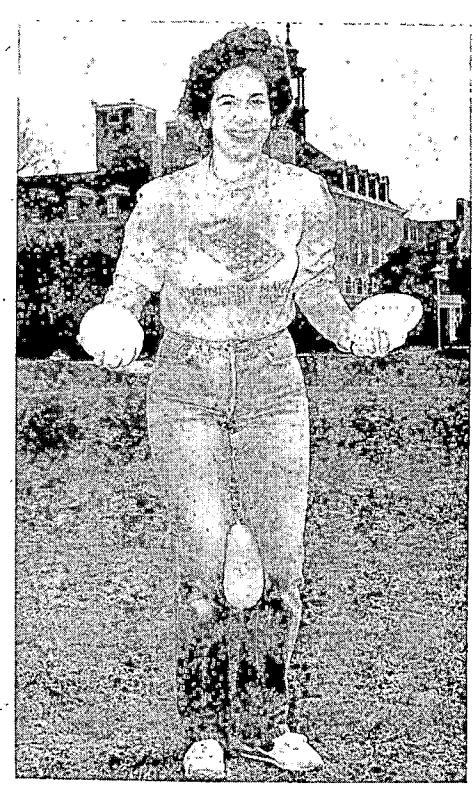
Master of Engineering

The Master of (specific school) Engineering degree programs are designed to prepare the graduate for the practice of the engineering profession in industry and government. They are distinguished by particular emphasis on developing in students the ability to perform effectively in design and development work; the programs normally include internship experiences as a part of the academic process. Approximately one year of graduate study is taken at the culmination of these programs offered in the Schools of Agricultural Engineering, Chemical Engineering, Civil Engineering, Electrical and Computer Engineering, General Engineering, Industrial Engineering and Management, and Mechanical and Aerospace Engineering.

Admission to one of these programs depends upon being accepted by one of the professional schools in the College of Engineering, Architecture and Technology (CEAT). The programs consist of undergraduate work corresponding to the junior and senior level, and a 32-semester-credit-hour study program in graduate-professional status meeting Graduate College requirements for a Plan III master's degree.

Students may enter a professional school at any level for which they are qualified that exceeds the minimum requirements for eligibility for admission to a professional school. (See "Admission to Professional Schools.")

To be admitted to graduate-professional status in a professional school in the CEAT, a student must have completed a curriculum leading to a B.S. degree in engineering meeting the requirements of the Accreditation Board for Engineering and Technology. Students with B.S. degrees in physics, chemistry, etc., must complete work to meet ABET undergraduate requirements before gaining graduate-professional status. Scholastic performance as an undergraduate at a level that indicates a high probability of success in a graduate program requiring a 3.00 minimum GPA on a 4.00 scale is also a requirement.



The 32 semester hours in graduate-professional status combine with 68 or more semester hours of upper-division work to total at least 100 semester hours beyond the pre-engineering level for the professional programs. This course work is taken in accordance with a professional school plan of study established for each student to meet the objectives of the student and the professional school in which he or she is enrolled. Three-year plans of study will include: 16 semester hours of required courses common to all engineering curricula; not fewer than 36 semester hours of additional engineering work specified by the particular professional school, and of these, at least 15 semester hours must be at the 5000 level, exclusive of professional practice; and six to eight hours of professional practice in the graduate year of the plan of study. The courses should be chosen at both undergraduate and graduate levels to meet ABET basic and advanced requirements for course work that is classified as design. (Currently, one-half year of engineering design is required in the basic, i.e., undergraduate programs, and an additional one-third year in the advanced portion.)

The professional school plan of study serves as the preliminary plan of study for the graduate portion of the program, but a separate final plan of study must be filed with the Graduate College by the end of the second week of the term during which all requirements for graduation are to be completed.

Scholarships

Several scholarships are funded through private donations, alumni gifts, and industries, and vary in amounts from $400 to $1,250 per year.

These scholarships are available for freshman through senior students, and are awarded primarily on the basis of academic achievement and leadership potential. However, during the selection process consideration may be given to financial need and other factors. Freshman students should normally have an ACT composite score of 30 or higher and be in the top 10 percent of their high school graduating class to be competitive for CEAT scholarships.

Each school or department within the College normally has scholarship funds available. These are administered through that school or department rather than through the College's scholarship committee. However, a separate application form is not required.

Application forms and information regarding CEAT may be obtained by contacting the Office of Student Academic Services, CEAT, EN 101, OSU, Stillwater, OK 74078.

Freshman scholarship applications must be completed and on file by March 1 preceding the academic year for which the student expects to receive the scholarship. Applications should be submitted to the Office of Student Academic Services.

Continuing and transfer students should submit scholarship applications to the head of the school in which they are majoring prior to May 1. In this manner they will also be considered for any departmental scholarships for which they may be eligible as well as for any CEAT scholarship. Students who have not selected a major should submit their applications to the Office of Student Academic Services.

Academic Advising

The College's Office of Student Academic Services provides advisement for all pre-engineering students and pre-architecture students. (Consult the heading "Division of Engineering Technology" for specific information regarding advisement for students in technology programs.) When a student has gained admission to a professional school of engineering or architecture, he or she will be assigned a faculty adviser.

Each student is personally advised in the planning and scheduling of his or her course work and is counseled and advised individually on matters of career choice, his or her activities at OSU, and on other academic matters. An academic file is created for each student at the time of initial enrollment.

Progress Toward a Degree

Full-time students are expected to complete twelve or more semester credit hours each term with a grade-point average of 2.00 or above to make satisfactory progress toward a degree. Should either the hours completed or grade-point average for any term fall below the minimum, the student may be placed on academic probation.

Probation and Suspension

1. Students in the CEAT will be placed on probation at the end of any academic term in which they fall below the criteria for satisfactory progress toward their degree objectives.
   a. The conditions for satisfactory progress in an academic term are:
      1. at least a 2.00 GPA, and
      2. at least 24 grade points (12 in a summer term) for a full-time student in courses which apply toward the degree objective. Part-time students must make at least a 2.00 GPA.
   b. Students placed on probation following the fall semester will be subject to suspension following the spring semester. Probation terms are set on an individual basis but normally require at least a 2.00 GPA in at least 12 hours which apply toward the degree for full-time students.
   c. Students placed on probation following the spring or summer terms will be subject to suspension at the end of the following fall or spring semester depending on the student's academic record. Probation terms normally required of full-time students on probation for the academic year are:
      1. at least a 2.00 GPA in at least 12 hours which apply toward the degree objective in the spring semester, and
      2. at least a cumulative 2.00 GPA for the academic year, and
      3. successful completion of at least 24 hours total which apply toward the degree objective for the fall and spring semesters while on probation. Students on probation for the fall semester only must meet requirements as stated in (b).
2. A student will be subject to suspension at the end of any term in which he or she fails to meet

University retention standards. (See "Academic Regulations" in the *Catalog*.

3. A student will not normally be suspended who is within 24 semester credit hours of graduation.
4. Students who have been reinstated will be suspended at the end of any semester in which they fail to meet probation requirements.
5. Students who have been suspended for both reasons of unsatisfactory progress toward the degree and of academic dishonesty will not be reinstated in the College of Engineering, Architecture and Technology.
6. An effort will be made to appropriately advise students on probation of their academic status at the end of every academic term, but they are responsible for being aware of their academic status and for taking appropriate action.
7. Students on probation will be required to sign an acknowledgement of the terms of their probation. Students will be held subject to the terms of probation established by their advisers whether or not they see their advisers and sign the acknowledgement of the terms of probation.
8. Students on probation will not be allowed to enroll for the term following the end of the probationary period until grades are received verifying that probation requirements have been met.

Reinstatement

Any student who has been suspended from the University for academic reasons may apply for reinstatement by making application through the Office of Student Academic Services in the college in which the student wishes to be reinstated. Students in the CEAT should obtain a copy of CEAT reinstatement procedures to seek reinstatement.

A suspended student who is reinstated will return to school on academic probation and will be subject to the probation procedures above.

Concurrent Enrollment

If a student expects to apply credits toward a degree at OSU that are to be earned at another institution or through correspondence or extension, while enrolled in one of the programs of the College of Engineering, Architecture and Technology, permission must be obtained in advance. It is the belief of the faculty of the College that such enrollment detracts from the educational process at this institution, and can be justified only in the most unusual circumstances. Normally, if the material for which such permission is sought is available at OSU, permission will not be granted, nor will retroactive permission be granted in any circumstances.

Calculators

An engineering, architecture or technology student is expected to be equipped with an appropriate calculator or computer. Any student not so equipped will be at a disadvantage in learning activities. Necessary functions include exponential functions, the logarithm and inverse logarithm functions in both natural base and base 10, and the trigonometric and inverse trigonometric functions.

Special Academic Programs

Co-op Program. The College of Engineering, Architecture and Technology offers an experience-based program, Cooperative Education (Co-op). Co-op allows engineering and technology students to achieve a balanced education through the combination of theoretical and practical knowledge during their early years of professional development. The student's education is a cooperative effort between the University and industry. Students alternate semesters on campus with work semesters in industry during their junior and senior years. The periods of employment constitute an essential element in the educational process. Students gain practical knowledge which is carried back to the classroom, giving academic programs a sense of reality. By the time they receive their degrees, students have accumulated the equivalent of a year-and-a-half of progressively challenging work experience.

Participation in Co-op is voluntary; transfer students must successfully complete at least one semester at OSU prior to their first placement. Students may obtain further information about the program from the coordinator, Room 101A, Engineering North.

Engineering Honors Program. The Honors Program provides opportunities for challenging and individual study for undergraduate students of unusually high ability, motivation and initiative. Honors classes, seminars and independent study courses are structured to put interested students and teachers together in ways which encourage discussion and a mature approach to learning. Invitation to the program is extended only to approximately the top five percent of entering students.

Each honors course completed with an "A" or "B" grade is identified on the student's transcript as such. A special bachelor's degree Honors diploma is conferred upon graduation for successful completion of all Honors Program requirements.

Qualified high school scholars will be eligible for the Honors Program beginning with their first enrollment at OSU as freshmen. An ACT composite score of at least 30 is required for Engineering and Architecture Honors students and at least 26 for Technology Honors students.

All other OSU students and transfer students who are classified as freshmen (27 semester credit hours or fewer), and who have completed twelve or more hours with a grade-point average of 3.50 or above are eligible to join the Honors Program regardless of their ACT scores.



Requirements for a Bachelors Degree with Honors. (1) A grade-point average of 3.50, both overall and in the major field. (2) A total of 12 semester credit hours with grades of "A" or "B" in honors sections of basic introductory-type courses from at least three of the following areas: English or foreign languages, mathematics or logic, social sciences, natural or physical sciences and humanities. (3) Honors credit with grades of "A" or "B" in a total of 12 semester hours of junior and senior courses within the student's major field, including at least three hours of independent study. (4) Acquisition and submission of a formal application for the Honors degree within two weeks after the beginning of the final semester.

Job Placement. An employment service is provided for students in the College. This service is available to students interested in obtaining summer or permanent employment.

The placement office is coordinated with the University Placement Office and assists students in signing up for interviews with companies interviewing on campus. Lists of employment opportunities with companies not recruiting on campus are maintained at all times. Resources are available to assist the student seeking employment including company literature, resume information, interviewing tips and placement annuals.

Placement orientation sessions are held at the beginning of each semester to familiarize the students with the services provided.

Tutoring Program. A tutoring program is provided to assist students in their understanding of fundamental courses in mathematics, physics, chemistry and engineering science.

The sessions are held each fall and spring semester Monday through Thursday evenings. Each session lasts 30 minutes and the student is charged a nominal fee. Students may sign up for a maximum of one hour per evening if they wish.

Information about the program can be obtained in the Office of Student Academic Services.

General Education Requirements

The College of Engineering, Architecture and Technology urges its students to make maximum use of the course work required by the College and the schools for simultaneous fulfillment of many of the general education requirements.

Opportunities to satisfy General Education requirements with required courses in the schools of Engineering include:

English. Students are required to complete a course in technical report writing. Thus, students making an "A" or "B" in the first English composition course (ENGL 1113), need not take ENGL 1213, and may take the report writing course, ENGL 3323, to meet both the general education requirement for English and the College requirement.

Humanities and Social Science. Engineering students must complete a total of 16 semester credit hours to meet this requirement, which is in compliance with the minimum requirements stipulated by the Accreditation Board for Engineering and Technology. By taking American history and political science to meet general education requirements, three or four additional hours of social and

behavioral science, and six or seven hours of humanities, the 16 hours can meet the University's requirements in these areas. Furthermore, if one of these courses is selected from those meeting the University's requirements for an International Dimension, the total number of hours for the degree can be held to the minimum.

Basic Science and Mathematics. All students are required to complete 32 semester credit hours in these areas to meet college requirements. Eighteen of these credits can be used to meet University requirements in Natural Science and in Abstract and Quantitative Thought. The required chemistry and physics course work meet the University requirement for Scientific Investigation.

The total college requirements amount to 54 semester hours, well over the 40 hours required by the University for general education. However, no more than 18 of the 32 hours in mathematics and science can be counted toward General Education, and several hours of the course work are more advanced than what would normally be approved for General Education.

Opportunities for simultaneously meeting the requirements imposed by the School of Architecture and General Education requirements parallel those of the schools of Engineering with some variations. Specific courses, required in the Architecture curriculum, may be used to meet General Education requirements as follows: Urban Sociology (SOC 3423) can be used to meet the minimum requirements in Social and Behavioral Science, and Architecture and Society (ARCH 2003) can be used to satisfy three credit hours of General Education credit in the Humanities as well as the International Dimension requirement. At least 17 semester hours of basic science and mathematics can be counted toward General Education requirements, and required course work in "History and Theory of Architecture" can be used for General Education credit, except that at least one General Education course unrelated to the major must be included.

The pattern for meeting General Education requirements with course work also meeting departmental requirements is similar in the Division of Engineering Technology, but with some variations from department to department.



Required course work in mathematics and basic science is utilized to meet up to 18 semester hours of General Education requirements also. The Scientific Investigation requirement is met as a part of the course work meeting professional requirements for basic science.

Meeting the remaining General Education requirements is not influenced by departmental requirements. In each case, provision is made for an elective to complete the minimum 15 semester credit hours in course work not directly supportive of the major. These hours, and the required hours in the Humanities (H) and Social and Behavioral Studies (S) areas provide an opportunity for the student to also meet the International Dimension requirement without adding hours to the program.

Lower-division Requirements

In the Schools of Engineering and the School of Architecture the lower-division course work is devoted to qualifying for admission to the associated upper division; i.e., in each case continued progress in the program is contingent on successful completion of lower-division course work measured against standards that are considerably higher than University retention standards.

Engineering. Admission to a professional school. A student is eligible to apply for admission to one of the professional schools of Engineering when the classes in which he or she is enrolled will bring his or her total semester credit hours of course work at an accredited institution of higher learning to at least 60 hours. Admission to the professional school is the demonstration of an acceptable level of competence in subject matter comparable to that covered in the General Education and Pre-Engineering components of the lower-division curriculum as described in detail in the publication, *Undergraduate Programs and Requirements* and acceptance by the appropriate professional school. The demonstration of competence is normally in the context of formal course work, but up to one half of the requirements may be completed by examination.

An acceptable level of competence for the purpose of admission to a professional school may be demonstrated by achieving all of the following:

1. Of the 60 or more semester credit hours, at least 51 shall be from the General Education and Pre-engineering courses specified for the degree. The minimum grade-point average in these 51 hours is 2.30, and final grades of "C" or better are required in each English, mathematics, physics, chemistry or engineering science/engineering course.
2. A minimum of 12 of the required semester hours must be completed at Oklahoma State University, with a grade-point average of 2.30 or better in these courses.
3. The overall grade-point average applicable to the mathematics, physics and chemistry courses, and those engineering science and engineering courses taken prior to admission to a professional school, should equal or exceed 2.50.

While 60 semester hours are specified for the common pre-engineering curriculum, in some cases, preliminary courses pertinent to an individual major are recommended to be taken in the sophomore year. When such courses are taken, it is understood that pre-engineering course work may be deferred to the junior year. Futhermore, individual schools may impose higher standards for admission. Consult the *Undergraduate Programs and Requirements* or the particular requirement sheet for these details.

Architecture. Admission to the upper division (third year) in the School of Architecture is granted to the most qualified applicants up to the capacity of the program. However, to be considered, a student must have completed 60 semester credit hours, all required architecture courses specified for the first two years with grades of "C" or better, and maintained an overall GPA of 2.30 or better. Furthermore, first preference will be given to students who have completed ARCH 2114 prior to admission.

Technology. The specific requirements for continuation beyond the lower division in the various majors in the Division of Technology are not uniform. Programs may have stipulations regarding admission to the upper division. Attention is directed to the requirement sheet for the appropriate major or the publication *Undergraduate Programs and Requirements* for the specific conditions a student must satisfy.

Departmental Clubs and Honor Societies

Alpha Epsilon (juniors & seniors in agricultural engineering)
Alpha Pi Mu (honor society for juniors & seniors in engineering)
Amateur Radio Club
American Institute of Architects
American Institute of Astronautics & Aeronautics
American Institute of Chemical Engineers
American Society of Agricultural Engineers
American Society of Civil Engineers
American Society of Mechanical Engineers
CEAT Student Council
Chi Epsilon (civil, architectural or general engineering honor society)
Construction Management Society
Construction Specifications Institute
Engineeretts (spouses of students in CEAT)
CEAT Student Council
Eta Kappa Nu (electrical engineering honor society)
Fire Protection Society
Institute of Electrical & Electronics Engineers
Institute of Industrial Engineers
Omega Chi Epsilon (chemical engineering students)
Pi Tau Sigma (mechanical and aerospace engineering honor society)
Society of Automotive Engineers
Society of Black Engineers, Technologists & Architects
Society of Electronic Electrical Power Technology
Society of Manufacturing Engineers
Society of Mechanical Technicians
Society of Petroleum Engineers
Society of Women Engineers
Tau Alpha Pi (technology honor society)
Tau Beta Pi (engineering students honor society)
Tau Iota Epsilon (technology students)

Agricultural Engineering

Professor and Head David R. Thompson, Ph.D.

Agricultural engineers are professional people who generate and adapt engineering knowledge



and technologies for the efficient and effective production, processing, storage, handling and distribution of agricultural, food and other biological products, and the management of natural resources.

Agricultural engineering utilizes basic engineering expertise, but focuses this knowledge on the invention, design and management of biological systems. The opportunities for agricultural engineers are as diverse as flood control, equipment design for food production and processing, design and management of processing facilities, and environmental control for plants and animals. Agricultural engineers develop and utilize machine vision systems for quality control, expert systems for process and machine optimization, unique machines for efficient manufacture or production of food, forest products and other biological materials, and environmental control system for aquaculture, disease control or indoor plant production.

The problem-solving ability and broad-based engineering background of agricultural engineers make them well suited for activities such as research, development, design, production, management, technical sales and private consulting. The additional background in biological sciences provides graduates excellent opportunities for entering other professional schools, such as medicine, dentistry, veterinary medicine, biological sciences or agricultural programs. Many opportunities exist for international work in both developed and developing countries.

Agricultural engineering courses for juniors and seniors integrate the engineering sciences with agricultural and biological sciences and teach students to design solutions to real problems of society. Students work both as individuals and in teams to solve design problems provided by industrial firms who also hire agricultural engineering graduates. Students receive specialized design experiences in one or more of the following areas: hydrology and water resources, including flood control, irrigation, and water supply; machinery, instruments and controls for farming and ranching, food processing and packaging, and production of biotechnology products; and systems for efficient production, processing, handling and storage of agricultural and biological products.

Graduate Programs

The School of Agricultural Engineering offers three programs leading to post-baccalaureate degrees: Master of Agricultural Engineering, Master of Science and Doctor of Philosophy. The Master of Agricultural Engineering program places emphasis on design and internship in engineering experience to prepare the graduate for practice in the engineering profession.

Facilities for design and research are available in processing of agricultural products, plant and animal environment, energy in agriculture, microelectronics, light structures, agricultural power and machinery, pesticide application, soil and water resources development, irrigation, hydraulics, and hydrology.

Research projects are supported by the Agricultural Experiment Station. A well-trained faculty, many of them registered professional engineers with research, consulting and design experience, guide the graduate students' activities and help plan programs to meet the students' needs. Graduate students prepare designs and specifications for special equipment and facilities needed to carry out their work. They are expected to demonstrate by thesis and supporting research or by designs the ability to organize a design problem or an experimental investigation, carry it to completion and report the results.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree program requires graduation from an engineering curriculum accredited by the Accreditation Board for Engineering and Technology.

Admission to the Master of Agricultural Engineering degree program is permitted for students who meet the prerequisites as stated in the "Master of Engineering" section. The departmental graduate committee will evaluate the applicant's credentials to determine equivalency and specify requirements to overcome deficiencies. A student must be accepted by an adviser in the Department prior to official admission to the graduate program.

Degree Requirements. A candidate for any of the degrees listed above follows an approved plan of study which must satisfy at least the minimum University requirements for that particular degree.

School of Architecture

Professor and Head Virgil R. Carter, M.Arch., FAIA

The School, founded in 1909, offers undergraduate programs in the two areas of architecture and architectural engineering. The School's parallel program emphasis on architecture and architectural engineering involves the sharing of faculty, course work and facilities. This sharing, under one roof, is a major strength of the School and makes it one of the few such integrated programs in the United States. The School of Architecture is an element of the College of Engineering, Architecture and Technology. This organization facilitates access to state-of-the-art electives and to a wide variety of graduate course work.

The School is dedicated to providing the highest quality programs of higher education to students whose career goals are to enter the private practice of architecture and architectural engineering. This clear educational goal allows the School to focus its resources toward the specific needs of the vast majority of its students at a level of excellence not otherwise achievable.

Architecture

Architecture is the difficult and complex art and science of planning, designing and renovating settings for human life and habitation. It is a creative response to human needs. Architects design new buildings, renovate and adapt existing buildings, their interiors and their sites.

Education in architecture consists of campus-oriented classroom and studio courses, as well as off-campus studies. It is conducted in an intellectual climate which stimulates inquiry, introduces principles and values, and teaches the disciplines necessary to work in collaboration with others. The goal of the program is the education of future leaders within the architecture profession.

The design studio is the center of the School's educational program. It is the setting where students and faculty work most closely together, and where all specialized study and knowledge comes together and is synthesized in design. The record of OSU students' achievements in the design studios is evidenced by the success in national and international architectural design competitions. Over the last 40 years, the School has the second highest number of winners and finalists of any program in the United States in these prestigious competitions.

The program has long been known as one of the strongest professional programs in the United States. OSU graduates are consistently offered employment opportunities in many of the best architectural offices in Oklahoma and throughout the United States. The program is fully accredited by the National Architectural Accreditation Board.

Architectural Engineering

Architectural engineering combines the creative aspects of architecture with the analytical rigors of engineering. It differs from architecture in that architectural engineering has as its focus the design of structural and environmental elements, systems and procedures for buildings, rather than the design of individual buildings.

Architectural engineering at OSU concentrates on the design of building structural systems to resist the various forces of nature, such as gravity, winds and earthquakes, as well as the forces of man. It involves the detailed study and use of materials such as steel, concrete and wood in applications as diverse as earth-sheltered structures, high-rise and long-span structures.

Architectural engineers practice in a wide variety of professional engineering settings such as consulting firms, architectural firms, industrial or commercial organizations and governmental agencies. The program's educational goal, as in architecture, is to provide the education necessary for leadership in the architectural engineering profession.

The demand for OSU graduates consistently exceeds the supply potential from the School. OSU graduates are sought by leading architectural and engineering firms both in Oklahoma and nationally.

Undergraduate Curriculum

The programs in architecture and architectural engineering are five years long and offer the professional degrees of Bachelor of Architecture and Bachelor of Architectural Engineering, which are required for professional licensure.

Undergraduate Admission. Students who satisfy the University admission requirements are eligible to enroll for the first two years of the program. Upon completion of these two years, the best qualified students are selected, upon application, by the School for admission to the upper division. Admission is based upon academic achievement and professional potential. Admission criteria are subject to annual review by the School and may be obtained directly from the School.

Transfer students are required to furnish transcripts and course descriptions for previous classroom courses, as well as examples of previous studio work. Evaluation and enrollment by the School is on a course-by-course basis for all transfer students.

Student Work. Projects submitted for regular class assignments may be retained by the School. All projects not retained will be available to the student.

Faculty and Facilities. In keeping with the professional orientation of the School, the faculty each have extensive experience as successful practicing architects and architectural engineers, as well as outstanding scholastic records. Faculty experience includes the design of virtually all building types and systems in the many varied climates of Europe and Asia, as well as North and South America.

The School of Architecture is housed in the Architecture Building, the original University Gymnasium and Armory, built in 1918. This structure was extensively remodeled in 1976 and contains all studios, laboratories, galleries and offices of the School. Specialized facilities include the Cunningham Resource Center, containing all of the University's holdings on architecture and a fully-equipped Computer-assisted Design Laboratory. The faculty and students are especially proud of the Architecture Building, for it serves as an example of innovative architectural design and the adaptive reuse of an important building.

Student Body. With the curriculum based upon extensive and personalized student-faculty interaction, the student-faculty ratio in studio courses is set at approximately 15 to one. Annual student enrollment is approximately 300 students of whom 22% are women and 18% are international students, thus providing a rich and diverse educational environment. A variety of student organizations and activities are available.

Graduate Programs

The School offers the opportunity for specialized study at the graduate level in architecture and architectural engineering. These programs lead to the post-professional degrees, Master of Architecture and Master of Architectural Engineering.

These graduate programs are designed for students already possessing their first professional or five-year degree. Each graduate program is normally one-year long and consists of a minimum of 32 credit hours.

Candidates with nonprofessional four-year undergraduate degrees may apply for admission to the professional degree program and, if admitted, complete the requirements for a Bachelor of Architecture degree. Application may then be made to the School's graduate program.

Graduate Admissions. Admission is limited and based upon undergraduate academic records and accomplishments, examples of work, practical experience and recommendations from practicing architects, engineers and educators.

Admission depends upon being accepted by the Graduate College of the University and by the School's Graduate Admissions Committee. Complete applications for admission must be filed with both the Graduate College and the School by February 15. The School's Graduate Admissions Committee will review all applications by March 31. Late applications will be considered only if vacancies exist. Normally, applications to the graduate program are considered for admission beginning the following fall semester only.

Student Portfolios. For the Master of Architecture program, photographic examples of work performed in architectural design and other professional courses or actual practice are to be submitted with the admissions application for review by the School. Slides are not acceptable. Portfolios should be mailed directly to the School to arrive no later than February 15. Candidates for admission to the Master of Architectural Engineering program are not required to submit a portfolio.

Regulations and Procedures. Regulations and procedures as established by the Graduate College for a master's degree apply to the School's graduate programs, except as otherwise noted in the School's current program description. This description is reviewed by the School annually, and may be obtained directly from the School.

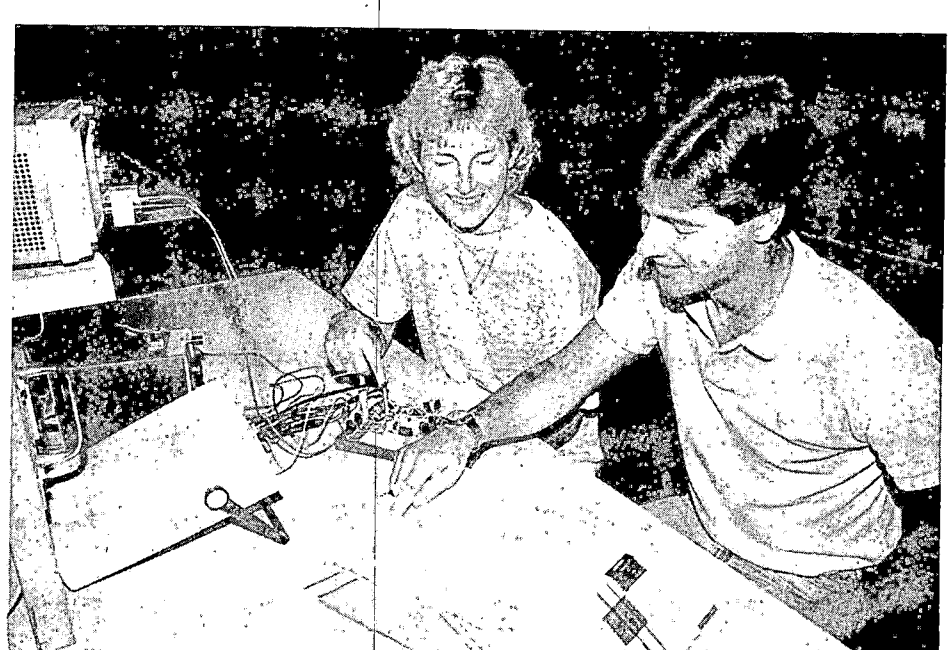
For further information, contact the School of Architecture, Oklahoma State University, Stillwater, OK 74078-1085.

Chemical Engineering

Regents Professor and Head Robert L. Robinson, Jr., Ph.D.,P.E.

Chemical engineers apply chemical, physical, and engineering principles to solve important problems and to supply vital materials for our technology-based civilization. Their work ranges from pharmaceuticals to fuels to industrial chemicals to bioengineering and to many others. It includes energy conservation and pollution control. The emphasis on chemistry and the chemical nature of everything we use is what makes chemical engineers different from other kinds of engineers.

Chemical engineers often find themselves defining a problem or product, developing a process to do what is needed, and then designing the plant to carry out the process. After the plant is started, chemical engineers will commonly manage operations, oversee equipment maintenance, and supervise control of product quality. They trouble-shoot the problems which hinder smooth operations, and they plan for future expansions or improvements. Their training and knowledge make them well qualified to market the products from a plant, the processing equipment for it, or even the complete plant itself.



The varied background and experience of chemical engineers make them ideally suited for advancement into top-level managerial and executive positions.

The academic preparation of chemical engineers for such a broad variety of careers must be based on a strong foundation in the basic sciences and mathematics. Computer competency is a must. Fundamental professional courses follow to provide the student an opportunity to apply the basic sciences to chemical engineering problems. Engineering design and laboratory courses integrate the more fundamental studies and demonstrate that engineering is a process of assembling knowledge from many fields and sources into a practical answer to a real problem. At the bachelor's level, three degree options are offered: (1) the regular course option prepares a graduate for a wide range of employment opportunities; (2) the petroleum option is specifically for those students interested in the energy field of petroleum and natural gas production, and (3) the premedical option is for those who wish preparation for medical school or seek employment in medically-related professions. All of these options prepare a student for success in M.S. or Ph.D. study at OSU or at other universities.

Upon completing the B.S. studies the qualified student is encouraged to continue in one of two master's programs.

Graduate Programs

The School of Chemical Engineering offers three programs leading to post-baccalaureate degrees: the Master of Chemical Engineering degree, the Master of Science degree, and the Doctor of Philosophy degree.

A program of independent study and research on a project under the direction of a member of the Graduate Faculty will be satisfactorily completed by all graduate students. For the Master of Science candidate, the project may result in a thesis or report; for the Master of Chemical Engineering candidate, the project will result in a report; for the Doctor of Philosophy candidate, the project will result in his or her dissertation.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree programs requires graduation from a chemical engineering curriculum approved by the American Institute of Chemical Engineers. Graduates from other curricula should submit transcripts to the head of the School of Chemical Engineering for evaluation.

Admission to the Master of Chemical Engineering degree program is permitted for students who have the minimum competencies as stated under "The Master of Engineering." Students may enter the program at any level for which they are qualified provided they are accepted by the School of Chemical Engineering.

The Master of Chemical Engineering Degree. This program involves one year study beyond the B.S. degree course work. A minimum of 32 semester credit hours are required to incorporate CHENG 5213, 5423, 5633, 5743, 5793, 5843, and six additional hours of approved graduate-level elective courses. Also, a professional internship is required which is represented by enrollment in CHENG 5030 for at least six semester credit hours. Two semester credit hours of CHENG 5990, Special Problems, are required.

This program is distinguished by the incorporation of an intern experience to give students real-time engineering practice, usually in an industrial environment under the guidance of an industrial preceptor as well as a University professor.

The Master of Science Degree. General requirements for the Master of Science degree in Chemical Engineering are 30 semester credit hours beyond the B.S. degree of course work and an acceptable thesis (a minimum of six hours of credit required for thesis research). The chemical engineering courses taken must include CHENG 5213, 5423, 5633, 5843, and 5743.

The Doctor of Philosophy Degree. The general credit requirement is a minimum of 90 semester credit hours beyond the B.S. degree including at least 30 hours of credit for research. The student must select a minor field with at least 12 hours of credit in this area. The chemical engineering courses must include CHENG 6023 or 6113, at least one other 6000-level CHENG course, and 12 hours of credit in other 5000- and 6000-level CHENG courses. Each student is responsible for consultation with his or her advisory committee in preparing the study plan.

Civil Engineering

Professor and Head Robert K. Hughes, Ph.D., P.E.

The exceptional diversity of professional practice in civil engineering presents many career opportunities for students well-founded in the physical sciences, mathematics, geology and biology.

The concern of civil engineers is man's environment—its control, alteration and utilization. Civil engineers engage in planning, designing and constructing highways, waterway and railway systems, harbors and shipping facilities, systems for the treatment and distribution of water and for the collection and treatment of sewage and industrial waste, dams and hydroelectric works, airports and terminals, structures of every kind including buildings, bridges, towers, industrial plants, aircraft, missiles, space vehicles, surface vehicles and submarines, tunnels and subway systems, schemes for the control of water and air pollution, and many other works of general benefit to society.

The professional curriculum in civil engineering is based on the pre-engineering courses in mathematics, physical sciences and engineering sciences. On this foundation, required courses train the student in the basic skills needed for the professional practice of civil engineering and provide the tools for more advanced study. Engineering theory and principles are developed in a way that will encourage their application to the solution of practical problems. Elective courses give experience in the solution of typical problems and develop the judgement and confidence of the student engineer.

The purpose of the curriculum is to prepare the student for his or her professional career as a designer, office engineer, field engineer, contractor, engineering businessman or manager. The graduate of this program will be well-prepared for work in engineering offices, city, state and federal governments and organizations, and the construction, chemical, petroleum and transportation industries.

Some degree of specialization is provided through the choice of elective courses in structures, engineering mechanics, transportation engineering, soil mechanics and foundations, construction engineering and management, environmental engineering and water resources. Strong support for various parts of the program are given by the departments of Industrial Engineering and Management, Mechanical and Aerospace Engineering, Agronomy, Business Administration, Chemistry, Geology, and Microbiology.

Graduate Programs

The School of Civil Engineering offers five programs leading to post-baccalaureate degrees—the Master of Civil Engineering degree, the Master of Environmental Engineering degree, the Master of Science degree in civil engineering, the Master of Science degree in environmental engineering, and the Doctor of Philosophy degree. The Master of Civil and Environmental Engineering degrees are graduate professional degrees with increased emphasis on professional practice through a broad spectrum of management, economic and technical studies and the incorporation of actual engineering design experience before graduation. The Master of Science degree, on the other hand, is characterized by a higher degree of technical specialization in a particular area of study. The Doctor of Philosophy degree is designed to prepare a student for research and for the teaching profession in engineering.

Major areas of study in the School are applied mechanics, structural analysis and design, transportation, construction engineering and management, geotechnical engineering, water resources, and environmental engineering. Research in all major fields is continuously pursued. Master of Civil Engineering candidates may choose either to specialize or to engage in a broadly based program of study, in accordance with an approved and purposeful plan of study.

Admission Requirements. Candidates for the Master of Science or Doctor of Philosophy degree must have graduated from a civil engineering curriculum accredited by the Accreditation Board for Engineering and Technology. Graduates from other curricula and schools should submit transcripts to the head of the School of Civil Engineering for evaluation. Admission to the Master of Environmental Engineering degree program is permitted for students who meet the minimum prerequisites as established by the School of Civil Engineering.

Degree Requirements. All degree programs follow an approved plan of study that must be submitted at a designated time. All programs are characterized by the flexibility available in a study plan that is designed to satisfy the particular needs of the student, while conforming to the general requirements implied by the title of the degree and specified by the University.

The Master of Civil Engineering or Environmental Engineering degree requires the completion of at least 100 semester credit hours of work beyond the minimum criteria stated for admission to the Professional School. This may include six semester credit hours for professional practice. Experienced engineers may substitute additional course work for professional practice.

The Master of Science degree in either Civil or Environmental Engineering requires the completion of at least 30 semester credit hours beyond the bachelor's degree, including a research thesis for which not more than six semester credit hours may be granted. The non-thesis option (32 semester credit hours) described in the "Graduate College" section may be permitted at the discretion of the student's adviser.

The Doctor of Philosophy degree requires the

completion of at least 90 semester credit hours of course work beyond the bachelor's degree, including not more than 30 semester credit hours for the research thesis. In addition, the candidate must complete six semester credit hours of course work in an area such as languages, mathematics, statistics, experimental techniques, research methodology, or similitude, (as specified by the advisory committee) that will facilitate his or her research effort. Generally, official admission as a candidate for the Doctor of Philosophy degree in any program offered by the School will not be granted until a member of the Graduate Faculty in the School agrees to serve as major (or thesis) adviser for the prospective candidate.

Electrical and Computer Engineering

Professor and Head James Baker, Ph.D., P.E.

Electrical Engineering

The electrical engineering program provides the fundamentals for a career in many related areas. All around is seen the astounding impact of microelectronics on consumer products such as calculators, electronic watches, TV games, home computers and microwave ovens, but the future impact will be even more astounding on worldwide satellite communications, energy conservation, automation of industrial plants, oil and gas exploration, electrical power generation and distribution, to mention a few.

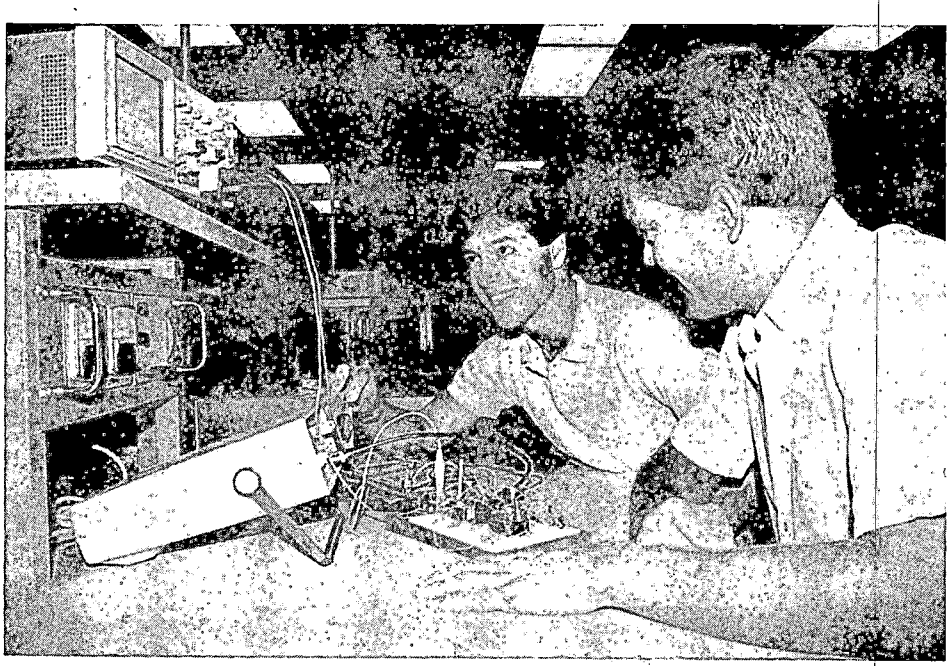
The undergraduate electrical and computer engineering program at Oklahoma State University prepares each graduate for a life-long professional career. During the first two years, students complete a carefully designed pre-engineering program consisting of mathematics, physical sciences, engineering sciences and selected courses in the humanities and social sciences. During the final two years of the program, each student concentrates his or her study on electrical and computer engineering subjects and can elect from the following areas: computer engineering, electronics, energy systems, communications, control systems, electromagnetics, solid state devices and network theory/signal processing.

Computer Engineering

A special program option in computer engineering is offered by the School of Electrical and Computer Engineering. This option is designed for students who have a strong interest in computers and desire to gain a full understanding of both the electronic hardware and the programming software aspects of modern computer systems. A student in computer engineering will also gain a detailed knowledge of one or more applications where computers are being used as integral components of advanced engineering systems; examples are instrumentation and test facilities, communication systems, power systems and process control systems. Students in computer engineering will work directly with microprocessors, microcomputers, and minicomputers and develop special electronic circuits for interfacing these computers to various peripheral devices.

In addition to the laboratories devoted to research, separate instructional laboratories give students "hands-on" experience in microcomputers, minicomputers, digital logic design, electronics, electrical machinery, networks, instrumentation and electromagnetics. In most instances, the student is guided through laboratory exercises which are closely related to classroom lectures. Here the student has the opportunity to verify theoretical principles and design concepts presented in the lectures. In other courses, the laboratory formats are more open-ended, allowing the student to experiment freely and exercise individual discretion in discovering experimental results.

The School of Electrical and Computer Engineering offers a full range of undergraduate and graduate program options. A degree in electrical or computer engineering is also an excellent foundation for graduate work in other professional fields such as medicine and law. Many graduates also pursue advanced programs in business and management after earning a degree in engineering.



Graduate Programs

The School of Electrical and Computer Engineering offers three graduate degrees: Master of Electrical Engineering, Master of Science and Doctor of Philosophy. The Master of Electrical Engineering degree is designed to prepare the graduate for the practice of the engineering profession and is distinguished by the incorporation of an internship program to give students practical engineering design experience before graduation.

The Master of Science degree is designed for students interested in careers in industry and government service that emphasize advanced design, development, and research methods for high technology. This degree incorporates additional advanced course work and on-campus creative activities.

The Doctor of Philosophy degree is designed to prepare the student for high-level research/development positions in industry and government and for the teaching profession in engineering and is distinguished by the emphasis on research and by the incorporation of a doctoral thesis.

Students may select course work and participate in research and design projects in the following areas: computer engineering, energy systems, control theory, communications, electromagnetics, electronics, network theory, solid-state devices, artificial intelligence and parallel processing.

In addition, students may elect a multidisciplinary program that crosses departmental lines and emphasizes the application of electrical engineering and systems theory to complex problems involving the interaction of engineering systems and technology with social, economic and environmental processes.

Admission Requirements. Admission to the Graduate College, as described under "General Regulations" in the "Graduate College" section is the first step for those students proceeding toward advanced degrees. Graduation from an electrical engineering curriculum accredited by the Accreditation Board for Engineering and Technology with high scholastic performance qualifies the student for admission to the School of Electrical and Computer Engineering as a candidate for any of the three advanced degrees offered.

Graduates from non-engineering fields such as mathematics, physics and computer science are also admitted to Electrical Engineering M.S. and Ph.D. graduate programs if an evaluation of their transcripts indicates they are prepared to take graduate-level course work in electrical engineering, or can be expected to do so after a reasonable amount of remedial course work. This condition also applies to graduates of unaccredited engineering programs and engineering technology programs.

Admission to the Master of Electrical Engineering program is permitted for students who meet the minimum prerequisites as stated in the section "Master of Engineering." Students may enter the program at any level for which they are qualified; they must at least meet the minimum admission criteria and be accepted by the School of Electrical and Computer Engineering.

Degree Requirements. The Master of Electrical Engineering degree is awarded to those who complete 32 hours of credit meeting Graduate College requirements for a Plan III master's degree program. The plan of study for this program must include at least 24 hours of course work, with more than half in electrical engineering at the 5000 level or above, and six to eight hours of credit for the internship practice. Flexibility is permitted in selecting courses to achieve specific program objectives.

The Master of Science degree is awarded to those students who successfully complete an approved plan of study under one of two possible options. If a thesis is written, 30 semester credit hours are required, including six hours credit for the thesis. If no thesis is written, 32 semester credit hours are required, including two hours credit for a creative activity. To be approved, a plan of study will include, as a minimum, 18 hours of 5000-level courses in electrical and computer engineering. Most plans of study include additional 5000-level courses, depending upon the background and particular educational goals of the student, and the minimum stated above is allowed only when a specific interdisciplinary plan of study is approved by the faculty. Each student is encouraged to include courses in supporting disciplines such as mathematics, computer science, statistics, business or other engineering fields. In certain cases, remedial work in undergraduate electrical and computer engineering will be required in addition to the 30-32 hours specified above.

The Doctor of Philosophy degree is granted in recognition of high achievement in scholarship in course work selected from the broad field of electrical engineering, and an independent investigation of a research problem in a chosen field of specialization that leads to a contribution to knowledge, as presented in a dissertation. For this degree the Graduate College requires a minimum of 90 credit hours for acceptable academic work beyond the bachelor's degree, including credit for the dissertation.

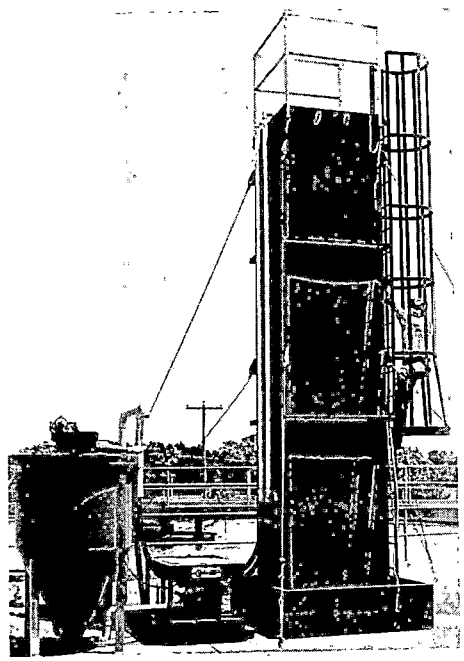
General Engineering

Professor and Head Bennett L. Basore; Sc.D., P.E.

For the student with interests that do not conform to any one of the traditional engineering disciplines, OSU offers a structured interdisciplinary program that continues the breadth developed in all engineering students in the engineering sciences course work, and has considerable depth.

General engineering embodies the fundamentals of four major engineering disciplines (civil, electrical, industrial and mechanical), to develop in basic science and engineering fundamentals regardless of the context in which these concepts are applied.

As a professional with an interdisciplinary background, the general engineer is prepared to analyze, design and synthesize solutions in a technically expedient manner, while considering the economics of design or process, as well as the humanistic requirements for utilization and operation. The student may choose to follow a professional practice within one of the four disciplines; he or she may look to a career in research



and development, particularly of an interdisciplinary nature; he or she may choose the avenues of development in professional consultation or individual proprietorship; or finally, because of his or her background and perspective, he or she may choose a career in the management circles of government or industry.

The resources of the College, both faculty and laboratory facilities, are available to the general engineering student who pursues course work alongside majors in each of their traditional disciplines.

Because the general engineer can expect to be called upon to perform at a professional level in any or all of the disciplines covered by the curriculum, each student is encouraged to plan a program leading to a master's degree, which will assure a more competitive level of competence in all four of the engineering disciplines.

Graduate Programs

The School of General Engineering offers three programs leading to post baccalaureate degrees: the Master of General Engineering degree, the Master of Science degree in general engineering, and the Doctor of Philosophy degree. The Master of General Engineering degree is distinguished by its increased emphasis on professional practice and design through a broad spectrum of technical, management and economic studies and the incorporation of an internship program to provide actual engineering experience before graduation. The Master of Science degree is characterized by a higher degree of technical specialization. The Doctor of Philosophy degree is a research-oriented degree designed to prepare the candidate for a career in teaching or research.

Major areas of study in general engineering follow the undergraduate pattern of combining course work from civil, electrical, industrial and mechanical engineering. Research is pursued with the option of limiting studies to one of the cooperating areas or of combining the areas.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree program requires graduation preferably from an engineering curriculum accredited by the Accreditation Board for Engineering and Technology. Graduates from unaccredited engineering curricula or from curricula in chemistry, physics, and mathematics should submit transcripts to the head of the School of General Engineering for evaluation.

Admission to the Master of General Engineering degree program is permitted for students who meet the minimum prerequisites stated in "Master of Engineering." A student may enter the program at any level for which he or she is qualified provided the minimum admission criteria have been met and the student has been accepted by the head of the School of General Engineering.

Degree Requirements. An approved plan of study is developed for each student. All programs are characterized by the flexibility available in a study plan that is designed to satisfy the particular needs of the student, while conforming to the general requirements for the degree as specified by the University and as implied by the title of the degree.

The Master of General Engineering degree requires about three years of study beyond the pre-engineering requirements and involves not fewer than 98 semester credit hours of course work including an internship period. The plan of study for the graduate professional (third) year should include three semester credit hours of mathematics or statistics and probability; eight semester credit hours of internship/professional practice; 12 semester credit hours in an area of interest; and three semester credit hours of humanities. At least 32 semester credit hours must be included in the graduate professional study plan, and of these, 12 or more semester credit hours must be in design, as defined by the Accreditation Board for Engineering and Technology, and 21 semester credit hours shall be in 5000-level courses or above. Any remaining course work may consist of specified courses to meet the objectives of the student and the curriculum.

The Master of Science degree program is based on an integrated plan of study with a specific objective for each candidate. The Master of Science degree requires the completion of approximately 30 semester credit hours beyond the bachelor's degree including a research thesis of six semester credit hours. Students from disciplines other than general engineering will be required to follow study plans designed to produce the breadth expected of a general engineer, and will require 32 semester credit hours if no thesis is pursued.

The Doctor of Philosophy degree in general engineering requires the completion of not fewer than 90 semester credit hours beyond the bachelor's degree, including credit for a research dissertation. In the plan of study, the mathematics and technical engineering courses are directed toward and support the proposed area of research. Emphasis may be placed on two or more areas of concentration which support the research and dissertation. The ideal plan of study should generally include: 12-18 credit hours of mathematics above the bachelor's degree or bachelor's certification, six credit hours of humanities, and 18-24 credit hours of research. The semester credit hours remaining to complete the plan of study should be selected to satisfy all requirements of the Graduate College, and to supplement the student's academic background. The overall plan of study is subject to the approval of the advisory committee.



Industrial Engineering and Management

Professor and Head Carl B. Estes, Ph.D., P.E.

Industrial engineering is one of the five major engineering disciplines and is concerned with designing, analyzing and operating a wide range of systems that include people, materials, money and equipment. Industrial engineering is the only engineering discipline which is specifically concerned with the role of the human being in the processes by which goods and services are produced and as such is often called the "people-oriented engineering discipline."

Productivity and effective utilization of resources, including energy and hazardous materials management, are principal concerns of practicing industrial engineers. The industrial engineer may follow a career in almost any type of enterprise; manufacturing companies, service organizations such as insurance companies, banks and hospitals, and government agencies, including city, state and federal government functions. The industrial engineer's position in an organization is usually as a management adviser in contact with every phase of the organization. Because of the breadth of his or her background, the industrial engineer is especially well qualified to rise to positions of leadership and authority within the organization.

The curriculum blends a basic group of common engineering science courses with specialized courses in the major areas of industrial engineering—design of human/machine systems, design of management control systems and improvement of operations (both manufacturing and service). The course offerings stress mathematical and statistical techniques of industrial systems analysis, quantitative methodologies of operations research, computers as a tool for problem solving and simulation, economic considerations of alternatives, control of product or service quality and quantity, specifications of the manufacturing process including equipment and tooling, planning, scheduling and control of work flow, and behavioral sciences in the organization and management of human endeavor.

Prospective students are encouraged to write directly to the School of Industrial Engineering and Management for career guidance information.

Graduate Programs

The School of Industrial Engineering and Management offers graduate programs leading to the Master of Industrial Engineering and Management degree, the Master of Science degree, and the Doctor of Philosophy degree. The School is also one of the joint sponsors of the Master of Manufacturing Systems Engineering degree.

The Master of Industrial Engineering and Management degree is a graduate professional degree with increased emphasis on professional practice, incorporating an engineering design experience during the final year of study.

The Master of Science degree is characterized by a higher degree of technical specialization in a particular field of study. This degree program is designed to prepare men and women for technical positions such as research and consulting, as well as professional practice, in various kinds of organizations.

The Master of Science degree and the Master of Industrial Engineering and Management degree are intended to be especially attractive to all engineering graduates, including non-industrial engineers, and to many science majors. The two degree programs include a strong, technical component and an orientation to business and management which is complementary to other technical backgrounds.

The Doctor of Philosophy degree is designed to carry the student to the leading edge of knowledge in the profession of industrial engineering and management. It is intended to prepare men and women for highly specialized positions, such as research and consulting in industry, government and service organizations, and for teaching and research positions in colleges and universities.

The Master of Manufacturing Systems Engineering degree emphasizes a broad exposure to manufacturing from the perspective of the industrial, electrical and mechanical engineering disciplines. Students select courses from all three engineering disciplines. The program is oriented toward engineering practice in integrated manufacturing systems. Structured as a terminal degree, it prepares individuals with knowledge of all aspects of manufacturing systems, including management as well as hardware aspects of manufacturing.

The basic consideration in graduate education in industrial engineering and management at this institution is the most effective and efficient utilization of human, physical, and economic resources. Instruction in management embraces both qualitative and quantitative concepts, including analytical methodologies and social considerations pertinent to organizations of many kinds.

Staff and facilities are available for the study and practice of several phases of industrial engineering. Advanced degree programs may be arranged with major emphasis in fields of interest such as industrial management, management systems analysis and design, operations research, production control, quality assurance, economic analysis, methods engineering, energy management and other qualitative and quantitative facets. Students may complement industrial engineering and management courses with work in several other branches of engineering, as well as economics, business administration, computer science, statistics, mathematics, psychology, and sociology.

Admission Requirements. Graduation from an accredited engineering curriculum with scholastic performance distinctly above average qualifies the student for admission to the Master of Science or Doctor of Philosophy degree programs. Applicants not meeting these criteria should submit transcripts to the head of the School of Industrial Engineering and Management for evaluation.

Admission to the Master of Industrial Engineering and Management degree program is permitted for students who meet the minimum prerequisites as stated in "Master of Engineering." A student may enter the program at a point for which he or she is qualified provided the minimum admissions criteria are met and the student is accepted by the School of Industrial Engineering and Management.

Degree Requirements. The Master of Industrial Engineering and Management degree requires the completion of approximately three years of study beyond the pre-engineering requirements, for a total of 157 semester credit hours, including the internship or professional practice.

The Master of Science degree in industrial engineering and management requires the completion of at least 30 semester credit hours beyond the bachelor's degree, including a research thesis of six semester credit hours. A 32 semester credit hour option is also permitted and must include three to five hours of independent study.

The Doctor of Philosophy degree requires the completion of at least 90 semester credit hours of course work beyond the bachelor's degree or 60 semester credit hours of course work beyond the master's degree, including normally about 20 semester credit hours for a research thesis. In addition, the candidate must complete six semester credit hours of course work in an area such as mathematics, statistics, experimental techniques, or research methodology (as specified by the advisory committee).

The Master of Manufacturing Systems Engineering degree requires the completion of 33 semester credit hours beyond the bachelor's degree and normally includes six credit hours based upon an internship in industry.

Mechanical and Aerospace Engineering

Professor and Head Lawrence L. Hoberock, Ph.D., P.E.

Mechanical engineering is a professional discipline which involves the invention, design, and manufacture of devices, machines and systems that serve the ever-changing needs of modern society.

Mechanical engineering is an exceedingly diverse field which is not identified with or restricted to any particular vehicle, device or system. Mechanical engineers are vitally concerned with all forms of energy production, utilization and conservation. They deal with everything mechanical, whether it is small or large, simple or complex—from power lawn mowers to automobiles, fuel cells to nuclear power plants, gas turbine engines to interplanetary space vehicles, artificial limbs to life support systems, robotic manipulators to complex automatic packaging machines, precision instruments to construction machinery, household appliances to mass transit systems, and heating and air-conditioning systems to off-shore drilling platforms. In virtually every organization where engineers are employed, mechanical engineers are included.

The aerospace option within mechanical engineering is concerned with the science and technology of flight, and the design of air, land and sea vehicles for transportation and exploration. This exciting field has already led man to the moon and continues to lead in the expansion of man's frontiers deeper into space and into the ocean's depths. Because of their unique backgrounds in aerodynamics and lightweight structures, aerospace-oriented mechanical engineers are becoming increasingly involved in solving some of society's most pressing and complex problems—such as high-speed ground transportation and pollution of the environment.

The aerospace option in mechanical engineering is separately accredited as an aerospace group program by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Program criteria developed by the American Institute of Aeronautics and Astronautics as well as by the Society of Mechanical Engineers have been applied in the accreditation process.

The broad background and problem-solving ability of mechanical engineers make them suited to engage in one or more of the following activities: research, development, design, production, operation, management, technical sales, patent law and private consulting. *Versatility* is their trademark. A bachelor's degree in mechanical engineering is also an excellent background for entering other professional schools such as medicine, dentistry, law or business (M.B.A.). A formal premedical option is available for students wishing to follow this avenue of approach to medical school. A petroleum engineering option is also available.

In the professional school, mechanical engineering students extend their study of the engineering sciences and consider applications of fundamental principles and analysis tools to the solution of real technological problems of society. Students make extensive use of modern electronic digital computers in virtually every course in their program. Design courses involve students in the solution of authentic, current and significant engineering problems provided by industrial firms, such as Ford, Fisher Controls, IBM, Whirlpool, Conoco, Phillips, Halliburton, Procter and Gamble, Mobil, Texas Instruments, Magnetic Peripherals, 3M, General Dynamics and Boeing. These industrial firms also are representative of those hundreds of firms that employ mechanical engineers with the aerospace option.

The student designs, with the guidance of an adviser, an individualized program of study consistent with his or her interests and career plans. Some students terminate their studies with a bachelor's degree, while others receive one of several graduate degrees.

Graduate Programs

The School of Mechanical and Aerospace Engineering offers programs leading to the Master of Mechanical Engineering degree, Master of Science degree, and the Doctor of Philosophy degree.

The Master of Science degree and the Doctor of Philosophy degree prepare the graduate for research/development positions in industry and government, or for the teaching profession in engineering. These degrees are distinguished by the incorporation of a research component.

The Master of Mechanical Engineering degree prepares the graduate for engineering practice and is distinguished by its incorporation of an off-campus internship in industry to give the student engineering design experience before graduation.

Students may select course work and participate in research or design projects in the following areas: fluid mechanics and aerodynamics, thermal and environmental sciences, engineering acoustics and vibrations, mechanisms and systems design, energy conversion and utilization, solid mechanics and materials behavior, system dynamics and automatic control, fluid control systems, and biomechanics. Students are encouraged to take courses in mathematics and science and in other fields of engineering which fit into their programs.

Admission Requirements. Admission to the Graduate College is required of all students pursuing the M.Mech.E., M.S., or Ph.D. degree. Graduation from a mechanical or aerospace engineering curriculum accredited by the Accreditation Board for Engineering and Technology, with scholastic performance distinctly above average, qualifies the student for admission to the School of Mechanical and Aerospace Engineering as a candidate for the M.S. and Ph.D. degrees. Graduates from disciplines other than mechanical or aerospace engineering may be admitted if an evaluation of their transcripts by the School of Mechanical and Aerospace Engineering indicates they are prepared to take graduate-level course work in mechanical engineering, or can be expected to do so after a reasonable amount of prerequisite work.

Admission to the Master of Mechanical Engineering degree program is for students who meet the prerequisites stated under "Master of Engineering." A student may enter the program at any level for which the individual is qualified provided he or she meets the minimum admission criteria and is accepted by the School of Mechanical and Aerospace Engineering.

Degree Requirements. All degree programs follow an approved plan of study designed to satisfy the individual goals of the student, while conforming to the general requirements of the School of Mechanical and Aerospace Engineering and the Graduate College.

The Master of Mechanical Engineering degree requires 24 semester hours of approved graduate-level course work and a prescribed internship. As a result of the internship, a written report acceptable to the faculty must be submitted for completion of the degree requirement.

The Master of Science degree program with the thesis option requires 24 semester credit hours of approved graduate-level course work, and a suitable research thesis of six semester credit hours. The non-thesis option requires 32 semester credit hours of which two to five must be for an acceptable, individually directed creative activity which results in a written and oral report to the faculty.

The Doctor of Philosophy degree requires a minimum of 90 semester credit hours beyond the bachelor's degree, including a dissertation for which no more than 30 semester credit hours may be awarded.

Division of Engineering Technology

Professor and Director James E. Bose, Ph.D., P.E.

Engineering technology education is concerned with the practical application of engineering achievement with emphasis upon the end product rather than the conceptual process. Whereas the development of new methods is the mark of the engineer, effective use of established methods is the mark of the technologist. Often the technologist will be expected to achieve what the engineer conceives.

Engineering technology education is a four-year program which leads to a Bachelor of Science in Engineering Technology. Graduates of the program are known as "technologists" and are trained either to assist engineers or to independently provide the support for engineering activities. The technologist receives an intensive education in his or her technical specialty and great depth in mathematics and technical sciences. The program provides breadth in related technical, communication and socio-humanistic studies. A "master of detail," he or she is capable of independent action in performance of technical activities and is frequently involved as a coordinator, expediter or supervisor of other technical personnel. His or her capability in technical sales and other public-contact positions is enhanced by his or her background in selected liberal studies.

The engineering technology graduate is qualified to select from a broad array of positions. In research and development, he or she may serve as a laboratory technician or engineering assistant in the performance of experiments, evaluation of data, or prototype development. In production, typical positions are engineering aide, process specialist, design technician, technical writer and production supervisor. In the field, he or she will often be identified as a technical representative, technical salesperson, field test technician or technical consultant.

The Bachelor of Science in Engineering Technology program is composed of the following curricular subdivisions:

Mathematics and science—algebra, trigonometry, applied calculus, general physics, and chemistry or other science.

Technical specialty—technical science and related technical courses.

Communication—English composition, and business or technical communication.

Social sciences and humanities—history, government, religion, literature, art, music.

Electives—controlled and general.

High School Preparation and Counseling

At least two semesters of high school algebra and a course in plane geometry are recommended for entering students. One year of high school credit in physics and/or chemistry is desirable.

Those less intrigued with theoretical concepts but who have the interest and aptitude toward applications are likely engineering technology majors. These students particularly appreciate the engagement of technical specialty courses beginning with the first semester and continuing throughout the course of study. The relevance of the technical science and related technical courses adds further satisfaction.

Transfer Students

An important, contemporary educational development is the "two-plus-two" bachelor's program. Those completing an associate degree in technology-oriented curricula at other institutions are generally admissible to the junior year with a minimum loss of academic time. The "two-plus-two" concept provides the attractive feature of two occupational-entry levels—technician or technologist.

Curricula

Bachelor of Science in Engineering Technology Degree Programs

Construction Management
Electronics
Fire Protection and Safety
General
Manufacturing
Mechanical Design
Mechanical Power
Petroleum

The Bachelor of Science in Engineering Technology degree credit hour requirements vary from 126 to 129 credit hours.

Construction Management Technology

Associate Professor and Head Jerrold F. Bradley, M.S., P.E.

The construction industry is the largest industry in the world. Leadership in this field requires a broad knowledge of labor, materials, equipment, capital and construction procedures. The interdisciplinary approach of the construction management program offers the student specialized course work in all phases of construction, designed to prepare him or her for responsible positions in industry.

The modern constructor must have a great deal of technical knowledge to keep abreast with rapidly changing materials and methods of construction. Specialized courses in estimating, surveying, structures, construction planning and scheduling, construction law and insurance, field and office management and construction procedures provide students with the background necessary for today's construction industry. These specialized courses, in addition to a blend of the basic sciences, business, and general studies, produce a well-balanced curriculum for students in construction. Special attention is given to computer application in construction estimating.

Students with an interest in building structures may select courses in the "building" option of construction management which provides him or her with a knowledge in working drawings, mechanical and electrical equipment of buildings, and other course work for a career in building construction.

Students with an interest in civil engineering structures may select courses in the "heavy" option of construction management which provides him or her with a knowledge in highways, soils, foundations and other course work for a career in the heavy and industrial construction industry.

Graduates of construction management have shown the curriculum to be successful in their development as productive members of the construction industry, holding responsible positions as project managers, estimators, material and equipment salespersons, labor management and construction managers.

Electronics and Computer Technology

Associate Professor and Head Thomas G. Bertenshaw, M.S., M.Ed.

The electronics technology curriculum provides preparation for outstanding career opportunities not only in the electronics industry itself but also in many other areas in modern industry which depend upon electronics for control, communications or computation. Many opportunities exist for graduates to work in the areas of digital electronics, microcomputers and main-frame computers.

The work of the electronics graduate may range from assisting in the design and development of new equipment in the laboratory or applying modern microprocessors in the field, to the operation or supervision of production operations, technical writing, customer service and sales.

The program provides the Bachelor of Science degree in Engineering Technology with an electronics major. To meet these diverse needs the program is laboratory-oriented and provides a strong foundation of mathematics and science, specialized course work in electronics technology and related technical areas, and courses in the area of communications and the social studies.

The electronics technology—computer option curriculum provides the preparation for graduates to enter the growing and exciting field of computer hardware and software. The demand for graduates having both computer hardware and software skills is quickly developing as the importance of automation, robotics, and artificial intelligence is recognized. Graduates of this program will be prepared for those opportunities in industry requiring considerable knowledge of both computer hardware and software.

The program provides the Bachelor of Science degrees in Engineering Technology with an electronics major—computer option. To meet the diverse needs that graduates will have, the program provides a strong foundation of mathematics, science, specialized courses in the computer field. Related courses in the humanities and social sciences are included to give the graduate an appreciation of the world in which the graduate will live and work.

Graduates will have the opportunity to work for many different kinds of industrial concerns. Computer manufacturers, as well as companies that are incorporating computers into their product will be interested in employing the graduates. Others may choose to seek employment in computer sales or software development.

Fire Protection and Safety Technology

Associate Professor and Head Harold R. Mace, M.S.

The nuclear/electronic/aerospace revolution, in conjunction with increased ecological awareness, has created an economic and moral responsibility to provide a cadre of trained personnel, knowledgeable in current loss-control and risk management techniques. In response to this challenge, the curriculum is designed to familiarize the student with inherent risks in such areas as fire protection, occupational safety and health, radiation hazards, product liability and industrial security. Courses and laboratories are structured to enable the recognition, evaluation and control of existing and potential hazards threatening losses to life, property or proprietary information.

The curriculum emphasizes industrial fire prevention, occupational health and safety, risk assessment and industrial hygiene.

General Technology

Professor and Head James E. Bose, Ph.D., P.E.

The general technology curriculum is designed to provide a bachelor's degree program that will prepare men and women for employment as engineering technologists in more than one specific area. Normally, there are two groups of students who enroll in this program: those who have an associate degree in one of the traditional technology specialties, but desire more diversification than continuing in the same specialty; and those who have an associate degree from another institution in a technical specialty not offered at Oklahoma State University.

Each student who completes the program must show proficiency in the following areas by completing appropriate courses: technical graphics, machine tool processes, hydraulics, computer programming, electronics, controls, dynamics, supervision and instrumentation.

Manufacturing Technology

Associate Professor and Head Gerald R. McClain, M.S., CMFgT.

The flow of affordable goods and products from producer to consumer is a major cornerstone of the free enterprise system that is enjoyed in the

United States. Essential to this system are the manufacturing industries which comprise that segment of our economic society directly responsible for the conversion of raw materials into usable products. Today these industries face numerous and complex challenges, which if met, offer promising careers to men and women who have interests in manufacturing. These career positions include such areas as tool design, cost evaluation and control, plant operations, product design and development, and manufacturing methods. Emerging career fields include robotics, computer-integrated manufacturing and automatic assembly.

The manufacturing technology option provides educational experiences in the core areas of manufacturing processes, industrial materials, graphic communication and technical science, as well as an opportunity to develop an area of specialization. This option is available only for the bachelor's degree (an associate degree is not available). Manufacturing courses are concentrated in the last two years allowing for efficient transfer from other OSU programs or from other colleges or universities.

Mechanical Design Technology

Associate Professor and Head Gerald R. McClain, M.S., CMFgT.

Mechanical design is an activity necessary for existence of the modern world. All the conveniences of today's world have passed through the designers on their way to being useful products. Mechanical design is applied in robotics, automotive manufacturing, computer-aided drafting and design, computer-aided manufacturing, agricultural machines, petroleum industry, mining, shipbuilding, spacecrafts, electronics manufacturing, food processing, aircraft, metals and plastics production—nearly the entire spectrum of industry. Every industry requires some type of mechanical design, either directly to produce the product or indirectly to produce the tools, equipment and materials used to manufacture the product.

The computer has had an impact on few areas of technology more than mechanical design. The phrase "computer-aided design" or "CAD" means many things from computer drafting or graphics to sophisticated solids modeling and analysis. The mechanical design student is exposed to a range of applications from designing with a computer to manufacturing with a computer. It is the objective of the department that all of its graduates be proficient in using the computer as a problem solving tool both graphically and analytically.



Transfer students with an associate degree in drafting and design may transfer into the program with ease. The junior and senior years provide additional education in design principles, manufacturing processes, computer graphics, and other related areas necessary for more complex aspects of mechanical design. The mechanical design technologist with in-depth analysis and technical knowledge makes a computer-aided drafting and design work station a design tool rather than just a drafting tool. Bachelor of science graduates usually find employment in areas related to new product design and redesign, or manufacturing equipment design.

The curriculum has been carefully constructed to provide a realistic progression from the basic, or elementary principles, to advanced or more sophisticated techniques. The curriculum has two emphases available. The graphics emphasis requires the courses that would best prepare a graduate to work as a mechanical designer, tool designer, or product designer. The broad emphasis requires greater breadth and allows more flexibility to prepare for the broader fields of mechanical technology, such as, test, evaluation, operation, liaison or sales. Companies utilizing the talents of designers are diversified in their products, as well as geographical location, thus providing a variety of choices in respect to both type of work and place of residence. In addition to ABET accreditation, this technology program is certified at the Engineering Designer level by the American Institute for Design and Drafting (AIDD).

Mechanical Power Technology

Professor and Head Marvin D. Smith, Ph.D., P.E.

The mechanical power program in Engineering Technology prepares the graduate for entry into a broad spectrum of the industrial world. It is concerned with the utilization of energy, development and transfer of power, and the measurement and control of fluid and mechanical devices.

This program is designed to introduce the student to the broad spectrum of mechanical devices and skills. It also produces a highly competent technical individual who is capable of immediate employment in diverse industrial, governmental and education institutions. It offers a depth of theoretical knowledge, as well as a breadth in equipment exposure.

A graduate of this program will be thoroughly familiar with the scientific principles and the equipment associated with the generation, transmission and utilization of mechanical power.

Petroleum Technology

Professor and Head Marvin D. Smith, Ph.D., P.E.

The petroleum program in Engineering Technology is primarily concerned with the application of equations and techniques toward effectively drilling for, producing, and processing petroleum fluids. Graduates become involved in predicting recoverable reserves, designing drilling programs, casing designs, selecting completion techniques, designing artificial life systems, and designing lease processing systems and pipelines. They also become involved in well testing, well evaluation, problem well analysis and well treatment.

This program is designed to provide the graduate with both the theoretical and practical knowledge required for employment and advancement in the diverse petroleum industry and related energy industries. Emphasis is placed on the application of equations rather than the derivation of them. Another important aspect is the practical operations and associated equipment required to accomplish the events listed above.

The graduates of this curriculum are prepared in communication skills, computer usage, problem solving techniques and organization. They are capable of independent technical activities and of assuming responsibility for projects.

College of Home Economics

Elaine Jorgenson, Ed.D.,*Interim Dean*
Lynda Harriman, Ph.D., *Associate Dean for Home Economics Cooperative Extension*
Beulah Hirschlein, Ph.D., *Director of Home Economics University Extension*
Diane Jackman, Ph.D., *Director of Student Academic Services and Alumni Programs*



The College of Home Economics is composed of five departments and the School of Hotel and Restaurant Administration. The departments are Clothing, Textiles and Merchandising; Family Relations and Child Development; Food, Nutrition and Institution Administration; Home Economics Education and Community Services; and Housing, Interior Design and Consumer Studies.

Each department prepares graduates to pursue professional careers in home economics in such areas as education, business, extension, research, communications, social welfare, public health, international service and careers in a variety of other agencies, organizations and institutions.

The School of Hotel and Restaurant Administration graduates enter career fields in hotels/motels, diverse food service facilities, transportation, recreation and resort complexes, health care centers, business-related careers and education.

Home economics is the field of knowledge and service focusing on families as they function in various forms. This focus also encompasses special family or household support services and institutions. Home economics integrates knowledge from its own research and other areas such as the physical, biological and social sciences, and the arts, and applies this knowledge to the enrichment of the lives of individuals and families. The College of Home Economics is involved effectively and purposefully in the scientific, cultural, social and economic dynamics of a changing society.

Accreditation

All study programs culminating in a B.S. degree at Oklahoma State University are accredited by the Council for Professional Development, American Home Economics Association.

In addition, specialized agencies have approved or accredited specific programs in the College as follows:

The National Council for Accreditation of Teacher Education (NCATE), the Oklahoma State Department of Education, and the Oklahoma State Department of Vocational-Technical Education have accredited all Home Economics Teacher Education certification programs at the bachelor's level: vocational certification, general certification and occupational certification.

The Foundation for Interior Design Education Research (FIDER) has accredited the undergraduate interior design program.

The National Council for Accreditation of Teacher Education (NCATE) and the Oklahoma State Department of Education have accredited the nursery-grade 2 teacher certification program in family relations and child development at the bachelor's level.

The American Dietetic Association has approved the Plan IV dietetics program at the B.S. level.

High School Preparation

Good preparation in high school is important to success in college. Course work in the following areas will provide a good foundation for college courses: English, history, mathematics, science, computer science, economics, foreign language, geography, government, psychology, sociology, and speech.

Scholarships

A number of scholarships are awarded each year to students enrolled in the College of Home Economics. These scholarships are provided by alumni and friends of the College and vary in dollar value and selection criteria. Students make application for the scholarships in January, and the scholarships are given for the following school year—fall and spring semesters.

Off-campus Programs

In addition to courses offered on the Stillwater campus, the College of Home Economics offers course work at the University Center at Tulsa, at various locations in the state through the Educational Television System, and through University Extension programs offered throughout Oklahoma.

Academic Advising

Faculty members provide guidance and counseling as an integral part of the total program. The faculty-student guidance system helps maintain close interrelationships, thus providing an atmosphere conducive to goal accomplishment. All students with fewer than 28 credit hours are advised by the director of Student Academic Services. Upon successful completion of 28 credit hours the student is assigned to a faculty adviser in the major department.

Academic Programs

Undergraduate Program. The curricula for the B.S. in Home Economics are organized to include courses which contribute to a liberal education, common requirements in home economics, and professional requirements, which vary according to the area of specialization chosen by the student. The B.S. in Hotel and Restaurant Administration includes courses which contribute to a liberal education and professional requirements, which vary according to the option chosen by the student.

General Education requirements as specified by the University are met in each student's plan of study. Courses in the natural and social sciences, the humanities and the arts are included in the general education requirements. Courses in home economics are included for professional preparation and are consistent with the expectations of the professional and personal goals of the student.

A minor may be pursued in each of the departments within the College, in the School of Hotel and Restaurant Administration, and in general home economics. More details about specific requirements may be obtained from the respective departments.

Graduate Programs. Graduate study is available in all departments of the College of Home Economics.

The *Master of Science* degree is offered in the following fields: clothing, textiles and merchandising; family relations and child development; food, nutrition and institution administration; home economics education and community services; and housing, interior design and consumer studies.

The *Doctor of Education* degree is offered in the Department of Home Economics Education and Community Services. Students may have an area of emphasis in another field within the College of Home Economics.

The *Doctor of Philosophy* degree is an interdisciplinary degree program available through any of the departments in the College of Home Economics. Individualized programs lead to an area of specialization in any one of the departments and complementary strengths.

The *Doctor of Philosophy* degree in environmental science is an interdisciplinary degree program available through any of the departments in the College of Home Economics in cooperation with the environmental science program.

The *Doctor of Philosophy* degree in food science is an interdisciplinary program available through the Department of Food, Nutrition and Institution Administration as one of the participating departments.

Departmental Clubs and Honor Societies

Clothing, Textiles and Merchandising Club
Club Managers Association of America
College of Home Economics Alumni Association
Dean's Speakers Bureau
Family Relations and Child Development Club
Food, Nutrition and Institution Administration Club
Graduate Student Home Economics Association
Home Economics Education and Community Service Club
Home Economics Freshman Council
Home Economics Student Council
Hotel and Restaurant Society Club
Oklahoma Council on Consumer Interest Club
Omicron Nu (scholarship and leadership honor society)
Phi Upsilon Omicron (scholarship and leadership honor society)
Student American Society of Interior Design Club
Student Home Economics Association (SHEA)

Clothing, Textiles and Merchandising

Professor and Head Grovalynn Sisler, Ed.D.

The Department of Clothing, Textiles and Merchandising focuses on the interaction of people and the near environment through the utilization of clothing and textile products. Objectives of the Department are to assist students to:

1. better understand others through recognition of the importance of clothing and textiles as used by various cultural groups;
2. become aware of the economic structure in the United States and its relationship to consumer behavior in the area of clothing and textiles;
3. appreciate the value of preservation and study of historic costumes and textiles; and
4. become qualified for gainful employment in education and in areas of business and industry related to clothing and textiles.

Two undergraduate options are available: apparel design, and apparel merchandising. A minor is also available in the Department; information on requirements may be obtained from the department head.

Apparel design is for the student who is interested in a career in the apparel and textile design fields, in cooperative extension, in consumer services or in government. It focuses on developing creative ability, a knowledge of textiles and the consumer, and an understanding of the mass production of apparel. It provides an essential background for those who conduct, interpret, and use research involving fibers, fabrics or finishes for the consumer.

Apparel merchandising is for the student who is interested in buying, selling, promoting or coordinating fashion goods. Successful apparel merchandisers understand fashion, are productivity oriented and work well with people. Specialized course work and student work experience focus on developing competencies associated with major retail merchandising functions.

Students majoring in clothing, textiles and merchandising are employed by retail stores, advertising agencies, fabric, pattern or notion companies, apparel and textile manufacturers, and educational institutions.

Various combinations are available for students with interests in a specialized area. A clothing, textiles and merchandising major combined with specific home economics education requirements qualifies the student to teach in high school. Minors may be selected in areas such as communications or marketing, or in another department in the College of Home Economics.

Graduate Programs

The Department of Clothing, Textiles and Merchandising offers work leading to the degrees of Master of Science and Doctor of Philosophy in home economics. Graduate study and research may focus on apparel and textile marketing, functional design of clothing, computer applications and curriculum development in clothing, textiles and merchandising.

The Master of Science Degree. The Master of Science degree is designed to prepare individuals for careers in secondary, post-secondary and college teaching; extension; consumer education; and merchandising or promotion in business and industry. It is a comprehensive yet flexible program built around the academic background, experience, needs, special interests and professional goals of the student.

Students applying for the program must have a prerequisite of 30 semester credit hours in home economics or closely-related subject matter. A student with background deficiencies must remove such deficiencies before completing the master's degree.

The master's degree requires a minimum of 30 semester credit hours including six hours of thesis. The selection and organization of courses is made in consultation with the head of the Department and a departmental graduate committee. At least 21 semester credit hours must be completed in courses numbered 5000 or above. A minimum of 18 credit hours is required in the area of clothing, textiles and merchandising. Supporting courses may be taken in another area of home economics or in a related discipline.

The Doctor of Philosophy Degree. The Ph.D. prepares individuals for research positions in universities, business and industry, for university teaching and for administrative or management level positions. Admission to the program is based upon evidence that the applicant meets general requirements of the Graduate College, has demonstrated superior achievement, and can successfully complete a doctoral program. The student will be expected to have a master's degree or equivalent in clothing, textiles and merchandising or in a closely-related area from a college or university of recognized standing. A student may be required to demonstrate competence in clothing, textiles and merchandising and in related areas, and further course work may be required before admission will be granted.

The plan of study is individually planned by the student in cooperation with an advisory committee. Each plan of study will be an integrated combination of courses and research providing for specialization within the area of clothing, textiles and merchandising including synthesis of knowledge drawn from departments within and outside of home economics.

Emphasis is on attainment of competence rather than on the completion of specific numbers of credits or of course work and research. However, a minimum of 60 hours beyond the master's degree will be required. Each student will develop competence in the area of specialization, in research, in dealing effectively with the reciprocal relations between families and one or more aspects of their environments, and in exerting leadership in one or more professional roles. (See "Doctor of Philosophy" in the "Graduate College" section.)

Family Relations and Child Development

Professor and Head James Moran III, Ph.D.

Courses in family relations and child development assist students in developing attitudes and skills which are fundamental to satisfying relationships in the home and community and in preparing for people-oriented and service-oriented professions.

The Department has three major goals:

1. to offer professional preparation for graduate and undergraduate students in fields related to human development, early childhood education, family relations, and gerontology;
2. to improve the opportunities for all university students to enjoy wholesome and satisfying personal and family lives through an improved understanding of concepts of human growth and relationships;
3. to contribute to available knowledge of child and family development through basic and applied research with the family viewed as the basic human relationship.

Six options are available, all of which stress integration of theory and research with practice.

1. Early Childhood Education—Certification. The certification option provides professional preparation for individuals to teach in public school programs for four-year-olds and kindergarten public school through second grade. The program provides a combination of theory, cur-



riculum and experiential learning that meets and exceeds state requirements.

2. Early Childhood Education—Noncertification. The noncertification option prepares individuals to work as child care professionals in day care, nursery school, Head Start, Child Development Associate Training, religious education, and private programs. The program provides training in early childhood education without meeting all requirements for teacher certification.
3. Family Services. The family services option focuses on the development of individuals and families with special emphasis on family dynamics. Specifically, the goal is to offer students preprofessional preparation for future employment in social and community service agencies through training in interrelationship skills.
4. Child Development. Students in child development develop and demonstrate knowledge and understanding of children from birth through adolescence. The program integrates theory, knowledge and experiential learning with children. The option provides perspective and specialized knowledge to deepen the student's understanding of children. Graduates fill positions as hospital child life specialists, child care licensing workers, or administrators in agencies serving children.
5. Gerontology. The interdisciplinary geronotology option focuses on the biological, psychological and social development of older adults. Students develop a knowledge base about the special concerns, problems, and needs of the elderly and their families and the related programs and services. Students in gerontology will be prepared to work with aging populations in a wide variety of programs and environments.
6. Youth and Adult Development. This option focuses on developmental concerns from adolescence through the later adult life stages. Emphasis is placed on the interrelationships of relevant aspects of a person's life (e.g., biological, family, employment). Students obtain skills to work in a variety of social and community agencies.

All six options may be strengthened and expanded with appropriate courses to prepare a student for graduate study. The B.S. degree requires a minimum of 124 semester credit hours. A minor is also available in the Department; information on requirements may be obtained from the department head. The National Council for Accreditation of Teacher Education (NCATE) and the Oklahoma State Department of Education have accredited the B.S. program leading to nursery-second grade teacher certification.

Students completing degrees in this area, according to programs of study, follow careers in teaching children under six, public school teaching and social work in state and county human and community service agencies. Graduate study prepares the individual for teaching in colleges and universities, extension service, research, and supervisory positions and specialist positions in human and community service agencies.

Graduate Programs

The Department of Family Relations and Child Development offers work leading to the Master of Science degree and the Doctor of Philosophy in home economics—family relations and child development. In addition, students may obtain the Doctor of Education degree through the Department of Home Economics Education and Community Services with specialization in family relations and child development.

The Master of Science Degree. The Master of Science degree in family relations and child development provides professional education for individuals who wish to prepare for people-oriented careers in programs such as public school kindergartens, early childhood development centers, child guidance centers, family and community programs, and extension programs. Masters degree plans in FRCD are flexible and individually designed with a research and theory base to develop academic competence specific to the personal career goals of each student. Students are encouraged to take some courses outside of the department and college. Five plans are available.

1. Family Relations. The family relations plan provides students with research and theoretical foundations in addition to the practical skills necessary to work in a variety of family-oriented careers. Specifically, the program offers professional training for job placement in social and community agencies; a broad-based exposure to the relationships between families and work, school, community and other human environments; and, a background in current research for students who wish to pursue doctoral work.
2. Gerontology. The gerontology plan is an interdisciplinary specialty that combines family relations and human development within FRCD with course work available from several other departments at Oklahoma State University. The objectives of this specialty are to train students in research, education and program development with older adults. Theoretical and research efforts on the aging process combined with exposure to the delivery of services provides a balanced degree plan for both practitioners and researchers.
3. Child Development. The child development plan develops competencies related to understanding children and their behavior in a variety of environments. Career settings include colleges and universities, child guidance centers, extension programs and hospitals. The program balances academic knowledge from current research and theory in child development with experiences in working with children in laboratory and classroom environments. Students may pursue doctoral studies in child development.
4. Marriage and Family Therapy. The marriage and family therapy plan is jointly administered by the departments of Family Relations and Child Development and Applied Behavioral Studies. This option provides students with basic knowledge, skills and a professional identity essential for entry level practice of marital and family therapy. This plan has restrictive admission guidelines and a curriculum designed to meet the rigorous national guidelines set by the American Association for Marital and Family Therapy (AAMFT). The curriculum includes course work in individual development, marital and family systems, marital and family therapy, professionalism and ethics, research and statistics and supervised practicum. Graduates practice in controlled settings and under supervision with methods for determining how couple and family problems develop and can be resolved.
5. Early Childhood Education. The early childhood education plan provides professional career development for teachers and administrators of public and private schools and day care centers. The program offers specialization in early childhood education program supervision and administration; course work that may lead to partial fulfillment of requirements for state certification; and, a balance of theoretical base and research experience. Students selecting early childhood education as their area of emphasis may work toward licensure/certification in early childhood education as part of their master's program. Students holding a Standard Elementary Certificate may, with 17-18 specific credit hours in early childhood education, meet requirements for a Standard Certificate in early childhood education. Students who hold standard certification in early childhood education may work toward certification in related areas, e.g., elementary education or special education.

Admission Requirements. Admission to the graduate program is selective and based on a variety of criteria including grade-point average, Graduate Record Examination (GRE) scores, letters of recommendations, and student goals. Students need not have majored in family relations and child development as undergraduates but must have 12 upper-division semester credit hours in home economics, human development, family studies or closely related areas. Students not meeting these criteria will be required to complete prerequisite undergraduate courses in order to be considered for admission.

Degree Requirements. A minimum of 30 credit hours is required for the master's degree. A minimum of 18 credit hours from the areas of family studies, child development, and early childhood education is required. A minimum of 21 credit hours in courses numbered 5000 or above is also required. Supporting courses may be taken in any of the departments of the College of Home Economics or in psychology, sociology, education or other related areas with permission of the student's advisory committee. Specific guidelines for developing the plan of study for thesis and non-thesis options (30-hour minimum) are available from the Department.

The Doctor of Philosophy Degree. The Doctor of Philosophy degree is awarded in home economics with specialization in family relations and child development. The program offers an interdisciplinary combination of courses and research experiences. Courses from other departments in the College of Home Economics and other colleges at Oklahoma State University are selected to provide a flexible yet rigorous program.

The interdisciplinary Ph.D. program trains competent researchers and educators who will make contributions to the scientific literature in child and family sciences. Students establish competencies in: (1) an area of specialization within family relations or gerontology or child development; (2) research design and implementation including computer analysis and theory development; (3) interdisciplinary work to synthesize knowledge from a variety of academic specialties; and (4) personal leadership within a specific area of specialization.

Admission Requirements. Admission to the program is selective and is based on evidence that the applicant meets the general requirements of the Graduate College, has demonstrated superior achievement, and can successfully complete a doctoral program. The student will be expected to have a master's degree or equivalent in family relations or child development or in a closely related area. The degree must be from a college or university of recognized standing. A student may be required to demonstrate competence in major or related subject matter areas. Examinations or further course work may be required for admission to the program. Recommendations regarding admission will be made by an interdepartmental doctoral admission committee. Admission is based on a variety of criteria including grade-point average, Graduate Record Examination (GRE) scores, letters of recommendations, student goals, samples of writing, and critiques of research.

Degree Requirements. All degree programs follow an approved plan of study which must be submitted at the designated time. The plan of study is individually planned by the student in cooperation with an advisory committee. Each plan of study will be an integrated combination of courses and research providing for a specialization within the area of family/child studies and synthesis of knowledge from related areas within and outside home economics.

Emphasis is on the attainment of competencies; however, a minimum of 60 semester credit hours beyond the master's degree will be required, including not more than 20 semester credit hours for a research thesis. In addition, course work will be required that will facilitate the student's research effort, provide an area of specialization in family/child studies, and focus on competencies dealing with reciprocal relations between families and one or more aspects of their natural and human-built environments.

The Doctor of Education Degree. The Doctor of Education degree is primarily for those who wish to pursue careers related to education and the program focuses on the preparation of administrators and teachers.

For admission and degree requirements refer to the appropriate section in "Home Economics Education and Community Services" in the *Catalog.* The area of specialization in this degree may be in family relations and child development and the dissertation research may be under the direction of an adviser in the Department of Family Relations and Child Development.



Food, Nutrition and Institution Administration

Professor and Interim Head Lea Ebro, Ph.D.

Nutrition and dietetics are dynamic and diverse professions which integrate physical and biological sciences, behavioral and social sciences, nutrition, food science, food service management, communication skills, data processing and evaluation. Depending on the student's area of interest and career goals, courses in human resources, management, marketing, finance, industrial engineering or journalism may be advised.

Nutrition professionals work in a wide range of settings, in both the public and private sector and assume an array of challenging responsibilities.

Two options are offered: dietetics and human nutrition. The dietetics option meets the Plan IV academic requirements and is approved by the American Dietetic Association. With appropriate electives, minors may be obtained in hotel and restaurant administration or business administration. The human nutrition option is ideal for students desiring greater depth in the physiological and biochemical sciences in preparation for medical school, graduate study and research in human nutrition. The B.S. degree requires a minimum of 128 semester credit hours.

Career opportunities for a graduate with a bachelor's degree include: health care dietitian and administrator, nutrition or food science researcher, fitness/wellness consultant, food service design consultant, dietary products or equipment representative, public health nutritionist, entrepreneur in dietetic programs and services, and corporate dietitian/nutritionist.

Some of the specialized careers and college teaching require additional course work or advanced degrees. When students successfully complete the academic and experience components (dietetic internship or preprofessional practice program (AP4), they are eligible to write the Registration Examination for Dietitians which is administered in April and October each year. The individual who is successful on the exam is a registered dietitian and entitled to use the initials "R.D." to signify professional competence.

ADA approval for the Preprofessional Practice Program (AP4) is pending. The AP4 program includes graduate enrollment and preprofessional practice in Oklahoma City or Tulsa medical centers and government agencies.

Graduate Programs

Programs of study leading to the Master of Science and the Doctor of Philosophy degrees are offered. Graduates are prepared for teaching, research or management positions in nutrition, food service administration and dietetics. Such positions are available in universities, hospitals, federal and state agency programs, school food services, management contract firms, and in institutional food services such as in university residence halls and in-plant feeding. All candidates are encouraged to enhance their major with other professional home economics subjects, general professional education and related fields.

The Master of Science Degree. To be admitted to the master's degree program, students are expected to have undergraduate preparation comparable to the undergraduate major in the department. This means a minimum of 30 semester credit hours in departmental and home economics courses closely related to the major. Evidence of academic ability (approximately a 3.00 grade-point average in undergraduate work) and English proficiency is required. The Graduate Record Examination is recommended but not required. The master's degree requires a minimum of 30 semester credit hours with six semester credit hours for research and thesis. Each student prepares a thesis which is defended in a final oral examination.

The plan of study is individually planned with an adviser who is designated after entry into the program. An advisory committee gives final approval of the plan.

The Doctor of Philosophy Degree. The Ph.D. degree is an interdisciplinary degree program. To be admitted, applicants will be expected to provide evidence of academic ability and preparation, and will be reviewed by an interdepartmental doctoral admission committee. An emphasis in human nutrition or in food systems administration and management or in food science is available depending on the student's interests and qualifications. To acquire the competencies required, the candidate will need to study in the areas of research, nutrition, food service management, education and selected areas within the College of Home Economics and in other departments outside the College. (See also "Home Economics—Doctor of Philosophy.")

Home Economics

Professor and Interim Dean of Home Economics, Elaine Jorgenson, Ed.D.

Graduate Programs

The Doctor of Philosophy Degree. The Ph.D. is an interdisciplinary degree program in the College of Home Economics with students located in any of the following departments: Clothing, Textiles and Merchandising; Family Relations and Child Development; Food, Nutrition and Institution Administration; Home Economics Education and Community Services; and Housing, Interior Design and Consumer Studies. (For additional information, see departmental descriptions.) Graduates are prepared for leadership positions involving research, education, or administration in universities, government agencies, hospitals, military service, business, industry, and other people-oriented programs at the international, national, regional, and state levels.

Admission to the program is based upon evidence that the applicant meets general requirements of the Graduate College and has demonstrated superior scholarly achievement and professional success. The student is expected to have a master's degree or equivalent in the chosen or a closely related area from a college or university of recognized standing. A student may be required to demonstrate competence in the chosen and related areas, and further course work may be required before admission will be granted.

Recommendations to the dean of the Graduate College regarding admission will be made by an interdepartmental doctoral admission committee.

Plan of Study. The plan of study is individually planned by the student in cooperation with an advisory committee. Each plan of study will be an integrated combination of courses and research providing for specialization within a chosen area including synthesis of knowledge drawn from departments within and outside of home economics.

Emphasis is on attainment of competencies rather than on the completion of specific numbers of credit hours of course work and research. However, a minimum of 60 semester credit hours beyond the master's degree will be required. Judgment of the plan that will lead to the expected competencies and of the extent to which these have been developed will be the responsibility of the student's advisory committee.

Each student will develop competence in an area of specialization, in research, in dealing effectively with the reciprocal relations between families and one or more aspects of their environments, and in exerting leadership in one or more professional roles.

Home Economics Education and Community Services

Associate Professor and Interim Head Margaret Callsen, Ph.D.

Four options are available in the Department: (1) vocational certification and extension, (2) general certification and extension, (3) occupational certification, (4) communications, community services and extension.

The undergraduate curriculum prepares men and women for professional positions in (1) community services, (2) secondary and adult education, (3) home economics communications (journalism, radio and television), (4) extension and (5) business. Programs meet the approval of the State Board of Education, state and federal offices of vocational and technical education and the Cooperative Extension Service of the University.

Study for the bachelor's degree programs includes courses in three major areas—general education, professional education and specialization in areas of home economics. All students entering the Department should request an information sheet identifying required grade-point averages and other specific regulations for graduation.

The Bachelor of Science in Home Economics, Master of Science, Doctor of Education, and Doctor of Philosophy degrees are offered in the Department. The Ph.D. degree provides for specialization in home economics education and community services.

A minor in the Department is available for students who would like some background in teaching adults or youth in informal settings. Information concerning requirements for a minor may be obtained from the department head.

Many job opportunities in business, industry, education and government are available for students majoring in home economics education and community services. Students may also develop double majors with many departments. For example, students may develop double majors in home economics education and community services with journalism and broadcasting. A minor in any of these areas or a combination of more than one area may be taken with a major in any department within the College of Home Economics. (See "College of Arts and Sciences" section of the *Catalog* for information about the School of Journalism and Broadcasting.)

The media positions often filled by home economics communication specialists include writing and editing newsworthy stories and self-help information for the mass media dealing with food, nutrition, fashion, child care, family relations, education, consumer resources, housing, interior design and life styles; production of and participation in radio and television broadcasts; preparation of commercial messages for print and audio-visual media; market analysis and media selection; magazine and book editing; speech writing; and preparation of brochures and other promotional literature, product information and stockholder reports.

Students interested in any area of communications should confer early with appropriate faculty advisers in both the College of Home Economics and the School of Journalism and Broadcasting.

Graduate Programs

The Department of Home Economics Education and Community Services offers study for the Master of Science, the Doctor of Education, and the Doctor of Philosophy degrees. This advanced professional education is for those men and women preparing for positions in teacher education, state supervision, cooperative extension, community services, educational consulting, college teaching, and leadership and administrative roles in home economics.

The Master of Science Degree. To be eligible for admission to the Master of Science degree program, applicants must have earned a bachelor's degree with a minimum of 30 semester credit hours in home economics, related areas, or have had work experience in community services.

The Master of Science degree program may be planned with an emphasis in community services, cooperative extension, or teacher education. The master's degree requires a minimum of 30 semester credit hours with a thesis or a minimum of 32 semester credit hours with a creative component.

The Doctor of Education Degree. Students desiring admission to the Doctor of Education degree program will compile a folder for review by the departmental faculty. The plan of study for the Doctor of Education degree is planned by the student in consultation with the major adviser and approved by the student's doctoral committee. Academic background, experience, needs, and professional goals are considered when planning a program of study.

The Doctor of Philosophy Degree. Students desiring admission to the Doctor of Philosophy degree program with a specialization in home eco-



nomics education and community services will compile a folder for review by an interdepartmental doctoral admissions committee.

Study in this area may involve home economics in higher or secondary education; formal and nonformal education; vocational, adult and continuing education; and educational processes in home economics such as evaluation, curriculum planning and instruction. To acquire the competencies identified for graduates of this program the candidate will need to study in the areas of research, home economics education and community services, and selected areas within home economics and in departments outside of home economics (see "Home Economics—Doctor of Philosophy" for an additional description).

More detailed information on graduate study in the Department of Home Economics Education and Community Services can be obtained by writing the head of the Department.



School of Hotel and Restaurant Administration

Professor and Director G. Baker Bokorney, Ed.D.

The hotel, restaurant and club industry provides a wide range of professional management career possibilities for students genuinely interested in service-oriented industries. Opportunities within the industry for entrepreneurship, professional advancement and growth are unlimited.

Business and industry in hotels, motels, clubs, and restaurants are complex. Their management requires knowledge and skill in many areas for the proper use of a great number of products in a wide variety of processes. The guest or customer must be received in a courteous manner, housed in a well-kept, tastefully decorated space with modern appointments, served appetizing food, properly prepared, skillfully purchased, carefully stored and controlled. Professional management in the hospitality industry encompasses knowledge of a myriad of related and interrelated processes.

Career opportunities include a wide range of specializations in sales, personnel administration, labor relations, public relations and promotion, auditing, front office and general management positions. Positions as regional managers or directors for hotel, motel, restaurant, industrial, and fast food management chains are additional possibilities. Airline catering, food processing, convenience food processing, vending and individual restaurant entrepreneurship are excellent career areas.

To meet the needs of the industry and to provide sound academic training at the undergraduate level, the curriculum emphasizes important areas of learning including professional and general education. The professional area includes courses in accounting, law, finance, communications, insurance, marketing and personnel management. Courses in food preparation, food and beverage purchasing and control, layout and design, interior design, sales and promotion, front office management, tourism, and advanced hotel and restaurant management are also included in the specialized area. General requirements are met through courses in English and the natural and social sciences, humanities, political science, history and government, psychology, economics, speech, chemistry, mathematics and computer application. The B.S. degree in Hotel and Restaurant Administration may be earned by completing a minimum of 124 semester hours and maintaining a 2.30 grade-point average in the major area.

A minor in business administration is built into the curriculum. Information on requirements is available from the school director.

Special facilities for learning experiences include the Union Club and the catering and engineering areas of the Student Union, dining and food facility areas in the residence halls, and local businesses.

Additional courses necessary to meet Plan IV academic requirements of the American Dietetic Association may be elected and remain within the 124 total hours required.

A well-balanced academic high school program is recommended for students interested in hotel or restaurant management as a career. Mathematics, accounting, typing, English, speech and hospitality-related courses are excellent background courses.

Housing, Interior Design and Consumer Studies

Professor and Interim Head Margaret J. Weber, Ph.D.

The undergraduate curriculum in housing, interior design and consumer studies enables the student to major in one of the three areas included in the Department. The degree requires 124 credit hours and leads to the Bachelor of Science degree with an option in housing or consumer studies. The interior design option requires 130 credit hours. A minor is available in the Department in housing and in consumer studies. Information on requirements is available from the department head.

The *housing* option incorporates an interdisciplinary approach to the study of housing in relation to other disciplines such as economics, political science, sociology, psychology, technology and design. At the micro level, housing provides the basic needs of individuals and families for shelter. At the macro level, it includes theoretical elements from a variety of disciplines that affect housing decisions. Possible career opportunities for graduates include placement in government, housing and urban development offices, community planning, financial institutions, building industry operations or housing-related associations.

The *interior design* option encompasses interior spaces within the human environment. Competency includes fundamental design, design analysis, space planning and programming, selection of furnishings including design of all interior spaces, and an understanding of related aspects of environmental design. Technical development includes knowledge of structure with emphasis on interior construction; knowledge of building systems, equipment and components; and ability in communication skills. Career opportunities are found in interior design professional practice, work with architectural firms, historical restoration and preservation, facility management and development, and merchandising. The Foundation for Interior Design Education Research (FIDER) has accredited the undergraduate interior design program.

The *consumer studies* option combines family economics and consumer economics into a single focus on the household as an economic unit. The curriculum includes the study of households as they function in the product, labor and financial markets. Households as consumers of goods and services are the focus of marketing strategies of business. Therefore consumer behavior and marketing strategies are studied from the consumer perspective. As individuals and families interact in the labor market, decisions are made regarding time allocations among labor for a wage, time in household production and leisure time. Human capital accumulation and time use in these alternatives are studied. Interaction in financial markets for stocks, bonds and other investments is studied in personal finance as are budget allocations, risk management, retirement income, and estate planning. The role of government is studied as it interacts in these markets to provide consumer protection, promote employment, generate revenue through taxation, and improve the economic well-being of individuals and families through social programs. The focus of consumer studies is on the economic aspects of household decision-making.



Graduate Programs

The Department of Housing, Interior Design and Consumer Studies offers graduate work leading to the Master of Science and the Doctor of Philosophy degrees. Study and research may be concentrated in the areas of housing, interior design or consumer studies. Specialization at the master's and doctoral levels focuses on internship or research experience directed toward the student's career objectives. Both the Master of Science and Doctor of Philosophy degrees are tailored around professional goals of the candidate, departmental expertise, and College of Home Economics and Graduate College requirements.

The Master of Science Degree. The student may earn the Master of Science degree by majoring in housing, interior design, and/or consumer studies and completing a minimum of 30 semester credit hours including a course in research methods and six credit hours for a thesis, or a minimum of 32 semester credit hours including a course in research methods and a creative component. The student's record and experiences serve as criteria for the selection and organization of courses. Selections are made by the student in consultation with the head of the Department and members of the departmental graduate faculty. A minimum of 16 semester credit hours in the area of housing, interior design, and consumer studies are required. A minimum of 21 semester credit hours should be in courses numbered 5000 or higher. Minor or supporting courses may be selected from other areas of home economics, or from related subject matter areas such as architecture, communications, economics, marketing, finance, psychology, sociology or public policy, with permission of the graduate committee.

The Doctor of Philosophy Degree. Candidates seeking admission to the Doctor of Philosophy degree program in home economics choose a specialization in housing, interior design or consumer studies or a combination of the above options andmust meet requirements of the Graduate College.

A professional file is submitted for review by an interdepartmental admissions committee. The advanced work is complementary to the student's personal and professional goals in the selected concentration area. Plans of study include courses from departments within and outside the College of Home Economics with a strong emphasis on research. Programs are designed around competencies for professional success consistent with the candidates' objectives, rather than a specific number of graduate credit hours. However, a minimum of 90 semester credit hours beyond the bachelor's degree will be required. (See "Home Economics—Doctor of Philosophy" for more information.)

Graduates will be prepared for a variety of professional opportunities in education, government and business including research and program development.

More detailed information on graduate study in the Department of Housing, Interior Design and Consumer Studies may be obtained by writing the head of the Department.

College of Osteopathic Medicine

Clyde B. Jensen, Ph.D., *President*
Jan G. Womack, Ph.D., *Vice President of Administrative Services*
Jack R. Wolfe, D.O., *Dean of Academic Affairs*
Robert C. Ritter, Ph.D., *Associate Dean of Preclinical Education*
Larry D. Cherry, D.O., *Assistant Dean of Clinical Education*
Thomas R. Pickard, D.O., *Interim Assistant Dean of Postdoctoral Education*
Richard A. Wansley, Ph.D., *Assistant Dean of Research, Sponsored Programs, and Service*
Daniel E. Overack, Ph.D., *Assistant Dean of Students*

The College of Osteopathic Medicine was founded in 1972 in response to a physician shortage in the state. The College opened its doors in 1974 and graduated its first class in 1977. In 1988, the College was merged with Oklahoma State University and continues to prepare students to be primary care physicians with emphasis in rural medicine. The College's campus, a modern, three-building complex, is located on a sixteen-acre site on the west bank of the Arkansas River, just minutes from downtown Tulsa.

Although still addressing the needs of Oklahoma, the College has broadened its service area to include Arkansas, Louisiana, New Mexico, Colorado, Kansas, and southwest Missouri.

In 1981, the College opened a clinical teaching facility a half-mile south of the main campus. The College Clinic, which sees approximately 1,800 patients a month, is both a teaching clinic for medical students and a health care resource for residents of the west Tulsa area. The Clinic provides comprehensive health care and is staffed by licensed osteopathic physicians who supervise students in the care of patients.

Osteopathic Medicine

Promoting a holistic approach to health care, osteopathic physicians treat the entire patient, not just symptoms, and traditionally have excelled in general and family health care. The doctor of osteopathy is a fully-trained physician who prescribes drugs, performs surgery, and selectively utilizes all accepted scientific modalities to maintain and restore health. They are licensed to practice all phases of medicine (including surgery), and offer their patients an added dimension of health care through osteopathic manipulation, a hands-on technique that uses palpation and manipulative procedures of the musculoskeletal system to diagnose illness and treat patients. Osteopathic medicine embraces the philosophy that the human body is a balance of individual components that interact through the musculoskeletal system.

Minimum Admission Requirements

At time of application, the applicant must have an overall grade-point average of at least 3.00 (on a 4.00 scale) and a preprofessional science GPA of at least 2.75.

At the time of entry, the applicant must have completed:

1. At least three years (90 hours) and not less than 75 percent of the courses required for the baccalaureate degree at a regionally-accredited college or university;
2. A full academic year sequence (generally eight to ten hours) with no grade below a "C" (2.00 on 4.00 scale) in each of the following subjects: English, biology, general chemistry, organic chemistry, and physics;
3. The following courses are strongly recommended: biochemistry, comparative anatomy, embryology, microbiology.

Applicants must take the Medical College Admissions Test (MCAT). They are encouraged to take the examination in the spring prior to applying; however, fall scores are acceptable. Applicants taking the MCAT in the spring after application are at a distinct disadvantage because no offer of admission can be made until the College receives test results.

All applicants from Oklahoma and the regional service area (Arkansas, Louisiana, New Mexico, Colorado, Kansas, and southwest Missouri) who have fulfilled these requirements will be invited to an on-campus interview. Select applicants from outside the region will be invited to an interview as well. Applicants must participate in the interview to qualify for further consideration. Interview results and other data submitted will be considered when determining which applicants have demonstrated appropriate levels of scholarship, aptitude, and motivation for admission to the program. Class size is limited to 88 students.

The annual application deadline is March 1.

College Curriculum

Divided into Preclinical and Clinical Education, the curriculum at the College emphasizes general practice. The four-year program uses a coordinated, spiraling systems approach in which subject matter is continuously re-introduced in greater depth and complexity.

The first year of study concentrates on the basic sciences and preliminary clinical concepts. Preparation of the student for early patient contact requires selective background in anatomy, physiology, behavioral science, techniques of physical examination, diagnosis and patient interview, and recognition of normal and abnormal patterns of physical conditions and disease. The next three semesters emphasize the interdisciplinary study of the structure and function of body systems. In addition, students are introduced to specialized clinical care and medical procedures related to each body system.

The final sixteen months of the program are devoted exclusively to clinical rotations, where students work with patients under physician-faculty supervision. The student rotates through basic hospital services, including general medicine, surgery, obstetrics/gynecology, pediatrics, internal medicine, and emergency room, and spends a few weeks at a small rural hospital, major urban hospital, primary care clinic, psychiatric facility, community health facility, office of a private physician, and one elective location.



Students graduate from the four-year program with the Doctor of Osteopathy (D.O.) degree. Following graduation, students are required by state licensing boards to complete at least a one-year rotating internship approved by the American Osteopathic Association. Those who wish to specialize enter a residency program following the internship. Graduates are eligible to be licensed to practice as soon as they complete the internship.

Detailed information on the College of Osteopathic Medicine can be found in the College's academic catalog, available from the College:

College of Osteopathic Medicine of Oklahoma State University
1111 West 17th Street
Tulsa, Oklahoma 74107
(918) 582-1972

Affiliated Institutions

Students gain clinical training beginning in their second year at COM-OSU, working under physician supervision in small community hospitals, with private practitioners, in major hospitals, at the College Clinic, and in Indian Health Service hospitals. To demonstrate the diversity of clinical experience



students receive, listed below are some of the College's affiliated institutions:

Tulsa Regional Medical Center, 533 beds
Dallas Forth Worth Medical Center, 377 beds
Charles Still Hospital (Jefferson City, MO), 184 beds
Riverside Hospital (Wichita, KS), 87 beds
Claremore Health Center, 74 beds
Guymon Memorial Hospital, 53 beds
Tahlequah City Hospital, 51 beds
Hominy City Hospital, 26 beds

Physician Placement

The College maintains close contact with its graduates and can offer assistance in setting up a practice following the graduate's internship and residency training. The physician placement officer helps to assess the physician need in a community, estimates costs of establishing and operating a practice, and matches physicians to communities where both the community and the physician will benefit.

Selection Factors

The College considers applications for admission from all qualified candidates without regard to age, sex, creed, race, or national origin. Strong preference is given to Oklahoma residents and residents from the regional service area of Arkansas, Louisiana, New Mexico, Colorado, Kansas and southwest Missouri. Those who have experienced unequal educational opportunities for social, cultural or racial reasons are particularly urged to apply. Applicants must be U.S. citizens or have obtained permanent resident status to be considered.

Accreditation

The College is accredited by the Oklahoma State Regents for Higher Education and the Bureau of Professional Education of the American Osteopathic Association, the recognized accrediting agency for institutions that educate osteopathic physicians.

Financial Aid

The college employs a full-time financial aid officer who works to ensure that students are not prevented from attending the College because of finances. The primary purpose of the College's aid program is to provide financial assistance to students who would otherwise be unable to afford tuition.

Although the principal responsibility for financing an education remains with the student and his or her family, the College will work to offer campus-based aid to supplement that contribution.

Because the number of applicants and their total requests each year exceed the resources available, a selection process is necessary to see that the most deserving and best qualified students have first claim on available resources. Financial aid options include loans, scholarships, and grants, as well as work/study programs and return service agreements.

A Family Financial Statement and other required applications are available at the College.

Honor and Service Organizations

American College of General Practitioners — Undergraduate Chapter
Atlas Fraternity (social)
Christian Medical Society
Delta Omega (national osteopathic sorority)
Geriatric Medicine Club
Inter-Club Council
Minority Student Organization
Osteopathic Sports Medicine Society
Sigma Sigma Phi (honor society)
Society for the Advancement of Osteopathic Medicine
Student Associate Auxiliary
Student Osteopathic Medical Association
Undergraduate American Academy of Osteopathy

College of Veterinary Medicine

Joseph W. Alexander, D.V.M., M.S., *Dean*
J. Mack Oyler, D.V.M., Ph.D., *Associate Dean of Student Affairs*
Lloyd C. Faulkner, D.V.M., Ph.D., *Associate Dean of Research and Graduate Studies*
Louie G. Stratton, D.V.M., Ph.D., *Assistant Dean of College Outreach*
James E. Breazile, D.V.M., Ph.D., *Director of Laboratory Animal Resources*
Dan E. Goodwin, D.V.M., Ph.D., *Director of Animal Disease Diagnostic Laboratory*

The primary objective of the College of Veterinary Medicine is to educate veterinarians for private practice. However, the professional curriculum provides an excellent basic medical education in addition to training in diagnois, disease prevention, medical treatment, and surgery. Graduates are qualified to pursue careers in many facets of veterinary medicine and health-related professions.

Accreditation

The College has full academic accreditation status approved by the Council on Education of the American Veterinary Medical Association. Accreditation is based on an assessment of ten essential factors, namely, the college's organization, its finances, physical facilities and equipment, clinical resources, library and learning resources, enrollment, admissions, faculty, curriculum, and continuing and post-graduate education.

Preparatory Requirements

Attainment of the degree of Doctor of Veterinary Medicine requires, at a minimum, six academic years of collegiate training. In preparation for the professional training the student must complete both prescribed and elective collegiate courses. The minimum prescribed preparatory studies, totaling 60 semester hours of course work, can be completed in two calendar years. Most of the entering veterinary medical students in recent years have had three years of preparatory training or a bachelor's degree. It is recommended that the student undertake an appropriate regular bachelor's degree program in the sciences, in the course of which he or she will complete the prerequisites for entry into the College of Veterinary Medicine by the end of at least the third year of preparatory training.

Admission Requirements

Collegiate course requirements for entry into veterinary medical college may be completed at any accredited university or college. Special preveterinary curricula are available at Oklahoma State University through the College of Agriculture and the College of Arts and Sciences. Both colleges offer programs of study in pre-veterinary medical sciences which provide for the award of a bachelor's degree after the first or second year of veterinary medical studies to those persons who gain early entry into a veterinary medical college.

Requests for information on pre-veterinary medical study programs and applications for admission to such programs should be addressed to the dean of either the College of Agriculture or the College of Arts and Sciences.

Listed below are the *minimum* course prerequisites for consideration for admission to the College of Veterinary Medicine.

English composition and technical/professional report writing—eight semester credit hours.

Chemistry—17 semester credit hours including five semester credit hours of organic chemistry designed for pre-veterinary, premedical and pre-dental students and must include both the aliphatic and aromatic series of organic compounds. Additionally four semester credit hours of biochemistry (three hours lecture and one hour laboratory) is required.

Physics—eight semester credit hours. Physics courses must include laboratory work and the following topics: mechanics, heat, sound, electricity, magnetism, light and modern physics.

Mathematics—three semester credit hours. Mathematics courses must include the fundamental operations of algebra, exponents and radicals, simple equations, graphs, simultaneous equations, quadratic equations and logarithms.

Biological science—15 semester credit hours. Courses in zoology, botany, microbiology and genetics are required. These courses must include laboratory work. Comprehensive courses in biology will be considered but must be evaluated before credit is accepted.

Humanities and social science—Six semester credit hours.

Scholarships

The College has several scholarships which are available to veterinary medicine students, based on academic achievement and financial need. Special scholarships and awards are available for black students enrolled in veterinary medicine or in the pre-veterinary medicine program.

Veterinary Medical Studies

Entering classes in veterinary medicine are restricted in enrollment and are admitted once yearly at the beginning of the fall term. Applications for admission must be submitted by December 15.

Applicants who are legal residents of Oklahoma will be given first priority. However, up to ten percent of the first-year students may be selected from a pool of nonresident applicants. Questions about residency should be directed to the Office of Admissions, Oklahoma State University. Requests for application materials should be directed to the coordinator, Veterinary Medicine Admissions, College of Veterinary Medicine.

Students are admitted as candidates for the Doctor of Veterinary Medicine degree on the basis of records of academic performance in preparatory studies, standard achievement tests, and personal interviews and references to determine personal characteristics and career motivation.



The veterinary curriculum extends over four calendar years. The first two academic years conform to the normal semester system of the University. The last two academic years are continuous, the fourth starting shortly after the third, and organized into two-week periods, with sectioning of the classes to provide for lower faculty-student ratio and for more efficient utilization of clinical facilities.

Departmental Clubs and Honor Societies

American Veterinary Medical Association, Student Chapter
Society of Phi Zeta, Nu Chapter (academics and research)

Physiological Science

Professor and Interim Head Lloyd C. Faulkner, D.V.M., Ph.D.

Graduate Programs

The Department of Physiological Science offers programs of study leading to the degrees of Master of Science and Doctor of Philosophy in physiological science. The programs are designed to prepare students for teaching and research positions in universities or colleges; research positions in governmental laboratories, foundations or industry and related positions. Areas of concentration offered are anatomy, pharmacology, physiology and toxicology.

Application Procedure. Applications are accepted at any time; however, in order to be considered for assistantships applications for enrollment in the summer session or fall semester should be received by February 15, and applications for enrollment in the spring semester should be received by September 15.

Review and formal acceptance or rejection of applications for admission to the graduate program in physiological science is delegated to the departmental graduate education committee. For admission to the graduate program the candidate must possess a bachelor's degree or higher in a science-related field with course work in mathematics, chemistry and physics.

Criteria for recommending admission are:

1. For candidates whose highest earned degree is the baccalaureate, the sum of verbal and quantitative scores on the Graduate Record Examination will be multiplied by the grade-point average on a four point scale, for the last 60 hours of undergraduate course work. The product score must be 3000 or greater for M.S. degree candidates or 3150 or greater for Ph.D. degree candidates for admission without qualification. Students who fail to meet these criteria may be considered for admission on a provisional basis.
2. For candidates with advanced degrees, medical degrees or degrees earned outside the United States, admission status will be evaluated on an individual basis.

Applicants are encouraged to select a major professor prior to admission to the departmental program. When this is not possible, two temporary advisers will be assigned by the graduate education committee. A permanent adviser should be chosen as soon as possible. When the student's graduate program adviser is determined, the department head in consultation with the adviser and the graduate education committee, will appoint a graduate advisory committee. This committee will consist of not fewer than three graduate faculty members for students pursuing the master's degree. Two of the committee members must be members of the graduate faculty of the Department of Physiological Science. For students pursuing the doctoral degree, a graduate advisory committee of not less than four graduate faculty members, one of whom must be from outside the departmental graduate faculty, will be appointed by the dean of the Graduate College upon recommendation of the graduate education committee. Functions of the advisory committee are described in the "Graduate College" section.

The Master of Science Degree. This degree may be earned in one of two ways: (1) completion of a total of 30 semester credit hours including six credit hours related to a thesis. The thesis must be formally submitted to the Graduate College for partial fulfillment of the requirements for the degree. (2) completion of a total of 32 semester credit hours including two credit hours in research and thesis. A report must be submitted to the Graduate College for partial fulfillment of the requirements for the degree. The student must present his or her thesis or report in a seminar to the Department and pass a final oral examination at that time. The courses forming the student's program are determined by the student's graduate advisory committee in conference with the student.

The Doctor of Philosophy Degree. Students may enter the doctoral program without first acquiring a master's degree. The course requirement for the Ph.D. is 90 semester credit hours including a minimum of 30 credits for research and thesis. The courses required are determined by the graduate advisory committee in conference with the student. The 90 semester credit hours may include all or a part of the work completed for a master's degree. The student must pass written and oral qualifying examinations. A thesis or doctoral dissertation based on original research must be accepted by the graduate advisory committee and submitted to the Graduate College. The student must present his or her dissertation in a seminar to the department and pass a final oral examination at that time.

Minor in Physiological Science. A graduate student working toward a Ph.D. who wishes to declare a minor in physiological science is expected to have a member of the Department on his or her graduate advisory committee, must meet the Graduate College requirements for a minor, and have a minimum of 14 credit hours in physiological science including six credit hours of mammalian physiology (4000 level or higher).

Veterinary Medicine and Surgery

Professor and Head Grant H. Turnwald, B.V.Sc., M.S.

Graduate Programs

The Department offers graduate professional programs (internships and residencies). Internships are one-year post-D.V.M. clinical programs in small or large animal medicine and surgery. Residencies are three-year clinical programs in various disciplines designed in part to prepare for specialty board certification. Graduate academic programs in other departments are offered in association with some residencies.

Application Procedure. Applications are accepted at any time and will be considered as positions become available.

Veterinary Parasitology, Microbiology and Public Health

Professor and Head Robert W. Fulton, D.V.M., Ph.D.

Graduate Programs

The Department of Veterinary Parasitology, Microbiology and Public Health offers a program of research and study leading to the degrees of Master of Science and Doctor of Philosophy with specialization in the areas of veterinary helminthology, protozoology, bacteriology, virology, immunology, epidemiology and public health. The program is designed to prepare individuals for careers in teaching and research, and is flexible to meet the needs of the student within the capabilities of the Department and the University.

Application Procedure. Applications are accepted at any time; however, all documents must be received prior to March 1 for admission to the summer session, July 1 for the fall semester, and November 1 for the spring semester. Applicants are required to submit scores for the Aptitude Test portion of the Graduate Record Examination. (The Advanced Test in Biology is also suggested.) International applicants are required to take the English Proficiency Exam (TOEFL: a passing score is 550 or above), as well as the Test of Spoken English (TSE: a passing score is 220 or above), before they can be considered for graduate teaching assistantships unless they are from a country where English is a first language.

Applicants generally select a major professor before they are admitted to the departmental program. They are urged to correspond with a member of the department's graduate faculty whose interests reflect their own before making application. Information about the faculty's research interests is available upon written request to the Department. After acceptance to the graduate program, the department head recommends an advisory committee to the dean of the Graduate College to develop a plan of study.

Prerequisites. Candidates for admission must possess a bachelor's degree or equivalent, including 30 semester credit hours in biological and physical sciences. Unqualified admission will be granted only to those applicants with combined verbal and quantitative GRE total score multiplied by their GPA (last 60 hours) totaling 3000 or greater. Provisionary status may be awarded to those not having these credentials with specific requirements dependent on recommendations of the departmental graduate faculty.

The Master of Science Degree. The M.S. must be earned by either Plan I, with thesis, 30 credit hours, including not more than six credit hours for the thesis, or Plan II, with report, 32 credit hours, including not more than two credit hours for the report. The plan of study will be tailored to meet the student's needs and interests; however, all students must enroll in Seminar (VPARA 6110) for one credit hour, and must pass three credit hours of biochemistry acceptable for graduate credit, and a course in statistical methods. The student must also pass a final oral examination covering the thesis or report and related course work.

The Doctor of Philosophy Degree. The Ph.D. requires a total of 90 credit hours beyond the B.S. degree. All Ph.D. students must enroll in Seminar (VPARA 6110) for two hours of graduate credit and, if not already complete, must fulfill the requirements for biochemistry and statistical methods detailed above under "Master of Science Degree." A written and oral qualifying examination is required. Students must prepare a research proposal and complete a dissertation based on original research. The final examination is oral and is based primarily on the dissertation problem although not limited to this subject.

Veterinary Pathology

Professor and Head Anthony W. Confer, D.V.M., Ph.D.

Graduate Programs

The Department offers a program of research and study leading to the degrees of Master of Science and Doctor of Philosophy in veterinary pathology. The course work required depends on

the needs and background of the individual student. Most persons who undertake a program will have a professional degree in veterinary medicine. The programs, specializing in either anatomic or clinical pathology, are designed to prepare individuals for careers in teaching, research, and service pathology as required to fulfill the requirements of animal disease diagnostic facilities and industry.

Application Procedure. Applications are accepted at any time. Applicants should submit college transcripts and Graduate Record Examination scores.

Prerequisites. It is highly desirable that candidates for admission possess the Doctor of Veterinary Medicine or equivalent degree. Only in exceptional circumstances will applicants not possessing a medical degree be admitted. Such individuals must possess a bachelor's degree or equivalent and a strong background in biological and medical sciences. Approval for admission can be given only by the department head.

Faculty

COLLEGE OF AGRICULTURE

Agricultural Communications

Associate Professor and Head Kevin G. Hayes, M.A.

(See "Journalism and Broadcasting" in the "College of Arts and Sciences" for staff.)

Agricultural Economics

Professor and Head James E. Osborn, Ph.D.
Regents Professor Gerald A. Doeksen, Ph.D.; Harry P. Mapp, Ph.D; **Professors** Daniel D. Badger, Ph.D.; Raleigh A. Jobes, Ph.D.; Darrel D. Kletke, Ph.D.; James R. Nelson, Ph.D.; Robert L. Oehrtman, Ph.D.; Darryll E. Ray, Ph.D.; Dean F. Schreiner, Ph.D.; Daniel S. Tilley, Ph.D.; James N. Trapp, Ph.D.; Odell L. Walker, Ph.D.; Clement E. Ward, Ph.D.; Joseph E. Williams, Ph.D. **Associate Professors** Kim B. Anderson, Ph.D.; Francis M. Epplin, Ph.D.; Michael L. Hardin, Ph.D.; David M. Henneberry, Ph.D; Ross O. Love, Ph.D.; Raymond J. Schatzer, Ph.D.; Arthur Stoecker, Ph.D.; Michael Woods, Ph.D. **Assistant Professors** Daniel J. Bernardo, Ph.D.; Damona G. Doye, Ph.D.; David W. Park, Ph.D.; David A. Pyles, Ph.D.; Abelardo Rodriguez, Ph.D.; Larry D. Sanders, Ph.D.; Marcia L. Tilley, J.D.; Michael P. Welsh, Ph.D.

Agricultural Education

Professor and Head H. Robert Terry, Ph.D.
Professors James P. Key, Ed.D.; James D. Netherton, Ph.D.; Jack W. Pritchard, Ed.D. **Associate Professors** Eddy Finley, Ed.D.; Kevin Hayes, M.A.; C. Wesley Holley, Ed.D.; James Mosley, Ed.D.; Wallace Smith, M.S.; James D. White, Ed.D. **Assistant Professors** Paul Czarniecki, Ed.D.; Robert F. Reisbeck, Ed.D.; James Rutledge, M.S.; Fritz Wirt, M.A. **Instructor** Charles Cox, M.S.

Agricultural Engineering

Professor and Head David R. Thompson, Ph.D.
Regents Professor C.T. Haan, Ph.D., P.E. **Professors** Gerald H. Brusewitz, Ph.D., P.E.; Bobby L. Clary, Ph.D., P.E.; Glenn A. Kranzler, Ph.D.; A. Pat Lewis, M.S.; Ronald T. Noyes, M.S., P.E.; Charles E. Rice, Ph.D., P.E. (adjunct); Richard W. Whitney, Ph.D., P.E. **Associate Professors** H.Willard Downs, Ph.D.; Ronald L. Elliott, Ph.D., P.E.; Sam L. Harp, M.S., P.E.; Raymond L. Huhnke, Ph.D., P.E.; John B. Solie, Ph.D., P.E.; Marvin S. Stone, Ph.D.; Darrel E. Temple, M.S. (adjunct); Bruce Wilson, Ph.D. **Assistant Professors** Glenn O. Brown, Ph.D.; Thomas A. Esch, Ph.D.; Harry L. Field, Ed.D.; Gregory Hanson, Ph.D. (adjunct); Michael A. Kizer, Ph.D.; Kerry Robinson, M.S. (adjunct)

Agriculture (General)

Professor and Associate Dean Paul D. Hummer, Ph.D.

Agronomy

Professor and Head Charles J. Scifres, Ph.D.
Regents Service Professor Paul W. Santelmann, Ph.D. **Regents Professors** Edward L. Smith, Ph.D.; Robert L. Westerman, Ph.D. **Professors** Donald J. Banks, Ph.D.; John L. Caddel, Ph.D.; Lavoy I. Croy, Ph.D.; Lewis H. Edwards, Ph.D.; David M. Engle, Ph.D.; Howard A.L. Greer, Ph.D.; Gordon V. Johnson, Ph.D.; James S. Kirby, Ph.D.; Frank E. LeGrand, Ph.D.; Julian Q. Lynd, Ph.D.; Wilfres E. McMurphy, Ph.D.; Owen G. Merkle, Ph.D.; Lawrence G. Morrill, Ph.D.; Donald S. Murray, Ph.D.; Jay C. Murray, Ph.D.; David L. Nofziger, Ph.D.; Thomas F. Peeper, Ph.D.; H. Eugene Reeves, Ph.D.; Loren M. Rommann, Ph.D.; James H. Stiegler, Ph.D.; John F. Stone, Ph.D.; Jimmy F. Stritzke, Ph.D.; Charles M. Taliaferro, Ph.D.; Laval M. Verhalen, Ph.D. **Associate Professors** Brian J. Carter, Ph.D.; Brett F. Carver, Ph.D.; R. Jewell Crabtree, Ph.D.; Kevin J. Donnelly, Ph.D.; Robert L. Gillen, Ph.D.; Darold L. Ketring, Ph.D.; Eugene G. Krenzer, Ph.D.; J. Ron Sholar, Ph.D.; Billy B. Webb, Ph.D. **Assistant Professors** Terrence G. Bidwell, Ph.D.; Lowell M. Busman, Ph.D.; Arron C. Guenzi, Ph.D.; Stephen R. Hawkins, Ph.D.

Animal Science

Professor and Head Robert Totusek, Ph.D.
Professor and President John R. Campbell, Ph.D.
Professor, Dean and Director, Division of Agriculture Charles B. Browning, Ph.D.
Professor and Associate Director, Oklahoma Agricultural Experiment Station, Ronald R. Johnson, Ph.D.
Regents Professors Don R. Gill, Ph.D.; Stanley E. Gilliland, Ph.D.; William G. Luce, Ph.D.; Fredric N. Owens, Ph.D.; Donald G. Wagner, Ph.D.; Robert P. Wettemann, Ph.D. **Professors** Joe E. Berry, Ph.D.; David S. Buchanan, Ph.D.; Gerald W. Horn, Ph.D.; Joe H. Hughes, Ph.D.; Johnnie R. Kropp, Ph.D.; Keith Lusby, Ph.D.; Charles V. Maxwell, Ph.D.; Charles A. McPeake, Ph.D.; Curtis W. Richardson, Ph.D.; Jack D. Stout, Ed.D; Robert G. Teeter, Ph.D. **Associate Professors** W. Stephen Damron, Ph.D.; H. Glen Dolezal, Ph.D.; David W. Freeman, Ph.D.; Rodney D. Geisert, Ph.D.; Charles A. Hibberd, Ph.D.; F. Theodore McCollum, Ph.D.; James W. Oltjen, Ph.D.; Fred K. Ray, Ph.D.; Donald R. Topliff, Ph.D. **Assistant Professors** Archie C. Clutter, Ph.D.; Gerald Q. Fitch, Ph.D.; Larry W. Hand, Ph.D.; Brian Kirkpatrick, Ph.D.; Thomas G. Rehberger, Ph.D.; Glenn E. Selk, Ph.D.; Leon Spicer, Ph.D.; William B. Tucker, Ph.D.; Lawrence Yates, Ph.D. **Instructors** Glenden D. Adams, M.S.; Jarold E. Callahan, M.S.

Biochemistry

Professor and Head Roger E. Koeppe, Ph.D.
Regents Professor Chang-An Yu, Ph.D. **Professors** Margaret K. Essenberg, Ph.D.; Richard C. Essenberg, Ph.D.; Robert K. Gholson, Ph.D.; Franklin R. Leach, Ph.D.; Ulrich K. Melcher, Ph.D.; Earl D. Mitchell, Ph.D.; Eldon C. Nelson, Ph.D.; George V. Odell, Ph.D.; H. Olin Spivey, Ph.D.; George R. Waller, Ph.D; Linda Yu, Ph.D. **Associate Professor** Andrew J. Mort, Ph.D. **Assistant Research Professors** S. Kay Nida, Ph.D.; Margaret Pierce, Ph.D. **Instructor** Judy A. Hall, M.S.

Entomology

Professor and Interim Head Russell E. Wright Ph.D.
Regents Professors Raymond D. Eikenbary, Ph.D.; John R. Sauer, Ph.D. **Professors** Richard C. Berberet, Ph.D.; Robert L. Burton, Ph.D.; Stanley Coppock, Ph.D.; William A. Drew, Ph.D.; J. Alexander Hair, Ph.D.; S. Dean Kindler, Ph.D.; Pete D. Lingren, Ph.D.; Donald C. Peters, Ph.D.; Kenneth N. Pinkston, Ph.D.; Richard G. Price, Ph.D.; Jerry H. Young, Ph.D.

Associate Professors Robert W. Barker, Ph.D.; Gerrit W. Cuperas, Ph.D.; W. Scott Fargo, Ph.D.; James A. Webster, Ph.D. **Assistant Professors** Bobby D. Cartwright, Ph.D.; Jack W. Dillwith, Ph.D.

Forestry

Associate Professor and Head Edwin L. Miller, Ph.D.
Professors David W. Robinson, Ed.D.; Charles G. Tauer, Ph.D. **Associate Professors** Thomas C. Hennessey, Ph.D.; David K. Lewis, D.Phil.; Robert F. Wittwer, Ph.D. **Assistant Professors** Steven Anderson, Ph.D.; Stephen W. Hallgren, Ph.D.; Thomas B. Lynch, Ph.D. **Instructor** Thomas Kuzmic, M.S.

Horticulture and Landscape Architecture

Professor and Head Dale M. Maronek, Ph.D.
Professors James E. Motes, Ph.D.; Michael W. Smith, Ph.D.; Glenn G. Taylor, Ph.D. **Associate Professors** Brian A. Kahn, Ph.D.; Charles A. Leider, M.C.P.; B. Dean McCraw, Ph.D.; Paul J. Mitchell, M.S. **Assistant Professors** Jeffrey A. Anderson, Ph.D.; Joel F. Barber, Ph.D.; James C. Gallott, Ph.D.; Harold L. Gibbs, M.L.A.; J. Parks Hammond, M.L.A.; Janet C. Henderson, Ph.D.; Michael P. Kenna, Ph.D.; T. Greg McCollum, Ph.D.; B. Warren Roberts, Ph.D.; R. Keith Streigler, Ph.D. **Instructors** Katherine Crewe, B.L.A.; Mary Ann Schwartz, Ph.D.

Plant Pathology

Professor and Head Larry J. Littlefield, Ph.D.
Professors Kenneth E. Conway, Ph.D.; Francis J. Gough, Ph.D.; Hassan A. Melouk, Ph.D.; Charles C. Russell, Ph.D. **Associate Professors** Jacqueline Fletcher, Ph.D.; Robert M. Hunger, Ph.D.; Robert C. Nutter, Ph.D.; John L. Sherwood, Ph.D.; Larry L. Singleton, Ph.D.; Ervin Williams, Jr., Ph.D. **Assistant Professors** Carol L. Bender, Ph.D.; Alexander B. Filonow, Ph.D.

COLLEGE OF ARTS AND SCIENCES

Art

Professor and Head Richard A. Bivins, M.F.A.
Professor Larry C. Avrett, M.F.A.; **Associate Professors** Dean P. Bloodgood, M.F.A.; Nicholas W. Bormann, M.F.A.; Susan H. Hamlet, M.F.A.; Robert E. Parks, M.F.A.; B. J. Smith, M.F.A.; Nancy B. Wilkinson, Ph.D.; **Assistant Professors** Carey A. Hissey, M.F.A.; David M. Roberts, M.F.A.; Jack D. Titus, M.F.A.

Botany and Microbiology

Botany

Professor and Head Glenn W. Todd, Ph.D.
Professors Becky B. Johnson, Ph.D.; James K. McPherson, Ph.D.; James D. Ownby, Ph.D.; Paul E. Richardson, Ph.D.; Ronald J. Tyrl, Ph.D. **Associate Professors** David A. Francko, Ph.D.; David W. Meinke, Ph.D. **Assistant Professor** Arnon Rikin, Ph.D.

Microbiology

Professor and Head Glenn W. Todd, Ph.D.
Professor Norman N. Durham, Ph.D. **Associate Professors** Mark R. Sanborn, Ph.D.; Helen Vishniac, Ph.D. **Assisant Professors** Kim Burnham, Ph.D.; Mary Grula, Ph.D.; Alan R. Harker, Ph.D.; Moses Vijayakumar, Ph.D.

Chemistry

Professor and Head Neil Purdie, Ph.D.
Regents Professors K. Darrell Berlin, Ph.D.; Lionel M. Raff, Ph.D. **Professors** J. Paul Devlin, Ph.D.; I. Dwaine Eubanks, Ph.D.; Warren T. Ford, Ph.D.; George Gorin, Ph.D.; Elizabeth M. Holt, Ph.D.; Smith L. Holt, Ph.D.; Gilbert J. Mains, Ph.D.; Horacio A. Mottola, Ph.D.; Mark G. Rockley, Ph.D.; Donald L. Thompson, Ph.D. **Associate Professors** Richard A. Bunce, Ph.D.; John I. Gelder, Ph.D. **Assistant Professors** Christopher M. Adams, Ph.D.; Paul W. Geno, Ph.D.; Ziad El Rassi **Instructors** S. Daryl Larson, Ph.D. (adjunct); Mabel R. Stephanic, B.S.

Computing and Information Science

Professor and Head George E. Hedrick, Ph.D.
Professor Rector L. Page, Ph.D. (adjunct) **Associate Professors** John P. Chandler, Ph.D.; Michael J. Folk, Ph.D.; K. M. George, Ph.D.; Leslie Gilliam, M.S. (adjunct); Robert D. Gumm, Ed.D. (adjunct); Stephen Hill, Ph.D. (adjunct); Jacques La France, Ph.D. (adjunct) **Assistant Professors** Huizhu Lu, Ph.D. (visiting); Blayne E. Mayfield, Ph.D.; William D. Miller, Ph.D. (visiting); Mansur H. Samadzadeh, Ph.D.; Lan Yang, Ph.D. (visiting) **Instructors** Judith J. Edgmand, Ed.D.; Terry J. Johnson, M.L.S., M.S. **Lecturer** Farideh Samadzadeh, M.S.

English

Associate Professor and Interim Head Edward P. Walkiewicz, Ph.D.
Professors Mary H. Rohrberger, Ph.D.; Peter C. Rollins, Ph.D.; Thomas L. Warren, Ph.D.; Gordon Weaver, Ph.D.; Samuel H. Woods, Ph.D. **Associate Professors** Richard Batteiger, Ph.D.; Leonard Leff, Ph.D.; Margaret Nelson, Ph.D.; William Pixton, Ph.D.; Ravi Sheorey, Ph.D.; Bruce Southard, Ph.D.; Sherry Southard, Ph.D.; Jeffrey Walker, Ph.D. **Assistant Professors** Nuala Archer, Ph.D.; Joel Athey, Ph.D.; Linda Austin, Ph.D.; Randi Eldevik, Ph.D.; Elizabeth Grubgeld, Ph.D.; Edward Jones, Ph.D.; Linda Leavell, Ph.D.; Carol Moder, Ph.D.; Martin Wallen, Ph.D.; Samuel Whitsitt, Ph.D.

Foreign Languages and Literatures

Professor and Head John A. Schillinger, Ph.D.
Professors Santiago Garcia, Ph.D.; Harry S. Wohlert, Ph.D. **Associate Professors** Cida S. Chase, Ph.D.; Kenneth J. Dollarhide, Ph.D.; John J. Deveny, Jr., Ph.D.; Perry J. Gethner, Ph.D.; Paul Y. Lin, Ph.D.; Juan M. Marcos, Ph.D.; Dorothy Schrader, Ph.D.; James D. Wells, M.A. **Assistant Professors** Paul D. Epstein, Ph.D.; John W. Howland, Ph.D.; David A. Patterson, Ph.D. **Instructors** Dora M. Deveny, M.S.Ed.; Hildegund Wohlert, M.A.

Geography

Professor and Head Richard D. Hecock, Ph.D.
Professors George O. Carney, Ph.D.; Robert E. Norris, Ph.D.; John F. Rooney, Ph.D. **Associate Professors** Jerry D. Croft, Ed.D.; Stephen J. Stadler, Ph.D.; Stephen W. Tweedie, Ph.D. **Assistant Professors** James Curtis, Ph.D.; Louis Seig, Ph.D. **Instructor** M. Richard Hackett, M.A.

School of Geology

Sun Chair and Head Wayne A. Pettyjohn, Ph.D.
Professors Zuhair Al-Shaieb, Ph.D.; Arthur Hounslow, Ph.D.; Douglas C. Kent, Ph.D.; John W. Shelton, Ph.D.; Gary F. Stewart, Ph.D.; John E. Stone, Ph.D.; John D. Vitek, Ph.D. **Associate Professors** Ibrahim Cemen, Ph.D.; Arthur Cleaves, Ph.D.; Vernon Scott, Ph.D. **Assistant Professor** Scott M. Ritter, Ph.D.

School of Health, Physical Education and Leisure

Professor and Director George H. Oberle, P.E.D.
Professor and Coordinator, Health James H. Rogers, Ph.D.
Associate Professor and Coordinator, Leisure, and Coordinator of Graduate Studies Lowell Caneday, Ph.D.
Associate Professor and Coordinator, Physical Education Sandra K. Gangstead, Ph.D.
Professor John G. Bayless, Ed.D. **Associate Professors** Betty M. Edgley, Ed.D.; Steven W. Edwards, Ph.D.; Jerry J. Jordan, Ed.D.; Donna L. Payne, Ph.D.; Milton D. Rhoads, Ed.D.; E. Pauline Winter, M.A. **Assistant Professors** Kent Bunker, M.R.Ed. (adjunct); Christine Cashel, Ed.D.; Jeffrey Fair, Ed.D., A.T.C. (adjunct); Lynne A. Heilbuth, Ph.D.; Bert H. Jacobson, Ed.D.; Frank A. Kulling, Ed.D.; Mac L. McCrory, Ed.D. (adjunct); C.F. Schelsky, M.S.; Kirk Wimberley, M.R.Ed. (adjunct) **Adjunct Instructors** Chris Arrigo, M.S., A.T.C.; Karin Debenedetti, M.A.; Margaret Rebenar, B.S. **Lecturer** Merrillyn Hartman, M.S. **Academic Counselor** Dorothea Rogers, M.S.

History

Associate Professor and Head W. Roger Biles, Ph.D.
Professors Joseph F. Byrnes, Ph.D.; George F. Jewsbury, Ph.D.; Joseph A. Stout, Ph.D. **Associate Professors** Neil J. Hackett, Ph.D.; Helga H. Harriman, Ph.D.; James L. Huston, Ph.D.; Richard C. Rohrs, Ph.D.; James M. Smallwood, Ph.D.; Michael M. Smith, Ph.D.; John A. Sylvester, Ph.D. **Assistant Professors** John P. Bischoff, Ph.D.; William S. Bryans, Ph.D.; James F. Cooper, Jr., Ph.D.; Lionel M. Jensen, M.A.; Etta L. Perkins, Ph.D; Bryant T. Ragan, Ph.D.; Elizabeth A. Williams, Ph.D.

School of Journalism and Broadcasting

Professor and Director Marlan D. Nelson, Ed.D.
Professors Philip E. Paulin, Ed.D.; William R. Steng, Ed.D. **Associate Professors** Marshall E. Allen, M.A.; Charles A. Fleming, Ed.D.; Thomas R. Hartley, M.S.; William Rugg, Ph.D.; James Willis, Ph.D. **Assistant Professors** Terry M. Clark, M.A.; Donald Forbes, M.S.; Brooks Garner, M.S.; Elisabeth John, M.Ed.; Maureen Nemecek, Ph.D.; Charles Overstreet, M.S.; Donald Reed, B.A.; Elisabeth Schillinger, M.S.; Gregory Stefaniak, Ph.D. **Visiting Assistant Professor** Barbara Webb, J.D. **Lecturers** Jean Devlin, B.S.; Sharon Iorio, M.S.; Gene Post, Ed.D.; Keith Swezey, B.S.; Susan Tomlinson, M.S.

Mathematics

Professor and Head Marvin S. Keener, Ph.D.
Professor and Associate Head Dennis Bertholf, Ph.D.
Professors Alan A. Adolphson, Ph.D.; Dale E. Alspach, Ph.D.; Hermann G. Burchard, Ph.D.; James R. Choike, Ph.D.; Benny D. Evans, Ph.D.; Gerald K. Goff, Ed.D.; William H. Jaco, Ph.D.; John M. Jobe, Ph.D.; Jerry A. Johnson, Ph.D.; Ignacy I.

Kotlarski, Ph.D. **Associate Professors** James Cogdell, Ph.D.; J. Brian Conrey, Ph.D.; Amit Ghosh, Ph.D.; Joel Haack, Ph.D.; J. Robert Myers, Ph.D.; Wayne B. Powell, Ph.D.; Carsten Schutt, Ph.D.; David Ullrich, Ph.D.; John E. Wolfe, Ph.D. **Assistant Professors** Birne Binegar, Ph.D.; Jin-Tseh Chang, Ph.D.; Bruce C. Crauder, Ph.D.; Sheldon Katz, Ph.D.; Lisa A. Mantini, Ph.D.; Alan Noell, Ph.D.; David J. Wright, Ph.D; Roger Zierau, Ph.D.

Departments of Military Studies
Coordinator Smith L. Holt, Ph.D.

Aerospace Studies
Professor of Aerospace Studies and Head Col. Albert M. Silva, M.S.
Assistant Professors Capt. W. L. Metzinger, M.A.; Capt. S. L. Mitchell, M.S.; Capt. W. J. Welker, Jr., M.S. **Staff** SSgt. D.M.J. Chabot; SSgt. J. A. Rawles

Military Science
Professor of Military Science and Head LTC Conrad J. McHugh, M.M.A.S.
Assistant Professors Maj Marion J. Brown, M.S.; Maj William R. Johnson, M.S.; Maj William O. Sides, M.S.; Cpt (P) John B. DuBois, M.S.; Cpt Eric F. Lasher, B.S. **Staff** SGM Lee E. Dudley; MSG Noble E. Rodgers, Sr; SFC Thomas Terry, Jr.

Music
Professor and Head Gerald D. Frank, D.M.A.
Professor Stanley Green, M.M. **Associate Professors** Marian Abbott, M.M.; Peter Amstutz, D.M.A.; John Enis, M.M.; Eric Fried, D.M.A.; William McMurtry, Ph.D.; Carol-Jean Planthaber, M.M.; Gwen Powell, M.F.A.; Evan Tonsing, M.M.; Sunny vanEaton, M.M.; Thomas Walker, M.M. **Assistant Professors** William Ballenger, M.A.; Babbette Belter, M.M.; Wayne Bovenschen, M.M.; Karen Carter, Ph.D.; Glenn Dowlen, M.M.; Jerry McCoy, D.M.A.; Joseph Missal, D.M.A.; Robert Ward, D.M.A. **Instructor** Thora duBois, M.M.

Natural Science
Professor and Program Director L. Herbert Bruneau, Ph.D.

Philosophy
Associate Professor and Head Edward G. Lawry, Ph.D.
Professors Richard W. Eggerman, Ph.D.; Neil R. Luebke, Ph.D. **Associate Professors** David L. Levine, Ph.D.; Robert T. Radford, Ph.D.; Doren A. Recker, Ph.D.; Walter G. Scott, Ph.D. **Assistant Professor** Michael R. Taylor, Ph.D.

Physics
Professor and Head Larry E. Halliburton, Ph.D.
Regents Professors James N. Lange, Ph.D.; Richard C. Powell, Ph.D. **Professors** Bruce J. Ackerson, Ph.D.; George S. Dixon, Ph.D.; H. James Harmon, Ph.D.; Earl E. Lafon, Ph.D.; Joel J. Martin, Ph.D.; Mark A. Samuel, Ph.D.; H. Larry Scott, Ph.D.; William A. Sibley, Ph.D.; Jin-Joo Song, Ph.D.; Paul A. Westhaus, Ph.D.; Timothy M. Wilson, Ph.D. **Associate Professors** Craig Y. Allison, Ph.D.; Stephen W. S. McKeever, Ph.D.; Satya Nandi, Ph.D.; Jacques Perk, Ph.D. **Assistant Professors** Donna K. Bandy, Ph.D.; Peter O. Shull, Ph.D.; James P. Wicksted, Ph.D.

Political Science
Professor and Head Anne L. Schneider, Ph.D.
Professors Robert Darcy, Ph.D.; Bertil L. Hanson, Ph.D.; James L. Lawler, Ph.D., J.D.; Robert L. Spurrier, Jr., Ph.D. **Associate Professors** Anthony E. Brown, Ph.D.; Robert E. England, Ph.D.; William McParle, Ph.D.; Franz A. von Sauer, Ph.D.; Joseph Westphal, Ph.D. **Assistant Professors** David Billeaux, Ph.D.; James A. Davis, Ph.D.; Joel M. Jenswald, Ph.D. **Instructor** Danny M. Adkison, Ed.D.

Psychology
Associate Professor and Head Vicki Green, Ph.D.
Professors Larry T. Brown, Ph.D.; H. Stephen Caldwell, Ph.D.; Donald K. Fromme, Ph.D.; Arthur E. Harriman, Ph.D.; James L. Phillips, Ph.D.; William W. Rambo, Ph.D.; Kenneth D. Sandvold, Ph.D.; Robert S. Schlottmann, Ph.D.; Robert F. Stanners, Ph.D.; Robert J. Weber, Ph.D. **Associate Professors** Bob Helm, Ph.D.; Larry Hochhaus, Ph.D.; James Price, Ph.D.; Bill C. Scott, Ph.D. **Assistant Professors** Joan Holloway, Ph.D.; Daniel W. McNeil, Ph.D.; David Thomas, Ph.D. **Academic Counselor** Carolyn Gang, M.S. **Coordinator, Minority Graduate Student Service** Molly Tovar, M.A.T.

Religious Studies
Adjunct Assistant Professor William Ivy, Ph.D. **Professors** Azim A. Nanji, Ph.D.; Theodore Vestal, Ph.D. (visiting) **Associate Professor** James S. Thayer, Ph.D. **Assistant Professor** Charles Curl (visiting)

Sociology
Professor and Head Charles Edgley, Ph.D.
Professors Donald Brown, Ph.D.; Jack Bynum, Ph.D.; Richard Dodder, Ph.D.; Larry Perkins, D.S.S.; Harjit Sandhu, Ph.D. **Associate Professors** George Arquitt, Ph.D.; Patricia Bell, Ph.D.; Larry Hynson, Ph.D.; Kenneth Kiser, Ph.D. **Assistant Professors** Lynn Atkinson, Ph.D.; John Cross, Ph.D.; David Knott, Ph.D.; Keith Moore, Ph.D.; Carol Olson, Ed.D. (adjunct) **Academic Counselor** Georgia Hecock, M.A.

Speech Communication
Associate Professor and Interim Head Paul D. Harper, Ph.D.
Professor James Hughey, Ph.D.
Associate Professor Mike Stano, Ph.D. **Assistant Professors** Bena Harper, Ed.D; William Morphis, M.A.; Jeffrey McQuillen, Ph.D.

Speech and Language Pathology and Audiology
Professor and Head John M. Panagos, Ph.D.
Associate Professors Nancy Monroe, Ph.D.; Arthur L. Pentz, Ph.D.; Cheryl Scott, Ph.D. **Assistant Professor** Gary J. Beeby, M.A. **Instructors** Ann Davidson, M.A.; Carol Headrick, M.C.D.; Jan Marks, M.S.; Susan Richardson, M.S.

Statistics
Professor and Head J. Leroy Folks, Ph.D.
Professors P. Larry Claypool, Ph.D.; Robert Darcy, Ph.D.; Richard Dodder, Ph.D.; Ignacy I. Kotlarski, Ph.D.; Ronald W. McNew, Ph.D.; David L. Weeks, Ph.D. **Associate Professor** Linda J. Willson, Ph.D. **Assistant Professors** Barry K. Moser, Ph.D.; Gary F. Stevens, Ph.D. **Instructor** Brenda J. Masters, M.S.

Theater
Professor and Head Kenneth Cox, Ph.D.
Professor Jerry L. Davis, Ph.D. **Associate Professor** Mary Anne Hempe, M.F.A. **Assistant Professors** Tracy Callahan, M.F.A.; Heidi Hoffer, M.F.A.; Alex Pinkston, Ph.D.; Peter Westerhoff, M.F.A.

Zoology
Professor and Head Jerry Wilhm, Ph.D.
Professors John Bantle, Ph.D.; Calvin Beames, Jr., Ph.D.; L. Herbert Bruneau, Ph.D.; Sterling Burks, Ph.D.; H. James Harmon, Ph.D.; Rudolph Miller, Ph.D.; James Shaw, Ph.D.; John Thornton, Ph.D.; Dale Toetz, Ph.D.; Phillip Zwank, Ph.D. (adjunct) **Associate Professors** James Blankmeyer, Ph.D.; Tracy Carter, Ph.D. (visiting); Anthony Echelle, Ph.D.; Margaret S. Ewing, Ph.D.; Stanley Fox, Ph.D.; Jerry Hurst, Ph.D.; Helen Miller, Ph.D.; Larry Talent, Ph.D.; Alexander Zale, Ph.D. (adjunct) **Assistant Professors** David Leslie, Ph.D. (adjunct); James Lish, Ph.D. (adjunct); Robert Lochmiller, Ph.D.; Karen McBee, Ph.D.; Deborah Meinke, Ph.D. (adjunct)

COLLEGE OF BUSINESS ADMINISTRATION

School of Accounting
Professor and Head Lanny G. Chasteen, Ph.D., CPA
Professors Don R. Hansen Ph.D., CMA; Dennis H. Patz, Ph.D., CPA **Associate Professors** Dale E. Armstrong, Ph.D., CPA; Patrick B. Dorr, Ph.D., CPA; Lawrence H. Hammer, D.B.A., CPA; Janet I. Kimbrell, Ph.D., CPA; M.E. Lacy, Ph.D., CPA; Amy H. Lau, Ph.D., CPA; Gary K. Meek, Ph.D., CPA; Maryanne M. Mowen, Ph.D., CMA; Kevin E. Murphy, Ph.D., CPA; Charles R. Ransom, Ph.D., CPA; John W. Wilguess, Ph.D., CPA; Charlotte J. Wright, Ph.D., CPA **Assistant Professors** R. Dan Edwards, Ph.D.; James E. Groff, Ph.D.; Michael F. Thomas, Ph.D.; Thomas S. Wetzel, Ph.D.

Administrative Services
Professor and Head Joe W. Fowler, J.D.
Professors John T. Bale, Jr., Ed.D.; Dennis L. Mott, Ed.D.; Zane K. Quible, Ph.D. **Associate Professors** Jane N. Hammer, Ed.D.; Jeanine D. Rhea, Ed.D. **Assistant Professors** James F. Jackman, J.D.; Tipton F. McCubbins, J.D.; Greg Mosier, Ed.D., J.D.; Andrew L. Urich, J.D.

Business Administration
M.B.A. Program Director Cynthia S. Gray

Economics
Professor and Head Ronald L. Moomaw, Ph.D.
Professors Orley M. Amos, Jr., Ph.D.; Robert C. Dauffenbach, Ph.D.; Michael R. Edgmand, Ph.D.; Joseph M. Jadlow, Jr., Ph.D.; Gerald M. Lage, Ph.D.; Kent W. Olson, Ph.D.; Richard W. Poole, Ph.D.; John D. Rea, Ph.D.; Robert L. Sandmeyer, Ph.D.; Joseph Shaanan, Ph.D.; Frank G. Steindl, Ph.D.; Larkin B. Warner, Ph.D. **Associate Professors** Michael J. Applegate, Ph.D.; Pauline W. Kopecky, Ph.D.; Edward O. Price, III, Ph.D.; Keith D. Willett, Ph.D. **Assistant Professors** Kevin M. Currier, Ph.D.; James R. Fain, Ph.D.; Mary N. Gade, Ph.D.; Yoo Soo Hong, Ph.D.; Andreas Savvides, Ph.D.

Finance

Professor and Head W. Gary Simpson, Ph.D.
Associate Professors James F. Jackson, Jr., Ph.D.; Ronald K. Miller, Ph.D.; **Assistant Professors** Mary S. Broske, Ph.D.; Janice N. Jadlow, Ph.D.; John Polonchek, Ph.D.; John R. Wingender, Ph.D.

Management

Professor and Head Wayne A. Meinhart, Ph.D.
Regents Professor Hon-Shiang Lau, Ph.D. **Professors** Richard A. Aukerman, Ph.D.; G. Daryl Nord, Ph.D.; Thomas H. Stone, Ph.D.; J. Scott Turner, Ph.D. **Associate Professors** Steven H. Barr, Ph.D.; David C. Ho, Ph.D.; Tim C. Ireland, Ph.D.; Marilyn G. Kletke, Ph.D.; Chalmer E. Labig, Jr., Ph.D.; Jeretta A. Nord, Ed.D.; Ramesh Sharda, Ph.D. **Assistant Professors** Charles M. Byles, D.B.A.; Aunshumali A. Chahande, M.B.A.; Vance H. Fried, J.D.; Dennis I. Knox, M.S.; Debra L. Nelson, Ph.D.; Eui-Ho Suh, Ph.D.; Steven L. Thomas, Ph.D.; Margaret White, Ph.D.; Charles R. Williams, M.B.A.

Marketing

Associate Professor and Interim Head Raymond P. Fisk, D.B.A.
Professors Duane R. Hall, Ph.D.; B. Curtis Hamm, Ph.D.; John C. Mowen, Ph.D.; William G. Zikmund, D.B.A. **Associate Professors** Ruth H. Krieger, Ph.D.; Raymond W. LaForge, D.B.A.; L. Lee Manzer, Ph.D.; Joshua L. Wiener, Ph.D.; Clifford E. Young, Ph.D. **Assistant Professors** Jerry R. Goolsby, Ph.D.; James Hromas, Ph.D.; Ajay Sukhdial, M.B.A.

COLLEGE OF EDUCATION

Applied Behavioral Studies

Professor and Head Dale R. Fuqua, Ph.D.
Professors Kay S. Bull, Ph.D.; N. Jo Campbell, Ed.D.; Judith E. Dobson, Ph.D.; Rondal R. Gamble, Ph.D.; James M. Seals, Ph.D.; Paul G. Warden, Ph.D. **Associate Professors** Al F. Carlozzi, Ed.D.; Charles R. Davis, Ph.D.; Imogene Land, Ed.D.; David S. Lane, Jr., Ph.D.; Evangie H. McGlon, Ph.D.; Joseph H. Pearl, Ph.D.; Katye M. Perry, Ph.D.; Brent M. Snow, Ph.D.; Michael M. Warner, Ph.D.; J. Barbara Wilkinson, Ph.D. **Assistant Professors** Marcia M. Dickman, Ph.D.; Nancy Fagley, Ph.D.; Pamela L. Knox, Ph.D.; Dorothy A. Strom, Ph.D.; Janice E. Williams, Ph.D. **Adjunct Assistant Professors** Cathryn Burden, Ph.D.; Jan Carlson, Ed.D.; Nancy Dixon, Ed.D.; Rex Finnegan, Ed.D.; Stephen Grisson, Ph.D.; William Ivy, Ph.D.; Martha Jordan, Ed.D.; Robin H. Lacy, Ed.D.; Sherry Maxwell, Ph.D.; Nancy Mize, Ph.D.; Patrick Murphy, Ed.D.; Kent Sampson, M.S.; Howard Shipp, Ed.D.; Donald Young, Ed.D. **Instructor** Susan Richardson, M.S.

Aviation and Space Education

Professor and Head Kenneth E. Wiggins, Ed.D.
Adjunct Assistant Professors Malcom V. Phelps, M.S.; Gregory Vogt, M.S. **Instructors** Paul Burrell, B.S. (visiting); Nelson J. Ehrlich, Ed.D.; Steven K. Marks, Ed.D.; Glen Nemecek, M.S.

Curriculum and Instruction

Professor and Head Douglas B. Aichele, Ed.D.
Professors Carolyn Bauer, Ed.D.; Kathryn S. Castle, Ed.D.; Russell L. Dobson, Ed.D.; Thomas D. Johnsten, Ed.D.; Kenneth L. King, Ed.D.; Terence J. Mills, Ed.D.; Darrel D. Ray, Ed.D.; William E. Segall, Ed.D.; Daniel Selakovich, Ed.D.; Vernon E. Troxel, Ed.D.; Kenneth E. Wiggins, Ed.D.; David Yellin, Ph.D. **Associate Professors** Cida S. Chase, Ph.D.; Martha Combs, Ed.D.; Joyce Friske, Ph.D.; Randall Koetting, Ph.D.; Elizabeth M. Max, Ed.D.; Warren McKinney, Ed.D.; Audrey E. Oaks, Ed.D.; Bruce A. Petty, Ph.D.; Milton D. Rhoads, Ed.D.; **Assistant Professors** Margaret Scott, Ph.D.; Gwendolyn Turner, Ed.D. **Visiting Assistant Professors** Gerald Burns, Ed.D.; Geoffrey Tabakin, Ph.D. **Adjunct Assistant Professors** Larry Foreman, Ed.D.; E. Ann Hickman, Ed.D.; Martha McMillian, Ed.D.; Nancy O'Donnell, Ed.D.; Ron Payne, Ed.D.

Educational Administration and Higher Education

Professor and Head Thomas A. Karman, Ph.D.
Professors Ronald S. Beer, Ph.D.; Jerry B. Farley, Ph.D.; John J. Gardiner, Ph.D.; Kenneth H. McKinley, Ph.D.; J. Kenneth St. Clair, Ed.D. **Associate Professors** Lynn K. Arney, Ed.D.; Gerald R. Bass, Ed.D.; Patrick B. Forsyth, Ed.D.; Deke Johnson, Ed.D.; A. Kenneth Stern, Ed.D. **Assistant Professors** Adrienne Hyle, Ph.D.; David Webster, Ph.D; Elizabeth J. Whitt, Ph.D.

School of Occupational and Adult Education

Professor and Director Melvin D. Miller, Ed.D.
Adjunct Visiting Professor Francis Tuttle, Ed.D. **Associate Professors** John L. Baird, Ed.D.; Garry R. Bice, Ph.D.; Cecil W. Dugger, Ed.D.; Clyde B. Knight, Ed.D.; H. Gene Smith, Ed.D; William R. Venable, Ph.D. **Adjunct Associate Professors** Ann Benson, Ed.D.; Juanita Bice, Ed.D.; Zed DeVaughn, Ed.D.; Richard Makin, Ed.D.; Roy Peters, Ed.D.; **Assistant Professors** Robert E. Nolan, Ed.D.; Ray Sanders, Ed.D.; Robert Wicklein, Ed.D. **Instructors** Mike Daughterty, M.S.; Carol Duckworth, M.S.

COLLEGE OF ENGINEERING, ARCHITECTURE AND TECHNOLOGY

Agricultural Engineering

Professor and Head David R. Thompson, Ph.D.
Regents Professor C.T. Haan, Ph.D., P.E. **Professors** Gerald H. Brusewitz, Ph.D., P.E.; Bobby L. Clary, Ph.D., P.E.; Glenn A. Kranzler, Ph.D.; A. Pat Lewis, M.S.; Ronald T. Noyes, M.S., P.E.; Charles E. Rice, Ph.D., P.E. (adjunct); Richard W. Whitney, Ph.D., P.E. **Associate Professors** H. Willard Downs, Ph.D.; Ronald L. Elliott, Ph.D., P.E.; Sam L. Harp, M.S., P.E.; Raymond L. Huhnke, Ph.D., P.E.; John B. Solie, Ph.D.; Marvin L. Stone, Ph.D.; Darrel E. Temple, M.S. (adjunct); Bruce Wilson, Ph.D. **Assistant Professors** Glen O. Brown, Ph.D.; Thomas A. Esch, Ph.D.; Harry L. Field, Ed.D.; Gregory Hanson, Ph.D. (adjunct); Michael A. Kizer, Ph.D.; Kerry Robinson, M.S. (adjunct)

School of Architecture

Professor and Head Virgil R. Carter, M.Arch., FAIA
Professors Louis O. Bass, M.Arch.Engr., P.E.; Alan W. Brunken, M.Arch, AIA; John H. Bryant, M.Arch., AIA; William H. Haire, M.S. Management, AIA; Bob E. Heatly, M.Arch.; James F. Knight, M.Arch., AIA; Arlyn A. Orr, M.Arch.Engr., P.E.; Robert Wright, M.Arch. **Associate Professors** Eric N. Angevine, M.S. Arch., M.S.Engr., P.E.; David A. Hanser, M.Arch. **Assistant Professors** Robert Condia, M.S. Bldg. Design, AIA; Nigel R. Jones, M.Arch., RIBA (visiting); Steve E. O'Hara, M.Arch.Engr.; J. Randall Seitsinger, M.Arch. (visiting); Jeffrey K. Williams, M.Arch., AIA

Chemical Engineering

Regents Professor and Head Robert L. Robinson, Jr., Ph.D., P.E.
Regents Professor Kenneth J. Bell, Ph.D., P.E. **Professors** Marvin M. Johnson, Ph.D. (adjunct); Mayis Seapan, Ph.D.; Jan Wagner, Ph.D., P.E. **Associate Professors** Gary L. Foutch, Ph.D.; A. H. Johannes, Ph.D., P.E.; William E. Payne (adjunct) **Assistant Professors** Ruth C. Erbar, Ph.D.; Khaled A.H. Gasem (visiting)

Civil Engineering

Professor and Head Robert K. Hughes, Ph.D., P.E.
Professors William E. Dawkins, Ph.D., P.E.; Allen E. Kelly, Ph.D., P.E.; John P. Lloyd, Ph.D., P.E.; Garold D. Oberlender, Ph.D., P.E.; Donald R. Snethen, Ph.D., P.E. **Associate Professors** S. A. Ahmed, Ph.D.; Marcia Bates, Ph.D., P.E.; G. S. Gipson, Ph.D.; Vernon A. Mast, Ph.D., P.E.; William F. McTernan, Ph.D., P.E.; Meter Oner, Ph.D., P.E.; Avdhesh K. Tyagi, Ph.D., P.E.; John N. Veenstra, Ph.D., P.E. **Assistant Professors** William W. Clarkson, Ph.D., E.I.; Ron C. Donahey, Ph.D., P.E.; Kevin Lansey, Ph.D., E.I.; Farrell J. Zwerneman, Ph.D.

Electrical and Computer Engineering

Professor and Head James Baker, Ph.D., P.E.
Regents Professor K. Rao Yarlagadda, Ph.D., P.E. **Professors** H. Jack Allison, Ph.D., P.E.; Charles M. Bacon, Ph.D., P.E.; Bennett L. Basore, Sc.D., P.E.; Hans R. Bilger, Ph.D.; Ramachandra G. Ramakumar, Ph.D., P.E.; Ronald P. Rhoten, Ph.D., P.E; Keith A. Teague, Ph.D., P.E. **Associate Professors** Richard L. Cummins, Ph.D., P.E.; Marcus O. Durham, Ph.D. (visiting); Louis G. Johnson, Sc.D.; Carl D. Latino, Ph.D.; Joe Owen, M.S. (adjunct) **Assistant Professors** Jong J. Lee, Ph.D. (visiting); Kyon K. Lee, Ph.D. (visiting); George Scheets, Ph.D. **Instructor** Antone Kusmanoff (visiting) **Lecturer** Robert G. Hayes, M.S.

General Engineering

Professor and Head Bennett L. Basore, Sc.D., P.E.

Industrial Engineering and Management

Professor and Head Carl B. Estes, Ph.D., P.E.
Regents Professors Kenneth E. Case, Ph.D., P.E.; Joe H. Mize, Ph.D., P.E. **Professors** Allen C. Schuermann, Ph.D., P.E.; James E. Shamblin, Ph.D., P.E.; M. Palmer Terrell, Ph.D., P.E.; Wayne C. Turner, Ph.D., P.E. **Associate Professors** Michael H. Branson, Ph.D.; David E. Mandeville, Ph.D.; John W. Nazemetz, Ph.D.

Mechanical and Aerospace Engineering

Professor and Head Lawrence L. Hoberock, Ph.D., P.E.

Professors James H. Boggs, Ph.D.; David G. Lilley, Ph.D.,P.E.; Richard L. Lowery, Ph.D., P.E.; Faye C. McQuiston, Ph.D., P.E.; Peter M. Moretti, Ph.D., P.E.; C. Eric Price, Ph.D., P.E.; Karl N. Reid, Sc.D., P.E.; Robert L. Swaim, Ph.D., P.E.; Merlin L. Millett, Jr., Ph.D. (adjunct); Larry D. Zirkle, Ph.D., P.E. **Associate Professors** Ronald L. Dougherty, Ph.D.; Bruce A. Feiertag, B.S. (adjunct); Afshin J. Ghajar, Ph.D., P.E.; James K. Good, Ph.D., P.E.; Ing-Tsann Hong, Ph.D. (adjunct); John J. Shelton, Ph.D. (adjunct); Gary E. Young, Ph.D., P.E. **Visiting Assistant Professor** Steven L. Liany, Ph.D. **Instructors** Ronald L. Delahoussaye, M.S.; Steven M. Harris, M.S. **Lecturers** Howard E. Conlon, M.S., P.E.

Division of Engineering Technology

Professor and Director James E. Bose, Ph.D., P.E.

Construction Management Technology

Associate Professor and Head Jerrold F. Bradley, M.S., P.E.

Associate Professors Clarence L. Martin, M.Arch., AIA, P.E.; Charles A. Rich

Electronics and Computer Technology

Associate Professor and Head Thomas G. Bertenshaw, M.S., M.Ed.

Professor Russell L. Heiserman, Ed.D., S.E.T. **Associate Professors** Howard M. Johnson, Ph.D.; Larry D. Jones, Ed.D.; Samuel I. Kraemer, M.S., P.E.; Neal A. Willison, Ed.D., C.E.T. **Assistant Professors** Ralph E. Walkingstick (adjunct); W. Paxton Robey, B.S., P.E. **Instructor** Jonathan R. Joyce (adjunct) **Lecturer** Howard Branch **Teaching Associate** Kevin P. Smith, B.S.

Fire Protection and Safety Technology

Associate Professor and Head Harold R. Mace, M.S.

Associate Professors Larry Borgelt, M.S., C.S.P., P.E.; Pat D. Brock, M.S., P.E. **Assistant Professor** Jim L. Hanson

General Technology

Professor and Head James E. Bose, Ph.D., P.E.

Manufacturing Technology

Associate Professor and Head Gerald R. McClain, M.S., CMFgT.

Professor Gary G. Hansen, Ph.D., CMFgE. **Assistant Professor** John C. Scheihing, B.S. **Instructor** Mike Magill, B.S.

Mechanical Design Technology

Associate Professor and Head Gerald R. McClain, M.S., CMFgT.

Professors Gary G. Hansen, Ph.D., CMFgE.; Raymond F. Neathery, Ph.D., P.E. **Associate Professor** D. Jack Bayles, Ph.D., P.E. **Assistant Professors** Mike Magil, B.S.; John C. Scheihing, B.S.; Larry D. Simmons, M.S.; G. Richard Thomas, B.A. **Teaching Associate** Arlin Harris

Mechanical Power Technology

Professor and Head Marvin D. Smith, Ph.D., P.E.

Professor Eugene K. Buchholz, Ph.D., P.E.; Bill L. Cooper, Ed.D. **Associate Professor** Frederick D. Norvelle, M.S., P.E.

Petroleum Technology

Professor and Head Marvin D. Smith, Ph.D., P.E.

Professor Don Adams, Ph.D. **Associate Professor** Franklin F. Eckhart, M.S., P.E.

COLLEGE OF HOME ECONOMICS

Clothing, Textiles and Merchandising

Professor and Head Grovalynn Sisler, Ed.D.

Professor Donna Branson, Ph.D. **Associate Professors** Marilyn Burns, Ph.D.; Laura Jolly, Ph.D.; M. Lynne Richards, Ph.D. **Assistant Professors** Jan Park, Ph.D.; Tana Stufflebean, Ph.D. **Instructor** Louise Schroeder, M.S.

Family Relations and Child Development

Professor and Head James D. Moran III, Ph.D.

Associate Professors Godfrey Ellis, Ph.D.; David Fournier, Ph.D.; Joseph Weber, Ph.D.; Althea Wright, Ed.D. **Assistant Professors** Larry Clayton, Ph.D. (adjunct); Donna Couchenour, Ph.D.; Walt Davis, Ph.D. (adjunct); Arlene Fulton, Ph.D.; Mona Lane, M.S.; Mary Lawler, M.S. (visiting); Wayne Matthews, Ph.D.; Lois Mickle, Ph.D.; Ann Mills, M.S.; Kay Murphy, Ph.D.; John Rusco, D.Min. (visiting); Elaine Wilson, Ph.D. **Instructors** Barbara Heister, M.S.; Faye Ann Presnal, M.S.; Pat Tweedie, M.S.

Food, Nutrition and Institution Administration

Professor and Interim Head Lea Ebro, Ph.D.

Associate Professors N. Sue Knight, Ph.D.; Bernice Kopel, Ed.D.; Jerrold Leong, Ph.D.; Barbara Stoecker, Ph.D. **Assistant Professors** Christa Hanson, Ph.D.; Janice Stewart, Ph.D.; Ibrahim Wahem, Ph.D. **Instructor** Andrea Arquitt, M.S.

Home Economics

Professor and Interim Dean of Home Economics Elaine Jorgenson, Ed.D.

Home Economics Education and Community Services

Associate Professor and Interim Head Margaret Callsen, Ph.D.

Professors Anna M. Gorman, Ed.D.; Lynda Harriman, Ph.D.; Beulah M. Hirschlein, Ph.D.; Elaine Jorgenson, Ed.D. **Associate Professor** Bettye Gaffney, Ed.D. **Assistant Professors** Donna Cadwalader, Ph.D.; Renee Daugherty, M.S; Diane Jackman, Ph.D. **Instructors** Sheila Forbes, Ph.D.

School of Hotel and Restaurant Administration

Professor and Director G. Baker Bokorney, Ed.D.

Associate Professors N. Sue Knight, Ph.D.; Jerrold Leong, Ph.D. **Instructors** Jim Anderson, M.S.; Dan Crafts, M.S.; Donald Rose, M.S.

Housing, Interior Design and Consumer Studies

Professor and Interim Head Margaret J. Weber, Ph.D.

Professors Dorothy Goss, Ph.D.; Claudia J. Peck, Ph.D. **Associate Professor** Sue Williams, Ph.D. **Assistant Professors** Bill Beitz, M.S.; Gwen Brewer, Ph.D. (visiting); June Gilliam, M.S. (visiting); Asha Hegde, Ph.D. (visiting); Gong Soog Hong Ph.D. (visiting); Gail McKissick, M.S. (visiting) **Instructors** Pat Donovan, M.S.(visiting); Debra McCall, (visiting) **Assistant Extension Specialists** Sarah Drummond, M.S.; Virginia Solis, M.S.

COLLEGE OF OSTEOPATHIC MEDICINE

Clinical Education

Professor and Assistant Dean Larry Cherry, D.O.

Professors J. C. Doggett, Ph.D.; Jack R. Wolfe, D.O. **Clinical Professors (part-time appointment)** Joseph J. Back, D.O.; Harold L. Battenfield, D.O.; Kenneth E. Calabrese, D.O.; Dan H. Fieker, D.O.; Dean R. Fullingim, D.O.; Paul P. Koro, D.O.; William L. Lavendusky, D.O.; Joseph C. Nemcok, D.O.; Richard R. Polk, D.O.; James S. Seebass, D.O.; Raymond F. Sorensen, D.O.; Richard C. Staab, D.O.; W. W. Stoever, D.O.; E. Joseph Sutton, D.O.; A. Carson Todd, D.O.; James J. Trusell, D.O.; Melvin J. Van Boven, D.O.; John A. Voorhees, D.O. **Associate Professors** Richard H. Bost, Ph.D.; Tom E. Denton, D.O.; Wm. Stephen Eddy, D.O.; Richard A. Felmlee, D.O.; Kenneth E. Graham, D.O.; Robert E. Irvin, D.O.; William R. Kennedy, D.O.; Rosalie J. Lawson, Ph.D.; William E. Moore, D.O.; Michael H. Pollak, Ph.D.; M. Jean Root, D.O.; Richard A. Wansley, Ph.D. **Clinical Associate Professors (part-time appointment)** C. F. Finnell, D.O.; David F. Hitzeman, D.O.; David S. James, D.O.; Harriet H. Shaw, D.O.; Herbert A. Yates, D.O.; Leon J. Yoder, D.O. **Assistant Professors** Ronald F. Distefano, D.O.; Susan K. Geiss, Ph.D.; James L. Howard, D.O.; Thomas R. Pickard, D.O.; James F. Routsong, D.O. **Clinical Assistant Professors (part-time appointment)** James D. Bloch, D.O.; Gary W. Cannon, D.O.; Gary E. Gramolini, D.O.; Christian Hanson, D.O.; Thomas L. Harrison, D.O.; Richard A. Hastings, D.O.; Ronald E. Jackson, D.O.; Janet C. Pope, J.D.; Barclay J. Sappington, D.O.; Margaret A. Stripling, D.O.; Kenneth R. Trinidad, D.O.

Preclinical Education

Professor and Associate Dean Robert C. Ritter, Ph.D.

Professors Martin W. Banschbach, Ph.D.; George M. Brenner, Ph.D.; Robert S. Conrad, Ph.D.; Kirby L. Jarolim, Ph.D.; Gerald R. Kirk, Ph.D.; Loren G. Martin, Ph.D.; Dianne K. Miller-Hardy, Ph.D.; Daniel E. Overack, Ph.D.; William G. Robertson, Ph.D.; James F. Taylor, Ph.D. **Clinical Professors (part-time appointment)** B. B. Baker, D.O.; James D. Harris, D.O. **Associate Professors** Warren E. Finn, Ph.D.; Joseph A. Price, Ph.D.; Charles G. Sanny, Ph.D. **Clinical Associate Professors (part-time appointment)** Larry J. Dullye, D.O.; Floyd W. Rosdahl, D.O.; Thad Taylor, Jr., D.D.S.; D. Keith Watson, D.O. **Assistant Professors** William D. Meek, Ph.D.; Mark A. Mitchell, Ph.D.; Ortwin W. Schmidt, Ph.D.; Gary H. Watson, Ph.D. **Clinical Assistant Professor (part-time appointment)** John S. Dennis, D.O.

COLLEGE OF VETERINARY MEDICINE

Physiological Science

Professor and Interim Head Lloyd C. Faulkner, D.V.M., Ph.D.

Professors James E. Breazile, D.V.M., Ph.D.; *George E. Burrows, D.V.M., Ph.D.; Charlotte L. Ownby, Ph.D.; Everett C. Short, Jr., D.V.M., Ph.D.; Theodore E. Staley, D.V.M., M.S. **Associate Professors** *William C. Edwards, D.V.M., M.S. (adjunct); Subbiah Sangiah, D.V.M., Ph.D.; Larry E. Stein,

Ph.D.; Alastair G. Watson, B.V.Sc., Ph.D. **Assistant Professors** Cyril R. Clarke, B.V.Sc., Ph.D. (visiting); Bruce A. Lessley, Ph.D.; Joseph P. McCann, Ph.D.

Veterinary Medicine and Surgery

Professor and Head *Grant H. Turnwald, B.V.Sc., M.S.
Professors *Joseph W. Alexander, D.V.M., M.S.; *Michael A. Collier, D.V.M.; *William C. Edwards, D.V.M., M.S.; Dan E. Goodwin, D.V.M., Ph.D.; Thomas Monin, D.V.M.; J. Mack Oyler, D.V.M., Ph.D.; *Art J. Quinn, D.V.M.; *Lawrence E. Rice, D.V.M., M.S.; *Richard V. Shawley, D.V.M., M.S.; Thomas R. Thedford, D.V.M. **Associate Professors** *Robert J. Bahr, D.V.M.; Kenneth E. Bartels, D.V.M., M.S.; *David M. Clark, D.V.M.; *John P. Hoover, D.V.M., M.S.; *Charles G. MacAllister, D.V.M.; *Gregor L. Morgan, M.V.Sc., Ph.D.; *Steven H. Slusher, D.V.M., M.S.; *Robert A. Smith, D.V.M., M.S.; *Ronald W. Welsh, D.V.M. **Assistant Professors** Charles R. Baldwin, D.V.M., Ph.D.; Claudia J. Baldwin, D.V.M., M.S.; Mary H. Bowles, D.V.M.; *Lionel J. Dawson, B.V.Sc, M.S.; *George A. Henry, D.V.M.; Sheri L. Ihle, D.V.M.; *Henry W. Jann, D.V.M., M.S.; Marilyn Kostolich, D.V.M.; Frank K. Lochner, D.V.M., M.S.; *Roger C. Penwick, V.M.D.; *Jerry R. Rains, D.V.M., M.S.; *Kent D. Smith, D.V.M., M.V.Sc. **Instructors** Sharon L. Nash, D.V.M.; Carolynn L. Taylor-MacAllister, D.V.M.

Veterinary Parasitology, Microbiology and Public Health

Professor and Head *Robert W. Fulton, D.V.M., Ph.D.
Regents Service Professor *Patrick M. Morgan, D.V.M., Dr. P.H. **Professors** Sidney A. Ewing, D.V.M., Ph.D.; Helen E. Jordan, D.V.M., Ph.D.; A. Alan Kocan, M.S.P.H., Ph.D. **Associate Professors** J. Carl Fox, Ph.D.; John T. Homer, Ph.D.; C. Sidney S. McCain, D.V.M., M.S. **Assistant Professors** *Jean M. d'Offay, D.V.M., Ph.D.; Richard W. Eberle, Ph.D.; *Rebecca J. Morton, D.V.M., M.S.; John H. Wyckoff III, Ph.D. **Visiting Assistant Professor** Louis J. Perino, D.V.M.

Veterinary Pathology

Professor and Head Anthony W. Confer, D.V.M., Ph.D.
Professors Roger J. Panciera, D.V.M., Ph.D.; Charles W. Qualls, Jr., D.V.M., Ph.D.; Jeffie F. Roszel, V.M.D., Ph.D.; E.L. Stair, D.V.M., Ph.D.; Delbert L. Whitenack, D.V.M., Ph.D. **Associate Professors** Ray Ely, D.V.M., Ph.D. (adjunct); Katherine M. Kocan, M.S.P.H., Ph.D.; Ronald D. Tyler, D.V.M., Ph.D. **Assistant Professors** Kenneth Clinkenbeard, D.V.M., Ph.D.; Rick L. Cowell, D.V.M., M.S.; Sheryl J. Morgan, D.V.M., Ph.D.; Derek A. Mosier, D.V.M., Ph.D.; **Residents** Gladstone Dzata, D.V.M., M.S.; Chandikumar Elangbam, M.V.Sc.; Daniel Paulsen, D.V.M., M.S.; Barbara Waurzyniak, D.V.M.

Oklahoma Animal Disease Diagnostic Laboratory

Director Dan E. Goodwin, D.V.M., Ph.D.
Assistant Director and Chief Pathologist *E. L. Stair, D.V.M., Ph.D. **Bacteriologist** *Ronald D. Welsh, D.V.M., M.S. **Pathologists** *Ray W. Ely, D.V.M., Ph.D.; *Delbert L. Whitenack, D.V.M., Ph.D. **Toxicologist** *William C. Edwards, D.V.M., M.S. **Virologist** Charles A. Baldwin, D.V.M., Ph.D. **Toxicology Residents** Lanell Ogden, D.V.M.; Susanne B. Short, D.V.M.

* Board Certification in Specialty Area

Graduate College

Graduate College Calendar

(Refer also to the "University Calendar")

Summer 1989

June 5, Monday
Class work begins

June 9, Friday
Last day to file a diploma application

June 9, Friday
FINAL DRAFT copy of dissertations, theses and reports due

June 16, Friday
Applications for graduate credit for graduating seniors due

June 23, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

July 7, Friday
FINAL COPIES of dissertations, theses and reports due by summer candidates

July 21, Friday
Graduate College Hooding Convocation

July 31, Monday
Class work ends (makeup exams)

First Semester—1989-90, Fall

August 21, Monday
Class work begins

September 1, Friday
Last day to file a diploma application

September 22, Friday
Applications for graduate credit for graduating seniors due

November 3, Friday
FINAL DRAFT copy of dissertations, theses and reports due

November 3, Friday
Application for admission to spring candidacy due for doctoral and Ed.S. candidates

November 17, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

December 1, Friday
FINAL COPIES of dissertations, theses and reports due by fall candidates

December 10, Sunday
Graduate College Hooding Convocation

December 15, Friday
Class work ends

Second Semester—1989-90, Spring

January 8, Monday
Class work begins

January 19, Friday
Last day to file a diploma application

February 16, Friday
Applications for graduate credit for graduating seniors due

March 23, Friday
FINAL DRAFT copy of dissertations, theses and reports due

April 6, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

April 20, Friday
FINAL COPIES of dissertations, theses and reports due by spring candidates

April 27, Friday
Application for admission to fall candidacy due for doctoral and Ed.S. candidates

May 4, Friday
Class work ends

May 4, Friday
Graduate College Hooding Convocation

May 5, Saturday
University Commencement

Summer 1990
Regular 8-week Summer Session

June 4, Monday
Class work begins

June 8, Friday
Last day to file a diploma application

June 8, Friday
FINAL DRAFT copy of dissertations, theses and reports due

June 15, Friday
Applications for graduate credit for graduating seniors due

June 22, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

July 6, Friday
FINAL COPIES of dissertations, theses and reports due by summer candidates

July 20, Friday
Graduate College Hooding Convocation

July 30, Monday
Class work ends (makeup exams)

First Semester—1990-91, Fall

August 27, Monday
Class work begins

September 7, Friday
Last day to file a diploma application

September 28, Friday
Applications for graduate credit for graduating seniors due

November 9, Friday
FINAL DRAFT copy of dissertations, theses and reports due

November 9, Friday
Application for admission to spring candidacy due for doctoral and Ed.S. candidates

November 23, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATION due

December 7, Friday
FINAL COPIES of dissertations, theses and reports due by fall candidates

December 16, Sunday
Graduate College Hooding Convocation

December 21, Friday
Class work ends

Second Semester—1990-91, Spring

January 14, Monday
Class work begins

January 25, Friday
Last day to file a diploma application

February 15, Friday
Applications for graduate credit for graduating seniors due

March 29, Friday
FINAL DRAFT copy of dissertations, theses and reports due

April 12, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

April 26, Friday
FINAL COPIES of dissertations, theses and reports due by spring candidates

April 26, Friday
Application for admission to fall candidacy due for doctoral and Ed.S. candidates

May 10, Friday
Class work ends

May 10, Friday
Graduate College Hooding Convocation

May 11, Saturday
University Commencement



Norman N. Durham, Ph.D., *Dean*
John D. Vitek, Ph.D., *Assistant Dean*
Carol V. Olson, Ed.D., *Director of Student Academic Services*

The Graduate College is the hub of advanced study, research and creativity at Oklahoma State University. Faculty and students share an obligation to achieve greater knowledge and to present it to the scholarly community. Research is best done in an atmosphere where common goals exist. An esprit de corps exists in the OSU academic community where the goals are to maintain regional and national recognition, to provide an exciting research environment where students and faculty can make significant contributions to the store of knowledge, and to encourage each individual to reach his or her potential.

Organization of the Graduate College

The Graduate College administers regulations and standards specified and established by the Graduate Faculty. The Graduate council is elected by the Graduate Faculty to work with the dean of the Graduate College in development and administration of policy. The Graduate Council is the executive committee of the Graduate Faculty. It formulates and reviews policies concerned with the conduct of graduate study at OSU. All new policies are referred to the Graduate Faculty for approval.

All departmental requests for permission to offer advanced degrees are referred to the Graduate Council and then to the Graduate Faculty with the Graduate Council's recommendations.

All requests for waiver or any rules or regulations as listed in the *Catalog* must be in the form of petitions to the Graduate Council. A supporting letter from the major adviser is also required.

Graduate Council Members

Norman N. Durham, *Chairman*

Elaine Jorgenson, *Vice-Chairman (1989)*

Group I—Biological Sciences
1989—Russell Wright
1991—Laval Verhalen
1989—Charlotte Ownby

Group II—Humanities
1990—Art Pentz
1992—Thomas Warren
1990—Linda Leavall

Group III—Physical Sciences and Technology
1989—Allan Kelly
1991—Leroy Folks
1989—Mark Samuel

Group IV—Social Sciences
1990—Daniel Tilley
1992—Richard Dodder
1990—Bob England

Group V—Teacher Education
1989—N. Jo Cambell
1991—Zane Quible
1989—Anna Gorman

Research at Oklahoma State University

Research, a critical dimension of the mission of the University, is vital to the growth, health and progress of the state, the region and the nation.

Over the last several years, national attention has turned to economic developmemt. This renewed emphasis on economic development and high technology has been spurred by the advances made by the Asian and European economic communities.

OSU is deeply involved in meeting this challenge. In recent years, significant strides have been taken in developing programs at the cutting edge of technology and basic research. The progress made by the establishment of the Noble Research Center for Agriculture and Renewable Natural Resources, the International Trade Development Center, and the ongoing activities of the Laser Materials Center, the robotics and automated manufacturing laboratories, and the biotechnology programs underscore the University's commitment to find solutions to pressing problems.

The University Center for Water Research (UCWR) coordinates programs associated with the Oklahoma Water Resources Research Institute, the Water Research Center and the National Center for Ground Water Reserach. The UCWR assists researchers in staying on the frontiers of water research by providing critical support and services.

The University Center for Energy Research facilitates and promotes multidisciplinary activities addressing the complex problems in the energy field. It provides funding to initiate and encourage energy-related research. Areas emphasized include fossil fuels, policy and other energy research.

The telecommunications Center has established the University as a world leader in telecommunications technology and has enhanced OSU's ability to disseminate research results. Major research affiliations exist with the National Center for Groundwater Research, Oak Ridge Associated Universities and National Laboratories, and the Oklahoma Medical Research Foundation. Research facilities exist within each of the academic colleges. Well-equipped laboratories, teaching and diagnostic facilities, and various resource centers provide an excellent environment for creative scholarly research.

University Research Council. The University Research Council operates to assure proper consideration of research projects that are multidisciplinary in nature and to provide a mechanism for consideration of administrative problems and policies. The Council serves as an advisory group on all research matters for the president of the University. This Council is composed of the assistant vice-president for research., the dean of the Graduate College, the director of University Extension, a representative of the Faculty Council, a representative from Sigma Xi, the director of Grants and Contracts Administration, and the research directors of the various colleges. The Research Council meets quarterly.

Research Centers

Agriculture Experiment Station	139 Agricultural Hall	744-5398
Agronomy Research Station	101 Agricultural Hall	744-7036
Caddo Research Station	R.R. Box 42 Fort Cobb, OK 73738	643-2501
Eastern Research Station	Rt. 1, Box 65A Haskell, OK 74436	918-482-3822
Irrigation Research Station	Route 1 Altus, OK 73521	482-3459
Kiamichi Field Station	Rt. 1, Box 228 Idabel, OK 74745	286-5175
North Central Research Station	Box 141 Lahoma, OK 73754	796-2447
Pecan Research Station	Sparks, OK 74869	918-866- 2263
Sandyland Research Station	Mangum, OK 73554	787-2046
Southeast Center	Lane, OK 74555	889-7890
South Central Research Station	Rt. 3, Box 75 Chickasha, OK 73018	224-4476
Southwest Agronomy Research Station	Tipton, OK 73570	667-4273
Noble Research Center for Agriculture and Renewable Natural Resources	139 Agricultural Hall	744-5398
Vegetable Research Station	Rt. 3, Box 20 Bixby, OK 74008	918-369-2441
Center for Aerospace Education Services Project	300 North Cordell	744-7015
Center for Applications and Remote Sensing	107 Thatcher Hall	744-5178
Center for Automated Design and Manufacturing	218 Engineering North	744-5900
Center for Consumer Services	016 Home Economics West	744-7084
Center for Economic Education	112 Business Building	744-5204
Center for International Trade Development	109 Cordell Hall	744-7693
Center for Local Government Technology	505 Engineering North	744-6049
Center for Systems Science	321 Engineering South	744-5162
Community Education Center	303 Gundersen Hall	744-7246
Electronics Laboratory	104 Electronics Lab	744-6788
Engineering Energy Laboratory	216 Engineering South	744-5157
Family Study Center	114 Home Economics West	744-5054
Fluid Power Research Center	118 Fluid Power Research Center	744-7375
Human Nutrition Center	425 Home Economics West	744-5040
Human Resources Development Center	406 Classroom Building	744-6275
Instructional Materials Center	203 Gundersen Hall	744-7124
Laser Spectroscopy Facility	232 Physical Science	744-5796
Materials Synthesis and Characterization Laboratory	227 Physical Science	744-5796
Natural Resources and Environmental Education Center	306 Gundersen Hall	744-7122
Oklahoma Industrial Energy Management Program	322 Engineering North	744-6055
Physical Properties Laboratory	415A Engineering North	744-5282
Plant Disease Diagnostic Laboratory	115 Life Science East	744-5643
Statistical Laboratory	301 Math Science	744-5684
University Center for Energy Research	001 Life Science East	744-5700
University Center for Water Research	001 Life Science East	744-6995
Veterinary Medical Research Program	308 Veterinary Medicine	744-6663
Veterinary Research Station	139 Agricultural Hall	744-5398
Water Quality Research Laboratory	425 Life Science West	744-5551

Accreditation

Oklahoma State University is accredited by the North Central Association of Colleges and Schools. Programs within the colleges are also accredited by other agencies.

In the *College of Agriculture*, the mechanized agriculture program receives approval from the American Society of Agriculture Engineers and the forestry program is accredited by the Society of American Forestry. The landscape architecture program is accredited by the American Society of Landscape Architects.

In the *College of Arts and Sciences*, the medical technology program is accredited by the National Accrediting Association of Clinical Laboratory Science; the chemistry program is accredited by the American Chemical Society; Health, Physical Education, and Leisure is accredited by the National Recreation and Park Association as well as the American Alliance for Health, Physical Education, Recreation and Dance; the Ph.D. program in history is accredited by the American Historical Association; the School of Journalism and Broadcasting as well as the curricula in advertising, news editorial, and public relations are accredited by the Accrediting Council on Education for Journalism and Mass Communications; the music program is accredited by the National Association of Schools of Music; and the public administration program in the Department of Political Science is accredited by the National Association of Schools of Public Administration. In the Department of Psychology, the doctoral program in clinical psychology is accredited by the American Psychological Association. The speech pathology program is accredited by the American Speech-Language-Hearing Association and the Oklahoma Speech-Hearing Association.

All programs in the *College of Business Administration* are fully accredited by the American Assembly of Collegiate Schools of Business, which is the only nationally-recognized accrediting body for programs in business and management. The School of Accounting has separate accreditation by this body.

In the *College of Education* all teacher education programs are fully accredited by the National Council for Accreditation of Teacher Education (NCATE); and the vocational rehabilitation counseling master's program is accredited by the American Council on Vocational Rehabilitation.

In the *College of Engineering, Architecture and Technology,* the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology has accredited the bachelor's programs in civil engineering, electrical engineering, industrial engineering and management, mechanical and aerospace engineering, agricultural engineering, chemical engineering, general engineering and architectural engineering. The Technology Accreditation Commission of the Accreditation Board for Engineering and Technology has accredited the bachelor's programs in electronics technology, fire protection and safety technology, mechanical power technology petroleum technology, construction management technology, manufacturing technology, and mechanical design technology. The National Architecture Accrediting Board has accredited both the bachelor and master's programs in architecture.

The *College of Home Economics* has full accreditation for all its programs from the Council for Professional Development, American Home Economics Association. In addition, the College's

program of home economics education and community services is accredited by the National Council for Accreditation of Teacher Education, the Oklahoma State Department of Education, and the Oklahoma State Department of Vocational-Technical Education. The Foundation of Interior Degisn Education Research has accredited the undergraduate interior design program. Also, the National Council for Accreditation of Teacher Education and the Oklahoma State Department of Education has accredited the programs in family relations and child development. The Child Development Laboratory has received accreditation by the National Academy of Early Childhood Programs. The Council on Accreditation of the American Dietetic Association has accredited the administrative dietetic internship program at the graduate level.

The *College of Veterinary Medicine* is fully accredited by the American Veterinary Medical Association. The Oklahoma Animal Disease Diagnostic Laboratory is accredited by the American Association of Veterinary Laboratory Diagnosticians and the Boren Veterinary Medical Teaching Hospital has been accredited by the American Animal Hospital Association.

Services at OSU

Library

The Oklahoma State University Edmon Low Library contains over 1,450,000 volumes, 2,100,000 microform units and over 160,000 maps. The open-stack arrangement of books and periodcals and the computer-assisted literature search and retrieval system support the on-going academic and research programs. The library contains a complete set of U.S. patents and is a regional depository of the federal government. Graduate students are entitled to a 30 day checkout period for books, and can utilize the interlibrary loan facilities.

Computer Center

The University Computer Center (UCC) provides computing services to all areas of the University including research, instruction, extension and administration. The Center operates three host computers: an IBM 3081K with an MVS/XA operating system, a DEC VAX 11/780 with VMS, and DEC VAX 8350 using ULTRIX. These computers are accessible via a number of public terminal clusters which are connected to the Asynchronous Communications Network. This network also allows access using microcomputers on or off campus. A large number of computers maintained by various academic departments are also accessible using this network.

The UCC offers a number of computer-related services to the University community. Non-credit short courses are offered each semester. Topics include various mainframe and microcomputer subjects. Registration is required. There is a small charge for some microcomputer courses. Mainframe and microcomputer diagnostic services staff will provide quick answers to computer-related questions.

The Computer Center offers discounts on computer purchases, provides consultation for software and hardware, and has a computer demonstration lab in which the latest products can be observed.

Programming service, systems analysis, design and development are also available. There is a charge for these services.

UCC is part of the BITNET network. Users should contact the UCC to get a BITNET number.

For more information, contact the University Computer Center, located in Math Sciences 113.

Living Accommodations

From high-rise residence halls to single-dwelling apartments, OSU has housing in all types to meet many preferences. The IBA Graduate House is the residence hall designated for single graduate students. This five story air-conditioned building offers single and double year-round occupancy. There is an optional meal plan available in neighboring cafeterias. Vending machines and microwave ovens are conveniently placed in the all for limited food preparation. Other amenities include an open visitation policy, extensive study space with computer terminals and printers, and parking adjacent to the hall.

Family housing is available on a limited basis. The apartment complex features two-bedroom units. To be eligible, one spouse must be a full-time student (nine credit hours per semester) or be enrolled in six credit hours and be employed by the University 50% of the time.

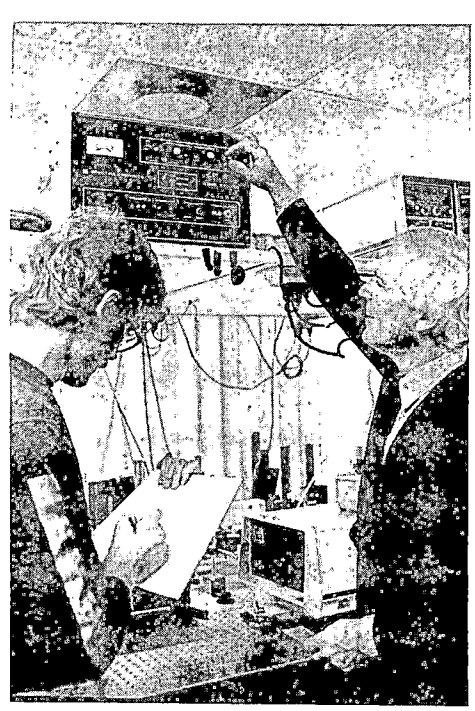
To apply for either housing service, an application and deposit must be filed with the appropriate office. Thus, early application is important. For futher information, contact Single Student Housing or University Apartments.

Health Care

Every student enrolled at OSU is eligible for health care at the University Health Center. Four agencies serve the University community to provide a wide range of mental health services. Low-cost life and health insurance is also available.

Recreation

Intellectual exercising involves complete development of the mind, body, and spirit, and Oklahoma State University offers a complete array of Big Eight athletic competition. The campus provides many opportunities for students to use their free time. Programs include concerts, lectures, films, and other media forms. Many student organizations function to enhance the educational experience of the student. The Colvin Physical Education Center offers a wide variety of organized and informal recreational activities including intramural sports of many types.



The Student Union offers a host of programs and services. The facilities include a complete food service, a theater, hotel, game rooms, lounges and meeting rooms, bookstores, diverse specialty shops, banking facilities and a travel agency.

Special Services

The Special Services program, a program of the University Counseling Center, provides assistance to the students enrolled in Oklahoma State University who are unique because of their social, economic, cultural or academic background. The program is designed to coordinate and provide services which will assist students so that they may reach their full potential.

Graduate Student Council

The goal of the Graduate Student Council is to improve all aspects of graduate education and graduate student life at OSU. The Council is composed of representatives from each department offering a graduate degree program. Members are nominated by the department heads with membership conferred by the dean of the Graduate College. Each representative is appointed for a term of one year providing the student is in good academic standing and is enrolled in at least two credit hours.

Financial Aid

Teaching and Research Assistantships

The University awards numerous teaching and research assistantships with competitive stipends. Fellowship opportunities are available through several programs. The terms of appointment are one semester or longer. Service expected and the number of hours of graduate work a student may take are governed by the terms of the appointment. Applications should be addressed to the head of the department in which the appointment is desired.

Oklahoma Tuition Waiver Scholarships

Eligibility: Oklahoma resident; regular admission to a graduate degree program; cumulative grade-point average greater than 3.00.

Application: Successful completion of ACT Family Financial Statement annually (packet available in Office of Financial Aids, 110 Hanner Hall); apply directly to academic departments.

Award: Varies; awards granted by semester.

Deadline: Contact department for deadline.

OSU Foundation Graduate Fellowships

Eligibility: Grade-point average greater than 3.50; acceptance into a graduate degree program; no prior work completed on the particular degree being sought.

Application: Nominations are made by the student's department head.

Award: Variable.

Deadline: Variable.

Oklahoma Tuition Aid Grant (Need Based)

Eligibility: Oklahoma resident; enrolled in a graduate degree program; making satisfactory progress toward a degree.

Application: Successful completion of ACT Family Financial Statement. Grants administered an awarded by Oklahoma State Regents for Higher Education.

Award: Varies according to need.

Deadline: Priority deadline is February 1 for consideration for the subsequent fall semester.

Minority Doctoral Study Grant Program

The Oklahoma State Regents have set aside special funds to underwrite assistance programs for minority graduate students who are studying in public higher education institutions in Oklahoma with college teaching as a career objective. The Doctoral Study Grant Program is for students pursuing the doctoral degree with a commitment to teach in Oklahoma colleges and universities. For further information, contact the Oklahoma State Regents for Higher Education, 500 Education Building, State Capitol complex, Oklahoma City, OK 73105.

Minority Tuition Waivers

Minority graduate students who are employed as research or teaching assistants are encouraged to apply for a tuition waiver scholarship as part of a social justice policy enacted by the Oklahoma State Regents for Higher Education. Other eligibility requirements must be met. (See "Tuition Waiver Scholarships" section above.) Contact the director of student academic services. Graduate College, 202 Whitehurst for details.

Water Resources Presidential Fellowships

The University Center for Water Research accepts applications for Presidential Fellowships in Water Resources. These awards are offered for advanced study and research toward solving pressing water problems in Oklahoma, the region and the nation. Focus areas include water quality and quantity management and protection; efficiency of use, reuse and conservation of the resource; and legal, economic, social and institutional aspects of water resources management. Currently the recipients receive stipends of $950 per month, beginning in July. Fellowships are renewable each July 1, and may be continued up to three years, provided satisfactory progress is demonstrated.

To receive additional information concerning the fellowship program including application guidelines, contact the director of the University Center for Water Research, 003 Life Sciences East, Oklahoma State University, Stillwater, Ok 74078.

Other Forms of Financial Aid

Need based (loans, college work study): Complete ACT needs analysis packet. Contact Office of Student Financial Aid (110 Hanner Hall).

Employment. Contact the Office of Personnel Services (407 Whitehurst) for information on campus employment.

Other scholarships and fellowships. Monitor announcements in the academic department and the Graduate College.

Special Programs

Certification Programs

Oklahoma State University offers State Department of Education-approved post-bachelor's certification programs for school counselors, psychometrists, reading specialists, and library media specialists. Certification is also offered in speech and language pathology and audiology and in special education (emotionally disturbed and learning disabilities).

Master's degrees are available in most of these programs and doctorates are available in many.

Post-master's level certification programs are available in: elementary school principal; school superintendent; secondary school principal; school psychologist; and school councelor.

Inquiries concerning any aspect of the Teacher Education program should be addressed to the Office of Teacher Education or the head of the department offering the program.

Off-Campus Programs

University Center at Tulsa

Oklahoma State University offers graduate courses at the University Center at Tulsa (UCT). All courses offered by OSU faculty are considered resident credit for degrees granted by Oklahoma State University. Courses offered by the other universities participating in UCT can be applied to OSU degree requirements as transfer credit.

The graduate and certification programs approved by the Oklahoma State Regents for Higher Education for Oklahoma State University to offer through the University Center at Tulsa are:

M.S. in Computing and Information Science*
M.S. in Health, Physical Education, and Recreation
Master of Business Administration
M.S. in Applied Behavioral Studies
  Emotionally Disturbed
  Learning Disabilities
  Community Counseling
Certification Program in School Psychology
M.S. in Curriculum and Instruction
  Elementary Education
  Curriculum and Supervision
  Reading Specialist
  Instructional Technology
M.S. in Higher Education
Certification Program in Educational Administration (Emphasis on Standard Certification for School Superintendent)
M.S. in Occupational and Adult Education (Emphasis in Human Resources Development or Adult and Continuing Education)
M.S. in Trade and Industrial Education
M.S. in Chemical Engineering
M.S. in Electrical Engineering
M.S. in Industrial Engineering and Management
M.S. in Mechanical Engineering
M.S. in Home Economics
  Family Relations and Child Development
  Home Economics Education and Community Services
  Housing, Interior Design, and Consumer Studies (Consumer Design)

*Approved but not currently offered.

Graduate Centers

Students make take one-half of the requirements for the master's degree at a Graduate Center provided they comply with the following conditions:

1. Each student working for a degree must comply with requirements for admission given in the *Catalog*.
2. At least 22 semester credit hours must be complete after the degree plan has been approved by the student's advisory committee and the dean of the Graduate College, and filed in the Graduate College. A minimum of 16 semester credit hours must be taken in residence on the Stillwater campus.
3. The thesis or report must be supervised and approved by resident members of the faculty teaching on the Stillwater campus.
4. Final examinations covering the entire graduate program are to be given by a committee selected by the major department and the dean of the Graduate College.
5. The last eight semester credit hours for the degree must be taken on the Stillwater campus unless a written request by the student to take the work at some other place is approved by the head of the major department and the dean of the Graduate College.

Off-campus Program in Engineering

A master's degree in engineering may be obtained with all course requirements being met at off-campus centers of Oklahoma State University, the University of Tulsa, and the University of Oklahoma. At least one-half of the hours needed must consist of courses taught by Graduate Faculty members of Oklahoma State University. The remainder of the hours may be made up of transfer credits from the University of Oklahoma earned on campus or at its off-campus centers and/or the University of Tulsa, and a maximum of eight hours of transfer credits from other institutions with approved graduate programs. All other requirements of the regular master's degree, as outlined in the *Catalog*, must be met.

Such a master's degree has the same designations as the one earned on-campus, except that the transcript will show the wording "Off-Campus."

Extension Credit

Any student registering in a graduate course to be taken by extension must make application for admission to the Graduate College.

Correspondence Credit

Oklahoma State University does not offer graduate courses by correspondence and does not accept credit taken by correspondence toward an advanced degree.

Mid-America State Universities Association (MASUA) Traveling Scholar Program

This program is designed to provide breadth and depth in opportunities for graduate study offered at MASUA universities by permitting advanced graduate students to apply at another MASUA university for one full term where they may utilize unique facilities or specializations.

To obtain more information about this program, interested students should contact the Graduate College.

Interdisciplinary Programs

Environmental Science

Program Coordinator John D. Vitek, Ph.D.

The environmental science program at Oklahoma State University emphasizes that an understanding of, and solution to, many environmental problems involves the application of skills and knowledge of more than one of the traditional disciplines. Graduate Faculty members from the agricultural, biological, social, and physical sciences and from engineering and education join for the purpose of offering graduate programs at both the master's and doctor's levels.

The University has had nine decades of experience and development in the application of scientific knowledge to society's problems. Important resources for graduate students are campus research and learning institutes and laboratories, cooperative programs with public and private agencies, and off-campus research and teaching facilities. Many of these are staffed by personnel drawn from more than one discipline, and many serve to address problems which are multidisciplinary or interdisciplinary in scope and solution. the environmental science degree programs at the University are designed to utilize these resources and serve students whose interests transcend the traditional demarcations of knowledge and whose goals include the broad understandings and skills obtained by crossing disciplinary lines in the classroom and laboratory.

Graduates from the environmental science program are expected to have skills and knowledge that are applicable to a wide range of research, management, and planning vocations. Government, industry, and private consulting firms offer employment opportunities for environmental science graduates.

Programs of Study. The breadth of offerings at Oklahoma State University affords flexibility to the student interested in any aspect of the environment. In some cases, the student may choose to integrate work from another discipline with work in a discipline for which all degree requirements are met. In other cases, the student may select course work and research supervision from several disciplines in order to focus on an environmental problem or subject not normally addressed by a single discipline.

The Master of Science Degree. To obtain the M.S. degree in environmental science, a student must complete the following 36-hour program: 10 hours of core courses, a three-hour seminar in environmental problem analysis, a minimum of 17 hours of courses in a thrust area, and a six-hour thesis. The thesis must deal with an environmental problem. Four thrust areas have been identified: energy, environmental education, renewable natural resources, and water. Specific requirements for the master's degree can be obtained from the program coordinator.

The Doctor of Philosophy Degree. To obtain the Ph.D. degree in environmental science, a student must propose and undertake a minimum of a 60-hour plan of study. The plan of study must include a minimum of 36 credit hours of course work that provides the student with expertise in understanding or solving a problem which is not normally addressed by a single discipline. The plan of study will reflect an emphasis in one of four thrust areas: energy, environmental education, renewable natural resources, and water. Students must write a dissertation dealing with an environmental problem. A maximum of 24 credit hours can be earned for the dissertation. (Minimum credit allowed is 15 credit hours.) Specific requirements for the doctoral degree can be obtained from the program coordinator.

The M.S. with Environmental Science Emphasis. To obtain the M.S. degree with an environmental science emphasis, the student must satisfy minimum degree requirements as specified by one of the cooperating departments (see list below). In addition the student will be required to take ENVIR 5103 and two courses outside the major department which provide breadth to the degree program.

The Ph.D. with Environmental Science Emphasis. To obtain a Ph.D. degree with an environmental science emphasis, the student must satisfy minimum degree requirements as specified by one of the cooperative Ph.D.-granting departments (see list below). In addition, the student will be required to take ENVIR 5103, a seminar in enviornmental problem analysis, and two additional courses outside the major department which provide breadth to the degree program.

Admission. A student wishing to participate in environmental science programs at OSU must apply to the Graduate College for admission. Application for the environmental science master's or doctoral degree must include a statement of educational and vocational goals and *three* letters of recommendation. International students *must* score 575 or above on the TOEFL.

Anyone interested in the environmental science *emphasis* should apply directly to the department in which they wish to earn a degree. The emphasis is completed by satisfying departmental and program requirements.

All applications to environmental science programs should be submitted at least 60 days before the opening of the semester for which enrollment is first intended. International students should supply all application materials by March 1st for fall enrollment, and July 1st for spring enrollment. The Graduate College will provide the necessary forms.

Financial Assistance. Fee-waiver scholarships are available through the Graduate College for environmental science students. Such scholarships are available for those who can qualify as Oklahoma residents. Priority is given to minority students, and those who can demonstrate financial need. To be considered, an ACT Family Financial Statement must be completed.

Graduate research assistantships are occasionally available through faculty members participating in the environmental science program or through one of the several research institutions or centers on campus. The initial application should specify an interest in an assistantship.

Cooperating Departments
Agricultural Economics
Agricultural Engineering
Agronomy
Animal Science
Biochemistry
Botany
Chemistry
Civil Engineering
Curriculum and Instruction
Economics
Forestry
Geography
Geology
Housing, Interior Design and Consumer Studies
Political Science
Psychology
Sociology
Wildlife and Fisheries Ecology
Zoology

Steering Committee
Daniel D. Badger, Agricultural Economics
Sterling L. Burkes, Zoology
Douglas C. Kent, Geology
James J. Lawler, Political Science
Edwin L. Miller, Forestry
Terence J. Mills, Curriculum and Instruction
John N. Veenstra, Civil Engineering
John D. Vitek, *Program Coordinator*, Geology
Sue E. Williams, Housing, Interior Design and Consumer Studies

(Specific requirements for degree programs can be obtained from the program coordinator in the Graduate College.)

Food Science

AnimalScience
Professor and Head Robert Totusek, Ph.D.
Biochemistry
Professor and Head Roger E. Koeppe, Ph.D.
Microbiology
Professor and Head Glenn W. Todd, Ph.D.
Food, Nutrition and Institution Administration
Professor and Interim Head Lea Ebro, Ph.D.

Food science is an interdisciplinary graduate program designed to provide an opportunity for students to acquire basic knowledge of food industry encompassing the biological and physical sciences. The increasing complexity of the problems involved in the production, processing, and utilization of food demands increased fundamental knowledge to solve these problems. There is a great demand for personnel with advanced training in the broad area of food science to staff research and quality assurance facilities of industry, universities and the federal government.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree programs requires an undergraduate major in animal science, dairy science, poultry science, food science, biochemistry, microbiology or human nutrition. Students majoring in other curricula may qualify by removing specific undergraduate deficiencies recognized by the student's graduate committee. A student enrolling in a degree program must have been accepted by an adviser prior to official admission.

Natural Science

This program leading to the M.S. degree is for science teachers and other individuals who desire a broader program than that offered in department programs. The goal of the program is to provide the student with a breadth of training in science and related areas, while concentrating on one area of science. The program is administered by the dean of the Graduate College. Requests for additional information about the program should be directed to the Graduate College.

Manufacturing Systems Engineering

This interdisciplinary master's degree is designed to address the needs of manufacturing managers, particularly those in small- to medium-size firms, in all aspects of manufacturing systems,

including management as well as the hardware aspects of manufacturing.

This program, jointly sponsored by the Schools of Electrical and Computer Engineering, Industrial Engineering and Management, and Mechanical and Aerospace Engineering, produces graduates capable of direct contributions in the design, selection, and implementation of up-to-date computerized manufacturing systems.

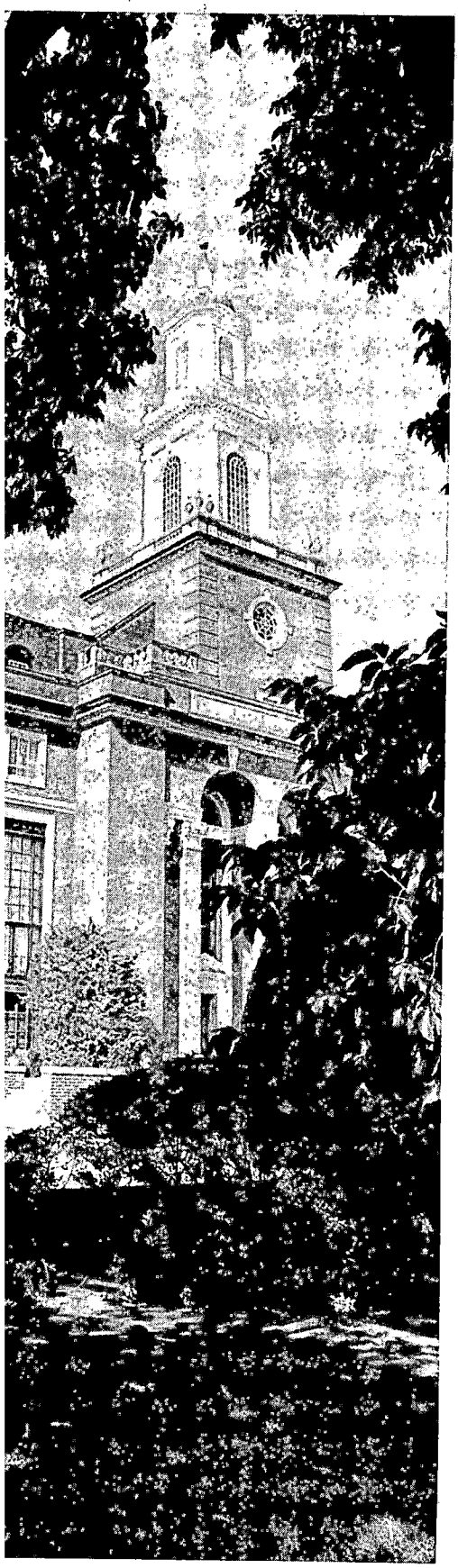
Students wishing to pursue this degree enroll in one of the three schools listed above and are advised by a faculty member in that department. The student's advisory committee is composed of members from each of the three schools. Students desiring more information should contact the program coordinator in the School of Industrial Engineering.



Graduate Admission Requirements

Requirements are subject to departmental revision.

Department/Major	Degree	GRE Gen	GRE Sub	GMAT	Miller Analogy (MAT)	Additional Requirements
1 = Test is required, 2 = Test is recommended, 3 = GRE or Miller may be interchanged, with departmental consent, 4 = GRE or GMAT may be interchanged.						
AGRICULTURE						
Agricultural Economics	MS, PhD					No entrance exam.
Agricultural Education	MS, EdD					EdD: GRE or Miller.
Agriculture (Agricultural Economics, Agricultural Education, Agronomy, Animal Science, Entomology, Forest Resources, Horticulture & Landscape Architecture, & Plant Pathology)	MAg					See specific departmental section.
Agronomy	MS					No entrance exam.
Crop Science	PhD					No entrance exam.
Soil Science	PhD					No entrance exam.
Animal Science	MS					No entrance exam.
Animal Breeding	PhD					No entrance exam.
Animal Nutrition	PhD					No entrance exam.
Dairy Science	MS					No entrance exam.
Poultry Science	MS					No entrance exam.
Biochemistry	MS, PhD	2	2			American Chemical Society exams in chemistry.
Entomology	MS, PhD	2	2			
Forest Resources	MS					No entrance exam.
Horticulture	MS					No entrance exam.
Plant Pathology	MS, PhD	1	2			No minimum score.
ARTS AND SCIENCES						
Botany	MS, PhD	1	2			No minimum score.
Chemistry	MS, PhD	2	2	2		Entrance exams.
Computing and Information Science	MS	1	2			MS: 75 percentile minimum mathematical aptitude.
	PhD	1	1			PhD: 75 percentile minimum mathematical aptitude; 50 percentile minimum advanced.
English	MA, PhD					MA: 3.00 GPA; BA in English or equivalent for TESL of Technical Writing. PhD: 3.50 GPA; MA in English.
Geography	MS	2				
Geology	MS	1	2			
Health, Physical Education and Recreation	MS	1	1			No minimum score.
History	MA	1	1			
	PhD	1	1			
Mass Communications	MS					No entrance exam.
Mathematics	MS, PhD					No entrance exam.
Applied Mathematics	MS					No entrance exam.
Microbiology	MS, PhD	1				No minimum score.
Natural Science	MS					No entrance exam.
Philosophy	MA	2	2			
Physics	MS, PhD	2	2			
Political Science	MA	1				See department admission requirements.



Department/Major	Degree	GRE Apt	GRE Adv	GMAT	Miller Analogy (MAT)	Additional Requirements
Psychology	PhD	1				No minimum score. Need departmental application & 3 letters of recommendation.
Sociology	MS, PhD	2				GRE required if GPA less than 3.00.
Corrections	MS	2				
Speech						
Speech Communication	MA	2				3.00 GPA minimum & 3 letters of recommendation. (English is second language, TSE: 220 minimum; TOEFL: 550 minimum.)
Speech and Language Pathology and Audiology		1				(English is second language, TSE: 220 minimum; TOEFL: 550 minimum.)
Theater						No entrance exam.
Statistics	MS, PhD					No entrance exam.
Wildlife and Fisheries Ecology	MS, PhD	1	1			Aptitude: MS-1000, PhD-1150. Advanced: MS-600, PhD-650.
Zoology	MS, PhD	1	1			Same as Wildlife and Fisheries Ecology.
BUSINESS ADMINISTRATION						
Accounting	MS			1		GPA 3.25 or higher and GMAT score of minimum 525.
Business Administration	MBA			1		3 letters of recommendation and an essay.
Business Administration emphasis in:						
Accounting	PhD			1		GMAT required, high GPA, & 3 letters of recommendation.
Finance	PhD			1		3 letters of recommendation.
Management	PhD			1		3 letters of recommendation.
Marketing	PhD			1		3 letters of recommendation.
Economics	MS, PhD	1				
EDUCATION						
Applied Behavioral Studies	MS, PhD, EdD	3			3	
Counseling and Student Personnel	MS, EdD, EdS	3			3	
Curriculum and Instruction	MS, EdD, EdS				1	No entrance exam.
Educational Administration	MS, EdD, EdS	3			3	GRE: 950, MAT: 47
Higher Education	MS, EdD, EdS	3			3	GRE: 950, MAT: 47.
Occupational and Adult Education	MS, EdD, EdS	3			3	MS: no entrance exam. EdS & EdD:MAT or GRE.
Distributive Education	MS					
Industrial Arts Education	MS					
Technical Education	MS					
Trade & Industrial Education	MS					

Department/Major	Degree	GRE Apt	GRE Adv	GMAT	Miller Analogy (MAT)	Additional Requirements
ENGINEERING						
Agricultural Engineering	MAgE, MS, PhD					No entrance exam.
Architecture	MArch					See specific school admission requirements.
Architectural Engineering	MArchE					
Chemical Engineering	MChemE, MS, PhD	2	2			
Civil Engineering	MCivilE, MS, PhD					No entrance exam.
Environmental Engineering	MEnvirE, MS					No entrance exam.
Electrical Engineering	MElecE, MS, PhD					No entrance exam.
General Engineering	MGenE, MS, PhD	2				
Industrial Engineering and Management	MIE&Mgmt, MS, PhD					No entrance exam.
Mechanical Engineering	MMechE, MS, PhD	2	2			
Nuclear Engineering	MS	2	2			
HOME ECONOMICS						
Clothing, Textiles and Merchandising	MS					
Family Relations and Child Development	MS	1 (for FRCD emphasis)			3	No entrance exam for other areas.
Food, Nutrition and Institution Administration	MS					
Home Economics (Clothing, Textiles and Merchandising; Family Relations and Child Development; Food, Nutrition, and Institution Administration; Home Economics Education and Community Services; Housing, Interior Design and Consumer Studies.)	PhD	1 (for FRCD emphasis)			3	No entrance exam for other areas.
Home Economics Education and Community Services	MS, EdD					No entrance exam.
Housing, Interior Design and Consumer Studies	MS					No entrance exam.
INTERDISCIPLINARY						
Environmental Science	MS, PhD					No entrance exam; 575 TOEFL.
Food Science	MS, PhD					No entrance exam.
Manufacturing Systems Engineering	MMSE					
Natural Science	MS					
VETERINARY MEDICINE						
Physiological Science	MS, PhD	1	1			GPA last 60 hrs. B.S. X GRE must equal 3000 or above for MS or 3150 or above for PhD.
Veterinary Parasitology	MS, PhD	1	1			GPA last 60 hrs x . General score on GRE must equal 3000 or above for unqualified admission.
Veterinary Pathology	MS, PhD	1				No minimum score.



General Regulations

Responsibilities

All graduate students are expected to read and to comply with the written regulations. The regulations presented in the Catalog may be supplemented by written departmental or program requirements available at departmental offices.

General regulations in the following sections relate to requirements for admission, enrollment, and academic standing. Succeeding sections outline requirements for the following degrees: master's, Doctor of Philosophy, Doctor of Education, and Specialist in Education. Particular attention should be given to timing and substantive requirements for matriculation, especially admission, the plan of study, residence, language proficiency, research and thesis or report, and graduation. The regulations are prescribed by the Graduate Faculty with the intent of assuring high-quality graduate programs and effective interaction of Graduate Faculty members and graduate students.

A request for waiver of any regulation must be made in writing to the dean of the Graduate College for presentation to the Graduate Council for action. Such a request must be approved by the major adviser. The student and the major adviser should present sufficient information to allow the Graduate Council to evaluate reasons for requesting a waiver and to make a decision concerning departure from normal Graduate College regulations.

Admission to the Graduate College

Qualified graduates of colleges and universities of recognized standing are eligible to seek admission to the Graduate College. Applicants must submit the completed application form to the Graduate College, with official transcripts of all academic work and degrees received.

1. The student should request all institutions previously attended to send two copies of the official transcript to the Graduate College, Oklahoma State University.
2. To be official, the transcript must show the complete scholastic record, bear the official seal of the institution, and be signed by the issuing officer.

To assure adequate time, application forms and transcripts should be received by the Graduate College at least 30 days prior to expected enrollment. *Transcripts and other credentials become the property of the University and must remain on file in the Office of the Registrar.*

Standardized Test Scores

Many departments require standardized test scores, such as the Graduate Record Examination. Applicants must contact the appropriate department head for information regarding departmental requirements for these tests. (Refer to the Table "Graduate Admission Requirements.")

International Student Admission

International applicants are expected to submit applications, financial affidavits, transcripts, and results of the Test of English as a Foreign Language (TOEFL) examination by March 1 for fall enrollment and by July 1 for spring enrollment.

TOEFL. As a condition of admission to regular graduate study at OSU, all persons for whom English is a second language are required to present a score of 550 or above on the TOEFL regardless of the number of semesters or terms completed in other institutions of higher education, including OSU, or prior enrollment in English language programs. Some departments require a score above 550. Students should contact the department for specific TOEFL requirements. Persons who present a TOEFL score of 500 or above and who demonstrate unusual academic promise may be admitted to graduate study on probationary status, but the number of such persons will not exceed two percent of the regularly enrolled graduate student population of the previous fall semester.

Submission of the TOEFL score with the application is never waived.

English Proficiency Test for International Students. Before international students who have no prior course work from a U.S. university can complete their first enrollment at Oklahoma State University, they are required to take the Test of English Language Profiency (TELP) administered by the University Testing and Evaluation Service. This test, scheduled on campus before each semester and summer session, is required in addition to the TOEFL. Should a student's composite score on the TELP indicate a need for further work in English, the student is required to enroll in a nongraduate-credit English course until the deficiency is removed. This enrollment is concurrent with courses enrolled in for the advanced degree.

Spoken English Proficiency for Employment. OSU policy requires all persons for whom English is a second language to demonstrate an acceptable level of spoken English before being employed as a member of the faculty, as a teaching assistant or teaching associate, or for other instructionally related assignments. Employment requires a score of 220 or above on the Test of Spoken English (TSE.) This test may be taken on campus or at any of the many testing sites provided by the Educational Testing Service. This test score is used as a condition of employment, not a condition for admission to the Graduate College.

Types of Admission

Oklahoma State University uses the 4.00 scale to calculate grade- point averages; that is, an "A" yields four points per credit hour, a "B" yields three points, a "C" yields two points, a "D" yields one point, and an "F" yields zero points. If an applicant's prior college or university uses a different scale, the grade-point average must be converted to the 4.00 scale to determine whether the applicant meets Oklahoma State University grade-point admission requirements for one of the types of admission. Therefore, all references to grade-point averages are based on a 4.00 scale. References to credit hours are to semester credit hours.

When the applicant's file is complete, the faculty in the department or program of the student's area of interest is asked to review the material and recommend an admission status to the dean of the Graduate College. The final decision for admission to the Graduate College is determined by the dean on the basis of the department's recommendations, prior academic performance of the applicant, and availability of space, facilities, and faculty advisers in the program. The decision is conveyed to the applicant by means of a letter. Admission to the Graduate College means only that the student will be permitted to enroll in courses through the Graduate College. It does not necessarily imply that the student has been or will be admitted to a program leading to an advanced degree or that the student will be able to obtain a graduate degree. Opportunities for receiving graduate credit and graduate degrees are dependent on the admission status granted to the student.

Unqualified Admission. Students planning to work toward a graduate degree in a recognized graduate program may be admitted without qualification provided they meet all Graduate College and departmental requirements.

1. Admission to full graduate status in a degree program is contingent on the presentation of an undergraduate degree from an accredited college or university, an acceptable academic record and the recommendation of the major department and the dean of the Graduate College.
2. If a student fails to provide proof of the receipt of an undergraduate degree or fails to remain in good standing academically, academic participation may be terminated or the status may be changed to probationary or unclassified.

Special Student Status. An applicant may be admitted to the Graduate College as a special student if he or she does not have immediate plans to become a degree candidate but wants to take graduate courses, prerequisites or other courses. *International students with an F-1 visa may not enroll as special students.*

1. A special student must meet all of the academic requirements described for unqualified admission except that he or she need not be admitted or recommended for admission by a department or program.
2. The student is responsible for filing a new application for admission to the Graduate College should he or she wish to become a degree candidate. The application will be evaluated by faculty of the department or program and the dean of the Graduate College to ascertain admissibility to the degree program.
3. As such work is not guided by a plan of study or approved by an adviser, no more than nine semester credit hours of course work taken while a special student may be used on a plan of study to meet requirements for a degree.

Graduate Student—Professional. Students with a bachelor's degree or equivalent level of academic attainment who wish to improve their professional competence by participating in post-baccalaureate study in a professional degree program may be admitted in the status of Graduate Student—Professional.

1. Students admitted in this status, but desiring admission to a graduate degree program, must submit a new application.
2. The student should be aware that only selected courses taken in this category, as recommended by the major adviser and approved by the Graduate College, may be used to meet requirements for advanced degrees such as the Master of Science, Doctor of Education, or Doctor of Philosophy. Not all courses used to meet requirements for a professional degree can be used to meet requirements for graduate degrees.

Unclassified Graduate Student Status. Students with bachelor's degrees from accredited colleges or universities may be admitted as

"unclassified students" in the Graduate College on the basis of educational services, other than degrees, that can be extended to them in meeting their individual needs.

1. The category of unclassified graduate students may include individuals working on teacher certification and post-baccalaureate objectives other than a graduate degree.
2. No credit earned under this classification can be used toward a graduate degree at Oklahoma State University.

Probation or Provisional Status. Applicants who are graduates of accredited colleges and universities who have attained less than an acceptable grade-point average in all undergraduate work may be admitted provisionally or on probation on recommendation of the major department at Oklahoma State University and concurrence by the dean of the Graduate College. Alternatively, a student who has been in full graduate standing or special student status may be placed on probation or continued provisionally if academic performance in courses taken in a graduate status at Oklahoma State University falls below a "B" average. Students with acceptable academic records but without the background necessary for a particular degree program may also be admitted provisionally. Students admitted provisionally or on a probationary basis may be granted full graduate standing after performing at an acceptable academic level. Failure to meet required academic levels while in a probationary status will result in dismissal from the Graduate College. *International students holding F-1 visas are not eligible for provisional admission.*

Transfer of Graduate Credits

Transfer of graduate credits to the Graduate College is possible only when the student was formally admitted to the graduate college at another accredited institution and the course(s) is certified as graduate credit by that institution.

The work must be recommended by the adviser as a part of an approved plan of study. The acceptance of transferred work requires the recommendation of the student's advisory committee and approved by the dean of the Graduate College at the time a program of study is planned. A maximum of nine credit hours with a grade of "B" or better in each course can be accepted as transfer credits toward a degree.

Departmental or Program Requirements

Departmental or program requirements are in addition to the general requirements. The decision is made within the department or major field regarding the substitution for OSU requirements of similar work taken at another institution.

A student who desires further information about departmental and admission and curricular requirements should write to the department in which he or she desires to major.

Readmission to the Graduate College

A prospective student must enroll for courses at OSU within a year after his or her admission date to retain active status. A graduate or prospective student who does not enroll within one year must reapply for admission. A student who interrupts enrollment for one year must be readmitted and will then be subject to the regulations in effect at the time of readmission.

Audit

A student who does not wish to receive credit in a course may, with the approvals of the student's adviser and the instructor of the course concerned, attend the class strictly as a visitor. A student who applies to audit a course promises that he or she will not use the audit to avoid the rule against excessive hours, and that he or she will not petition or ask in any way for the privilege of taking an examination to obtain credit after he or she has audited the course. (Laboratory courses, private music lessons and art courses are not open for audit.)

A student who has established a permanent record at OSU may have the audited course recorded on his or her transcript with the word "audit" appearing in place of the grade. Not later than one week after the close of that semester, the student must present to the Office of the Registrar the instructor's copy of the audit form with a signed statement from the instructor, on the reverse side, that it is appropriate for the course to be recorded on the student's transcript.

Any individual 65 years or older may obtain an audit form at no charge.

Tuition Regulations

Tuition and Fees

Refer to the section on "Costs."

Tuition Waiver Policy for Graduate Assistants and Spouses

The University will waive the nonresident tuition for graduate assistants who are employed at least one-fourth time in instruction, research or extension.

The nonresident tuition for summer will be waived even if the student is not employed as a graduate assistant for that period if the student held an assistantship for the preceding spring semester.

A spouse of a nonresident student employed as a graduate assistant for at least one-quarter time is also eligible for a nonresident tuition waiver.

Enrollment

Students with a bachelor's degree are expected to register in the Graduate College unless they want to obtain another bachelor's degree. If they register as an undergraduate, the courses taken cannot be given graduate credit at a later date.

Students in the Graduate College may enroll in a course which does not carry graduate credit or audit courses if such courses are recommended by an adviser and approved by the dean of the Graduate College.

Students who desire to enroll concurrently in another institution or by extension at OSU must secure approval in advance from the dean of the Graduate College. Forms are available in the Graduate College.

An advance fee payment is required of all new and readmitted students.

Students will be permitted to enroll (late fee will be charged) or to add a course through the first week of a semester or summer session. For short courses, students will not be permitted to enroll after the first day of the course.

Enrollment Procedure

1. Enrollment forms (trial schedules) are available in the Graduate College.
2. Advanced degree candidates have their trial schedule forms approved and signed by their departmental advisers and take them to the Graduate College prior to enrolling. Special and unclassified students have their trial schedule forms approved in the Graduate College prior to enrolling.
3. After having the trial schedule form approved in the Graduate College, graduate students complete the enrollment process in the Sectioning Room located on the fourth floor of the Student Union.

Phone-in Enrollment

Individuals residing outside Stillwater may wish to take advantage of the phone-in enrollment procedure. Graduate students may enroll by phone if they have been accepted into the Graduate College, are continuing students, or have taken courses at OSU since 1982. Students must have no academic or financial holds on their enrollment and must have the required $40 advance fee payment on file in the Office of the Bursar.

Oklahoma residents may use the toll-free number: 1-800-522-6809; others may use the 405-624-6368.

Minimum and Maximum Hours of Enrollment

Any graduate student using the facilities and faculty resources of the University must be enrolled. Every graduate student is expected to satisfactorily complete no fewer than six semester credit hours during the academic year (fall, spring and summer) until the degree is awarded. Students may satisfy this requirement by enrolling for the required hours during any one term or by continuous enrollment during the three terms. The total registration shall not exceed 18 credit hours for a semester or nine credit hours for a summer session. Regardless of the number of hours taken, a student may not count more than 16 credit hours taken in the fall or spring semester nor more than nine semester credit hours earned in a summer session toward a degree. For short-course sessions less than eight weeks in length, enrollment shall not exceed one credit hour for each week. Students in the Graduate College who are not taking any courses for graduate credit may register for the number of credit hours recommended by their advisers and approved by the dean of the Graduate College.

Enrollment Regulations for Graduate Assistants and Fellows. Graduate students employed by the University part time may register only for the amount of credit recommended by the head of the major department and approved by the dean of the Graduate College. In general, students employed 22 hours per week may not register for more than 10 semester credit hours of course work for a semester and five hours during a summer session. Other employment will permit registration for an appropriate number of hours. Graduate students whose employment is such that results will be used for a thesis, however, may register for additional thesis credit as recommended by the research adviser and approved by the dean of the Graduate College.

Any graduate student holding an assistantship or fellowship must enroll in at least six resident semester credit hours during the fall and spring

semesters and at least three resident semester credit hours for each summer session.

If a graduate assistant enrolls in more credit hours than allowed for percentage of time employed, a petition for excessive hours, available in the Graduate College, must be completed and returned to the Graduate College for approval.

Employment—Enrollment

If Employed:	*Petition to take:*	
	Fall/Spring	*Summer*
100%or full-time	more than 4 hours	more than 2 hours
75% or 3/4 time	more than 7 hours	more than 3 hours
60%	more than 8 hours	more than 4 hours
50% or 1/2 time	more than 10 hours	more than 5 hours
30-40%	more than 12 hours	more than 6 hours
25% or 1/4 time	more than 13 hours	more than 7 hours

Full-time or Half-time Status. Full-time or half-time status of graduate students is:

Regular Semester

Full-time	*Half-time*
9 or more hrs.	4-8 hrs.

Summer Session

Full-time	*Half-time*
4 or more hrs.	2-3 hrs.

The Office of the Registrar considers employment as a teaching or research assistant when determining enrollment status. A student holding a 0.50 FTE graduate assistant appointment, and enrolled in a minimum of six hours during the Fall or Spring semester, and three hours during the summer semester will be certified as a full-time graduate student.

Enrollment During the Research Phase

Because enrollment reflects the involvement of University faculty members, the graduate student must maintain continuous enrollment in thesis and/or problems courses for credit during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which may apply toward a degree.

All students who plan to complete the requirements for a degree must be enrolled in not fewer than *two* hours of thesis credit (or course work credit for master's candidates only) for the semester or summer session in which the examination is scheduled, or other requirements are met.

Academic Regulations

Refer also to the sections on "Adding Courses," "Dropping Courses," and "Withdrawing from the University."

Graduate-credit Courses

Courses numbered 5000 and above are primarily for graduate students, and only graduate students and seniors who have obtained prior approval may enroll. The majority of courses on the master's and doctoral plans of study will be 5000 level and above.

Courses numbered 3000 and 4000 that are identified by an asterisk in the "Course Listings" of the *Catalog* can be taken by graduate students. Graduate students enrolled in these courses will be considered as taking the courses for graduate credit and expected to fulfill all academic requirements as proposed by the professor.

Courses numbered 3000 and 4000 may be used to meet requirements for a graduate degree on the plan of study if approved by the student's advisory committee and the dean of the Graduate College. Courses that are not identified by an asterisk may not be used to fulfill requirements for a graduate degree.

Academic Standing

Minimum Grade Requirements. A grade-point average of "B" (3.00) is required to (1) maintain good standing as a graduate student and (2) meet requirements for a degree. In determining whether a student has met minimum requirements for a degree, grades for courses on the plan of study are averaged separately from other courses not on the plan of study. A student must have a "B" grade average in all courses on the plan of study; and also, a "B" grade average in thesis, report, and problem courses. After a student has completed a course, it cannot be dropped from the plan because of a low grade, unless the change in the plan of study is first approved in writing by the student's adviser, and then by the dean of the Graduate College.

A course with a grade below "C" cannot be used as part of the minimum number of semester credit hours required for the degree.

Some departments have more stringent requirements. The major department should be consulted concerning minimum grade requirements.

Academic Warning and Strict Academic Probation. If any student in good academic standing earns a grade-point average for a semester less than 3.00, a "warning" letter is sent as a reminder that the Graduate College requires a minimum grade-point average of 3.00. The semester grade-point average is based upon total enrollment, regardless of course level or whether the courses were taken as prerequisites or for personal interest.

If the grade-point average falls below 3.00 again in the next semester, the student is placed on "strict academic probation." On "strict academic probation," a minimum grade of "B" must be earned in every class. Failure to earn a "B" in each class results in dismissal from the University.

Students are notified by letter each semester in which grades indicate a lack of satisfactory progress toward a degree.

Grades for Thesis (5000) and Dissertation (6000). The grade of "R," indicating research progress, may be assigned to thesis (5000) and dissertation (6000) courses until the research is finished. Advisers also have the option of assigning a letter grade each semester. By assigning the grade of "R," the adviser acknowledges that the student has made progress on thesis or dissertation research. Upon completion of the thesis or dissertation, the adviser submits a Change of Grade form to have the final grade entered for the thesis or dissertation.

Pass–no Pass Grading System. The "P" or "NP" grade refers only to the final grade in the course as recorded by the Office of the Registrar. Homework will be assigned and evaluated, and tests and examinations will be given. Students taking the course on a "P" or "NP" basis are expected to satisfy these course requirements. "P" indicates a grade equivalent to an "A", "B", or "C" while "NP" indicates a grade equivalent to "D", "F"or "WF".

Graduate students may take a course utilizing the "Pass–No Pass" grading system with the consent of their major adviser and the dean of the Graduate College, but courses taken under this system *cannot* be used on a plan of study to meet graduate degree requirements unless the following requirements are met.

A graduate student wishing to use a course taken on a "Pass–No Pass" basis on his or her plan of study to meet degree requirements *must* submit a letter along with the Trial Schedule form at the time of enrollment to the major adviser. The major adviser will consider the request and if approved, the letter and Trial Schedule form will be submitted to the dean of the Graduate College for approval. A student who chooses the Pass–no Pass grading system may change to the usual grading system with the consent of his or her major adviser and the dean of the Graduate College any time prior to the second week of classes for a semester or summer session. Once the deadline has passed, a student will not be permitted to change his or her choice of grading system.

Grade Appeals. A student may appeal a grade given by an instructor in a case in which he or she believes the grade awarded is inconsistent with announced grading policy. The student should consult the *Student Rights and Responsibilities* pamphlet or contact the Office of the Vice-President for Academic Affairs and Research for information regarding initiating the appeals process.

Application for Diploma—Graduation

At the time of enrollment for the last semester or summer session of work toward a degree, the student completes an Application for Diploma card. Completion of that card initiates clearance procedure toward graduation by the Graduate College and the Office of the Registrar. The student is billed for the graduation fee along with tuition. If all requirements for the degree are not met according to deadlines specified in the Graduate College Calendar, the student must complete a new Application for Diploma at the time of re-enrollment. *Applications for degrees will not be accepted after the first two weeks of a regular semester or the first week of a summer session.*

Records and Transcripts

All permanent records are stored in the Office of the Registrar in Whitehurst Hall. Requests for grades, transcripts and diplomas should be made to that Office.

A graduate student who does not complete the requirements in time to receive the degree at the end of the semester may secure a statement from the Office of the Registrar when all requirements for the degree have been satisfied. Such a statement will not be issued until all grades for the semester have been recorded.

Master's Degree Programs

Accounting, MS
Agricultural Economics, MS
Agricultural Education, MS
Agricultural Engineering, MAgE, MS
Agriculture, MAg (Agricultural Economics, Agricultural Education, Agronomy, Animal Science, Entomology, Forest Resources, Horticulture and Landscape Architecture, and Plant Pathology)
Agronomy, MS
Animal Science, MS
Applied Behavioral Studies, MS
Applied Mathematics, MS
Architectural Engineering, MArchE
Architecture, MArch
Biochemistry, MS
Botany, MS
Business Administration, MBA
Chemical Engineering, MChemE, MS
Chemistry, MS
Civil Engineering, MCivilE, MS
Clothing, Textiles and Merchandising, MS
Computing and Information Science, MS
Corrections, MS
Counseling and Student Personnel, MS
Curriculum and Instruction, MS
Dairy Science, MS
Distributive Education, MS
Economics, MS
Educational Administration, MS
Electrical Engineering, MElecE, MS
English, MA
Entomology, MS
Environmental Engineering, MEnvirE, MS
Environmental Science, MS
Family Relations and Child Development, MS
Food, Nutrition and Institution Administration, MS
Food Science, MS
Forest Resources, MS
General Engineering, MGenE, MS
Geography, MS
Geology, MS
Health, Physical Education and Recreation, MS
Higher Education, MS
History, MA
Home Economics Education and Community Services, MS
Horticulture, MS
Housing, Interior Design, and Consumer Studies, MS
Industrial Arts Education, MS
Industrial Engineering and Management, MIE&Mgmt, MS
Manufacturing Systems Engineering, MMSE
Mass Communications, MS
Mathematics, MS
Mechanical Engineering, MMechE, MS
Microbiology, MS
Natural Science, MS
Nuclear Engineering, MS
Occupational and Adult Education, MS
Philosophy, MA
Physics, MS
Physiological Science, MS
Plant Pathology, MS
Political Science, MA
Poultry Science, MS
Psychology, MS
Sociology, MS
Speech, MA (Speech Communication; Speech and Language Pathology and Audiology; Theater)
Statistics, MS
Technical Education, MS
Trade and Industrial Education, MS
Veterinary Parasitology, MS
Veterinary Pathology, MS
Wildlife and Fisheries Ecology, MS
Zoology, MS

Abbreviations:

MA	Master of Arts
MAgE	Master of Agricultural Engineering
MAg	Master of Agriculture
MArch	Master of Architecture
MArchE	Master of Architectural Engineering
MBA	Master of Business Administration
MChemE	Master of Chemical Engineering
MCivilE	Master of Civil Engineering
MElecE	Master of Electrical Engineering
MEnvirE	Master of Environmental Engineering
MGenE	Master of General Engineering
MIE&Mgmt	Master of Industrial Engineering & Management
MMSE	Master of Manufacturing Systems Engineering
MMechE	Master of Mechanical Engineering
MS	Master of Science

Admission to a Program. Some departments require that any student seeking a master's degree take an examination (e.g. GRE, GMAT) before being admitted to a program of study. See table on "Graduate Admission Requirements" or contact the head of the major department.

Basic Requirements. The master's degree may be earned by one of three plans:

Plan I—with thesis, 30 credit hours, including six credit hours for the thesis;

Plan II—with report, 32 credit hours, including two credit hours for the report;

Plan III—with no thesis or report, 32 credit hours of course work including the creative component. The Plan III program *must* contain a creative component which is explicitly identified on the plan of study. For example, the creative element may be a special report, an annotated bibliography, a project in research or design, or other creative activity.

The number of credits specified for each plan are minimums set by the Graduate College. Departmental requirements may exceed these.

The major department, with the approval of the dean of the Graduate College, decides which alternatives are open to the candidates. Some departments also require a minimum number of semester credit hours of upper-division and graduate courses in the major field, including courses taken as an undergraduate.

Residence Requirements. Candidates for a master's degree must complete a minimum of 21 semester credit hours in residence if they follow Plan I, or 23 semester credit hours if they follow Plan II or III. The exception is that with the written recommendation of the head of the major department, the dean of the Graduate College may authorize the thesis or report to be prepared *in absentia* and the credit counted toward meeting the residence requirement. When this option is utilized, the student must register at the beginning of a semester and conduct the study or research under the direction of a member of the graduate faculty of the appropriate department.

Students taking courses at Graduate Centers may decrease the residence requirements to 16 semester credit hours if they have study plans approved in advance by the major department and the dean of the Graduate College.

Nine semester credit hours of the 30 or 32 required for the degree may be completed: (1) by residence courses taken at an accredited college or university, (2) by extension or in-service courses from Oklahoma State University or from another accredited institution, or (3) by a combination of these methods. Students may petition the dean for exceptions and deviations. Courses taken in Stillwater through the OSU extension program are not considered as residence credit.

The last eight semester credit hours for the degree must be taken on the Stillwater campus unless a written request by the student to take the work at another location is approved by the head of the major department and the dean of the Graduate College.

Advisement. The student should go to the department head, who may assign an adviser or advisory committee to assist the student in planning and pursuing the entire program for a degree. The advisory committee must include a minimum of three members of the Graduate Faculty.

Level of Courses Applied to Graduate Degree. Graduate students must enroll in no fewer than 21 semester credit hours of 5000- and 6000-level courses through Oklahoma State University as presented on the plan of study to meet requirements for the master's degree.

Plan of Study. The preliminary plan of study for the degree must be filed in the Graduate College *prior to enrollment for the 17th graduate credit hour* for students working for a master's degree in residence, or *prior to enrollment for the ninth graduate credit hour* for students pursuing graduate study at Graduate Centers. The student should secure the plan of study forms from the Graduate College, develop the plan with the adviser, and file three copies in the Graduate College. All copies must be signed by the adviser and by two other members of the graduate faculty in the major department , and approved by the dean of the Graduate College.

Students seeking a master's degree in Teacher Education must be admitted to the master's curriculum in Teacher Education before submitting a plan of study.

The plan of study is subject to modification as the student progresses, but all changes must have the approval of the adviser. A final, accurate plan of study must be filed in the Graduate College by the end of the second week of the semester or session in which the degree is to be conferred.

Graduate credit used to obtain one master's degree cannot be counted toward another master's degree.

Major Subject or Field. A major field of study may cross departmental lines subject to the decision of the major department. *Graduate students must enroll in no fewer than 21 semester credit hours of 5000- and 6000-level courses through*

Oklahoma State University as presented on the plan of study to meet requirements for the master's degree.

Before receiving a master's degree, the student must have completed in the major department or field a minimum of 16 semester credit hours above the prerequisites required for graduate work in that subject or field. A student who lacks 10 semester credit hours or fewer of the prerequisites required by the major department or field may count these credits as part of the requirements of the degree if the courses are on a complete study plan approved by the head of the department before it is presented to the dean of the Graduate College.

Minor Subject or Field. To minor in a subject or field, a student must complete, as a minimum, enough semester credit hours as a graduate student to satisfy, with undergraduate credits, the requirements for an undergraduate major in that department. The minor may vary from six to 15 semester credit hours.

A student may minor in two departments if the requirements are met for each and the major department and both minor departments approve.

Language Requirements. A candidate for the master's degree may be required to demonstrate a reading knowledge of a modern foreign language. Any such requirement of the department is included on the plan of study and is to be filled out at the time the preliminary plan is approved by the student's adviser.

If a foreign language is required, the head of the major department must certify that it has been met before a final examination can be scheduled.

A foreign language requirement for a master's degree may be met either by examination or by college credit, according to individual department requirement.

Written Examinations. Some departments require a written examination covering the major and minor fields. It is usually taken before the thesis or report has been completed. Arrangements for taking the examination should be made with the department at least three weeks in advance. The written examination must be passed before a final examination is scheduled.

A student who fails all or part of the written examination should consult the chairman of the examination committee to find out what must be done before taking another examination.

If a student does not complete requirements for the master's degree within two years after passing the written examination, a new plan of study must be submitted and another written examination passed.

Thesis or Report. Any student working on a thesis or report should purchase a copy of the *Graduate College Style Manual*, published by and available from the Graduate College. A thesis or report must conform to the specifications set forth in this manual. Variations may be made from the specifications only if requested by the head of the department and approved by the dean of the Graduate College.

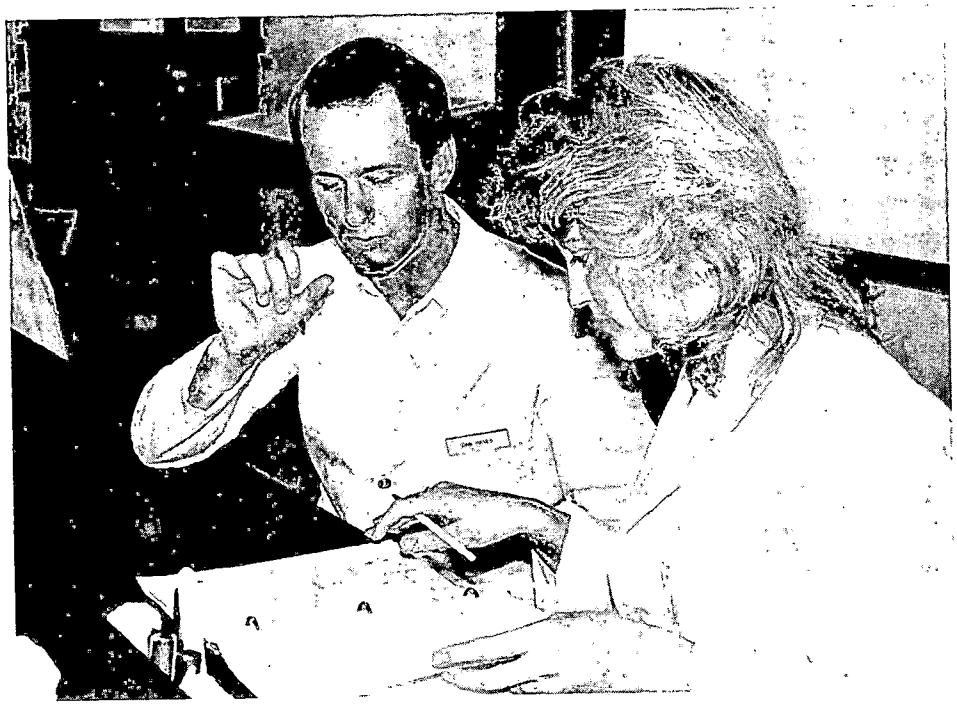
After completing the research, the student prepares a final draft copy (complete and legible final draft) of the proposed thesis or report, and submits a copy, along with the abstract, to each member of the examining committee, and to the Graduate College. When the final draft copy is submitted, the title must be final, and any request for waiver of the *Graduate College Style Manual* recommendations must be made. The proof copy

Summary of Procedure for Master's Degree

Dean-Dean of Graduate College
GCO-Graduate College Office
DH-Department Head
TA-Temporary Adviser
Adviser-Person designated by department head to advise
Comm-Committee

Procedure	Initiate through / Approved by	Time
1. Apply for admission. (Follow instruction sheet carefully. If relevant, see "Requirements for Admission to Teacher Education" in the "College of Education.")	Dean / Dean	Complete 30 days prior to enrollment. (60 days prior for international students.)
2. Read "General Regulations" and "Master's Degree" sections, then secure registration materials in the Graduate College.	GCO	
3. Secure assignment of a temporary adviser from department head of major department and enroll for the first semester.	DH & TA / Dean	
4. Plan program with advice of department head or designated Graduate Faculty member and submit plan of study.	Adviser / Dean	Prior to enrolling for the 17th credit for resident students and prior to enrolling for the 9th credit hour for extension students.
5. Proceed with course work and research assignment.	Adviser	
6. Complete the Application for Diploma card at the time of enrollment; make any corrections needed on plan of study.	GCO	At the time of enrollment for the semester or term in which the degree is to be conferred. (Application good for stated degree date only. File new application if conferring of degree is delayed.)
7. Take comprehensive written examinations as required by major department.	Adviser	
8. Complete research, prepare final draft copy of thesis or report and submit it at least one week prior to the final examination, along with a copy of the abstract, to each member of the examining committee and to the Graduate College. The final draft must be complete and legible. Ordinary proofreading marks and minor handwritten additions, changes, etc. are permitted, but the copy should be in such condition that it can be read easily and understood clearly. The format must follow the *Graduate College Style Manual* recommendations, unless a waiver is requested by the adviser. Any requests for waivers should be submitted along with the thesis or report final draft copy. The thesis title must be correct and cannot be changed since it will appear in the *Commencement Program*. The adviser's signature must be on the copy submitted to the Graduate College.	Dean / Adviser	Deadlines published yearly.

9. Examining committee members formally acknowledge receipt of the thesis or report and concur in request to administer final examination to candidate (Form T-1).	Comm Dean	
10. Committee chairman notifies Graduate College of the examination results immediately following conclusion of the examination (Form T-2).	Adviser Dean	Deadlines published yearly.
11. Candidate makes changes in thesis or report as required by examining committee and by the Graduate College. Advisory committee members sign final copies of thesis or report. The Graduate College makes the final decision on acceptance of the thesis or report. Candidate submits at least three approved copies of thesis and six approved copies of the abstract or one copy of a report and six approved copies of the abstract, along with clearance check (Form T-3) signed by the student and the adviser. Adviser certifies that all requirements have been met for non-thesis or report student. Forms for scheduling the final examination and notification of the completion of departmental requirements can be obtained from the Graduate College after the Application for Diploma card has been processed.	Adviser Dean	Deadlines published yearly.
12. Pay binding fee in the Bursar's Office and return form to the Graduate College.	GCO	Form to be obtained from the Graduate College after the thesis has been formally accepted by that office.
13. Arrange for cap, gown and hood at Student Union Bookstore and attend Commencement.		



must be signed by the adviser and be submitted to the Graduate College no later than the stated deadline date (see "Graduate College Calendar").

Permission to administer the final examination is requested from the dean of the Graduate College on Form T-1 which must contain the signature of each member of the examining committee, indicating that each has received the thesis or report and concurs in the request to administer the final examination. The adviser uses Form T-1 to propose a specific time and place for the examination.

The final examination is primarily a defense of the thesis or report. If the defense is judged inadequate, a decision on whether to permit re-examination will be made by the examining committee. Examinations are open to all members of the Graduate Faculty, and may be attended by anyone else who obtains the permission of the committee.

The committee will notify the Graduate College immediately of results of the final examination on Form T-2. Following satisfactory completion of the final examination, the candidate will make changes in the thesis or report as required by the committee and by the Graduate College, and submit it in final form signed by the committee to the Graduate College.

Thesis. The student must submit to the Graduate College three copies of the thesis with six copies of the abstract no later than the stated deadline (see "Graduate College Calendar"). These final copies of the thesis are accompanied by Form T-3. The thesis copies become the property of the University. Two copies are filed in the Library and one copy is kept by the major department. There is a binding fee, payable at the Office of the Bursar.

Report. The student must submit to the Graduate College one copy of a report, with six copies of the abstract. It must be bound in a pressboard cover as described in the *Graduate College Style Manual.* By paying the binding fee, the student may have extra copies of the report bound by the University. The final copy of the report, accompanied by Form T-3, must be submitted to the Graduate College no later than the stated deadline (see "Graduate College Calendar").

Final Examination. If the thesis or report option is used, the dean of the Graduate College arranges with the major department for the final examination after the draft copy of the thesis or report has been filed in the Graduate College and distributed as described in the preceding section. The final examination may be oral or written or both.

A student who fails to pass either a written or oral final examination should consult the chairman of the examining committee. Another examination cannot be given for two months after a failure, and a department may limit the number of times that the examination may be repeated.

If the non-thesis option is used, the department head or adviser must notify the dean of the Graduate College that the student has satisfactorily completed all departmental requirements. If the department requires a final oral and/or written examination, forms for arranging the examination can be obtained from the Graduate College. Both positive and negative results must be reported to the Graduate College.

Time Limit. Students are expected to complete the requirements for the master's degree within four years after filing the plan of study (i.e., the semester in which the 17th hour of the program was completed).

To determine whether or not courses taken more than four years before the anticipated date of the degree can be counted toward the degree, the student should consult the departmental graduate adviser. Such courses cannot be accepted except on a complete plan of study which gives the date that the requirements for the degree are to be completed. They must be a part of a study plan and can be approved only for a specified time.

Continuous Enrollment. A graduate student must maintain continuous enrollment during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which may apply to the degree. Continuous enrollment can be met with six credit hours per year or two credit hours in each of the fall, spring and summer semesters.

Special Requirements for Selected Master's Degrees. Requirements for the Master of Agriculture, Master of Architecture, Master of Architectural Engineering, Master of Business Administration, and Master of Engineering are described in detail elsewhere in the *Catalog*. Each degree has requirements that are program specific and exceed the minimal requirements specified by the Graduate College.

Doctor of Philosophy Degree Programs (Ph.D.)

Agricultural Economics
Agricultural Engineering
Animal Breeding
Animal Nutrition
Applied Behavioral Studies
Biochemistry
Botany
Business Administration
Chemical Engineering
Chemistry
Civil Engineering
Computing and Information Science
Crop Science (Horticulture and Landscape Architecture)
Economics
Electrical Engineering
English
Entomology
Environmental Science
Food Science
General Engineering
History
Home Economics (Clothing, Textiles and Merchandising; Family Relations and Child Development; Food, Nutrition, and Institution Administration; Housing, Interior Design and Consumer Studies)
Industrial Engineering and Management
Mathematics
Mechanical Engineering
Microbiology
Physics
Physiological Science
Plant Pathology
Psychology
Sociology
Soil Science
Statistics
Veterinary Parasitology
Veterinary Pathology
Wildlife and Fisheries Ecology
Zoology

The Doctor of Philosophy degree is granted in recognition of high achievement in scholarship and independent investigation. The candidate must prove his or her acceptability by (1) successfully completing a series of courses comprising a plan of study, (2) passing various examinations demonstrating academic competence; (3) carrying out a research program under supervision and preparing an acceptable dissertation, and (4) demonstrating initiative, creative intelligence, and ability to plan and carry out research in his or her chosen field.

Basic Requirements. The Doctor of Philosophy degree requires six semesters of full-time graduate study (a minimum of 90 semester credit hours) beyond the bachelor's degree, or four semesters of full-time graduate study (a minimum of 60 semester credit hours) beyond the master's degree. This includes a minimum of 15 credits for the dissertation (6000). Students may use 90 hours beyond the bachelor's degree as a degree total only if admitted directly into the doctoral program from the bachelor's degree.

Admission to a Program. A student who wishes to earn a Doctor of Philosophy degree may be required to take examinations based on a year of graduate study, or to produce other evidence of scholarly achievement consistent with expected academic competence in a field of specialization. Contact the head of the major department for the requirements for admission to the doctoral program.

The instructions for admission, registration, and other information given under "General Regulations" are also applicable to those who are working toward doctoral degrees.

Notice of Intention. Before taking additional courses after completing the requirements for a master's degree, a student who expects to work toward the Doctor of Philosophy degree should file a Notice of Intention form to become a candidate for the degree. The Notice of Intention form may be obtained in the Graduate College office and is filed in that office.

The Notice of Intention must be filed prior to midsemester of the first semester of graduate enrollment beyond the master's degree or prior to the second summer of enrollment for those who enroll only during summer sessions. Unless the form is submitted to the Graduate College, the courses taken may possibly not be accepted for the degree.

Temporary Adviser. Upon receiving the Notice of Intention of a student to become a candidate for the Ph.D. degree, the dean of the Graduate College will designate a member of the Graduate Faculty to serve as temporary adviser to the student. The temporary adviser will arrange the collection of information about the student and assist him or her in the early selection of courses.

Advisory Committee. Upon recommendation of the head of the major department or of the graduate committee of the department, an advisory committee of not fewer than four members will be appointed by the dean of the Graduate College. The duties of the advisory committee consist of (1) advising the student, (2) assisting the student in preparing a plan of study, (3) preparing and administering the qualifying examination, (4) assisting in planning and conducting the research, (5) supervising the writing of and passing upon the thesis, and (6) conducting the final examination.

The chairman of the advisory committee must be a member of the Graduate Faculty. Under special circumstances, the dean of the Graduate College may approve a substitute chairman. Each doctoral committee must have at least one member of the Graduate Faculty from outside the student's major department.

The student should consult the members of the advisory committee frequently and keep them informed on the progress of his or her work.

Preliminary Conference. As soon as the student is notified that an advisory committee has been appointed, the student should arrange with the chairman for a conference with the committee. During the conference, the preparation and qualifications of the student for graduate work will be discussed and appropriate plans made for future study.

Plan of Study. After the preliminary conference, the student should complete the plan of study for the degree, have it approved by the advisory committee, file two copies in the Graduate College and two copies with the advisory committee, and retain one for the student's personal file.

The plan must include all the acceptable graduate work that has been completed and all that will be taken for the degree. The plan should include approximately 75 percent of courses at the 5000-6000 level and at least 15 hours thesis credit. Forms for preparing the plan of study will be sent to the student by the Graduate College.

Because the acceptance of work which the student desires to use toward the degree rests with the advisory committee, it is important to plan a complete program and have it approved by the dean of the Graduate College as soon as possible.

The plan of study is to be submitted prior to the pre-enrollment date during the second full semester of enrollment (beyond the master's degree).

Changes in the plan can be made with the approval of the advisory committee and the dean of the Graduate College. A final, accurate and approved plan must be filed at the beginning of the semester or summer session in which the degree is to be conferred.

Minor Subject or Field. As a means of giving depth and breadth to their doctoral programs, most departments require work in a minor field or at least a selection of extra-departmental courses. To minor in a subject or field, as a minimum, the graduate student must complete graduate level work beyond requirements for an undergraduate degree in the minor department. A department in which a student indicates a minor must certify to the dean of the Graduate College the satisfactory completion of requirements for a minor.

Character of Work. The satisfactory completion of course work (see "General Regulations") is only one requirement for receiving the degree. The student must also (1) pass a qualifying examination, (2) prepare an acceptable dissertation, (3) demonstrate the ability to do independent study, (4) show qualities of leadership in the chosen field, (5) pass a final examination, and (6) comply with other requirements of the major department.

Residence Requirements. A minimum of 30 semester credit hours must be taken in residence at Oklahoma State University. All credit accepted toward the degree beyond the master's degree must be on the student's plan of study and be approved by the advisory committee.

One year of the last two years must be spent in continuous residence at this institution.

With prior approval by the advisory committee and the dean of the Graduate College, the stu-

dent may do research for the degree *in absentia.* Research conducted while not in residence is under the supervision of the major adviser and the advisory committee.

Courses taken at the University Center at Tulsa (UCT) while registered through Oklahoma State University are considered residence credit. Courses taken from the other three cooperating universities are considered to be transfer credit.

Language Requirement. Foreign language or other proficiency requirements may be specified to meet the need for specific skills and areas of knowledge that facilitate research and contribute to wider understanding. Specific requirements are determined by degree-granting departments or programs. In many fields, a reading knowledge of one or two modern foreign languages is an important part of scholarship and necessary for research. In other fields, proficiency in special and related disciplines may be required that will contribute to the needs of the individual program.

Qualifying Examination. The qualifying examination is comprehensive, covering the entire area of the student's graduate study. The examination may be all written or part written and part oral. The examination must be passed not less than six months before the degree is granted (see "Admission to Candidacy"). The results of the examination are reported to the Graduate College on Form G-4.

Before taking the qualifying examination, the student must have an approved plan of study on file in the Graduate College, have the approval of the advisory committee, and the approval of the dean of the Graduate College.

In case of failure to pass any part of this examination, the student will be notified in writing of the conditions under which another examination can be taken. A second examination may not be given earlier than four months after a failure.

If the results of the second examination are unsatisfactory, no other examination may be given without the approval of the Graduate Council.

Admission to Candidacy. A student must be admitted to candidacy at least six months before the commencement in which the Doctor of Philosophy degree will be received.

Before being admitted to candidacy, the student must have passed the qualifying examination, and have an approved plan of study and thesis outline filed in the Graduate College.

Dissertation. A dissertation (doctoral thesis) is required of each doctoral candidate. The subject of the dissertation must be approved by the advisory committee and the dissertation is prepared under the direction of members of the committee or a special thesis committee approved by the advisory committee chairperson.

The dissertation must follow specifications in the *Graduate College Style Manual,* available from the Graduate College. All dissertation copies must have the necessary approval signatures before submission to the Graduate College.

After completing the research, the student prepares a final draft copy (complete and legible) of the proposed dissertation and submits a copy, along with the abstract, to each member of the committee and to the Graduate College. The copy being submitted to the Graduate College must be approved by the student's thesis adviser. When the final draft copy is submitted, the title must be final and any request for waiver of *Graduate College Style Manual* recommendations must be made. The proof copy must be submitted to the Graduate College no later than the stated deadline date (see "Graduate College Calendar").

Final Examination. Permission to administer the final examination is requested from the dean of the Graduate College on Form T-1, which must contain the signature of each member of the committee, indicating each has received the dissertation and concurs in the request to administer the final examination. The chairperson also uses Form T-1 to propose a specific time and place for the examination.

The final examination is primarily a defense of the dissertation. If the defense is judged inadequate, a re-examination decision will be made by the examining committee. The examination is open to all members of the Graduate Faculty and may be attended by anyone else who obtains the permission of the committee.

The committee will notify the Graduate College immediately of results of the final examination on Form T-2. Following satisfactory completion of the final examination, the candidate will make any changes required by the committee and by the Graduate College and submit the dissertation in final form signed by the committee to the Graduate College.

Three copies of the dissertation in final form and six copies of the abstract must be submitted to the Graduate College no later than the stated deadline (see "Graduate College Calendar"). The final copies of the dissertation are accompanied by Form T-3. The dissertation copies become the property of the University; two copies are filed in the Library and one copy is kept by the major department. There is a binding fee, payable at the Office of the Bursar.

All dissertations are microfilmed by University Microfilms, Inc. The student is required to pay a fee for microfilming the complete document and for publication of an abstract of about 350 words. The student must complete a University Microfilms Agreement Form after the dissertation has been accepted by the Graduate College. Copyrighting the dissertation is not required, but can be done at a small additional cost with the approval of the dean of the Graduate College.

Time Limit. Students are expected to complete the requirements of the Ph.D. degree within six years after filing a Notice of Intention. (The Notice of Intention is filed during the first semester of the doctoral program.) After that time a new program of study must be arranged with the advisory committee and filed in the Graduate College.

If all requirements for the degree are not completed within four years after the qualifying examination was passed, a second qualifying examination must be repeated successfully.

Continuous Enrollment. A graduate student must maintain continuous enrollment during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which apply to the degree. Continuous enrollment can be met with six credit hours per year or two credit hours in each of the fall, spring and summer semesters.

Doctor of Education Degree Programs (Ed.D)

Agricultural Education
Applied Behavioral Studies
Counseling and Student Personnel
Curriculum and Instruction
Educational Administration
Higher Education
Home Economics Education and Community Services
Occupational and Adult Education

The degree of Doctor of Education is a professional degree conferred in recognition of outstanding ability as an educator in some special field or fields as shown by: (1) satisfactory completion of a program of study; (2) passing examinations showing an understanding of the field of specialization and its relation to allied subjects; (3) the preparation of a dissertation demonstrating ability to approach problems with a high degree of originality and independence; and (4) passing an examination covering the dissertation and related fields.



Basic Requirements. The minimum time required for the doctor's degree is six semesters of full-time graduate study (a minimum of 90 semester credit hours) beyond the bachelor's degree, or four semesters of full-time graduate study (a minimum of 60 semester credit hours) beyond the master's degree. Courses at the 5000 and 6000 level should make up approximately 75 percent of the plan of study and must include 10 hours for the doctoral dissertation. The student must register for the dissertation in the same way he or she registers for other courses. Students may use 90 hours beyond the bachelor's degree as a degree total only if admitted directly into the doctoral program from the bachelor's degree.

Admission to a Program. The student can secure an application form from the Graduate College along with information concerning areas and programs of study offered. The application will be evaluated by the faculty of the appropriate department and by the Graduate College and qualified applicants will be admitted provisionally for study toward the Doctor of Education degree. The student planning to seek the Doctor of Education degree must complete a personnel folder which includes a vita, letters of recommendation as requested by the College of Education, transcripts, protocols of scholarly work and test scores. Test scores required are the Miller Analogies Test and/or the aptitude portion of the Graduate Record Examination. A student should contact his or her department head to determine which tests are required and to obtain materials concerning the personnel folder.

When the student's personnel folder is complete, the graduate review committee will review the student's records and recommend to the dean of the Graduate College whether or not the student should be admitted. The dean of the Graduate College will inform the student by letter of admission status.

Notice of Intention. Before taking additional courses after completing the requirements for a master's degree, a student who expects to work for the Doctor of Education degree should file a Notice of Intention in the Graduate College to become a candidate for the degree. Unless the form is filed, courses taken may not count toward the degree. The Notice of Intention is to be filed prior to midsemester of the first semester of enrollment beyond the master's degree, or prior to enrollment beyond 30 credit hours of course work above the master's degree.

Temporary Adviser. Upon receiving a Notice of Intention for a student to become a candidate for the Doctor of Education degree, the dean of the Graduate College will designate a member of the Graduate Faculty to serve as temporary adviser to the student. The temporary adviser will guide the student in the selection of courses for the first semester or summer session.

Advisory Committee. If the recommendation of the graduate review committee is favorable, the dean of the Graduate College will appoint an advisory committee of not fewer than four members. The duties of the advisory committee consist of (1) advising the student, (2) assisting the student in preparing a program of study, (3) preparing and administering the qualifying examination, (4) assisting in planning and conducting the research, (5) supervising the writing and subsequent approval of the dissertation, and (6) conducting the final examination.

Summary of Procedure for Doctoral Degree

Dean-Dean of Graduate College
DH-Department Head
TA-Temporary Adviser
Comm-Committee
Ch-Chairman of Committee

Procedure	Initiate through / Approved by	Time
1. Apply for admission. (Follow instruction sheet carefully.)	Dean / Dean	Complete 30 days prior to enrollment (60 days prior for international students).
2. Secure assignment of temporary adviser from major department head and enroll.	DH & TA / Dean	
3. File Notice of Intention to become a candidate for the degree. Obtain forms in Graduate College.	Dean	Prior to mid-semester of first semester of graduate enrollment or second summer enrollment.
4. Provide temporary adviser with information as required to evaluate admissibility to program.		
5. On favorable action of appropriate Graduate Faculty group with respect to admission to program, request the appointment of advisory committee.	TA / Dean	
6. Prepare plan of study with assistance of committee. Submit two approved copies to Graduate College and two to the advisory committee.	Comm / Dean	Prior to enrollment date (see "University Calendar") during second full semester of enrollment beyond master's degree.
7. Fulfill foreign language requirement or attain other required proficiencies.		Prior to qualifying examination.
8. Complete major portion of course work and plan thesis program with committee. Submit copy of approved thesis outline to Graduate College.	Ch / Dean	Prior to qualifying examination.
9. Apply for and take qualifying examination.	Ch / Dean	As early in the doctoral program as feasible.
10. Submit results of qualifying examination and/or application for admission to candidacy (Form G-4).	Comm / Dean	Not less than six months prior to Commencement in which degree will be conferred.
11. Verify accuracy of plan of study in Graduate College. Secure committee approval for any necessary changes. Check on six-year time limit for the degree.	Comm / Dean	At the beginning of the semester or summer session in which degree is to be conferred.

Preliminary Conference. As soon as the student is notified that an advisory committee has been appointed, a conference should be arranged with the chairman and committee. Before the conference the student must see that the chairman has transcripts of previous work and other information that will be needed in the conference. During the conference the preparation of the student for graduate study will be discussed and plans made for future study.

Plan of Study. After the preliminary conference, the student should complete the plan of study for the degree, and have five copies approved and signed by the advisory committee. One copy will be retained by the student, two copies left with the major adviser, and two copies sent to the Graduate College.

The plan must include all the acceptable graduate work that has been completed and all that will be taken for the degree. The plan should include approximately 75 percent of courses at the 5000-6000 level and at least 15 hours thesis credit. Forms for preparing the plan of study will be sent to the student by the Graduate College.

Because the acceptance of work which the student desires to use toward the degree rests with the advisory committee, it is important to plan a complete program and have it approved by the

12. Complete the Application for Diploma card at the time of enrollment.	Dean	At the time of enrollment for the semester or session in which degree is to be conferred. (Application is good for stated time only. File new application if conferring of degree is delayed.)
13. Complete research, prepare final draft copy of dissertation and submit it at least one week prior to the examination, along with a copy of the abstract, to each member of the committee and to the Graduate College. The final draft must be complete and legible. Ordinary proofreading marks and minor handwritten additions, changes, etc., are permitted, but the copy should be in such condition that it can be read easily and understood clearly. The format must follow the *Graduate College Style Manual* recommendations, unless a waiver is requested by the major adviser. Any request for waivers should be submitted along with the dissertation final draft copy. The dissertation title must be correct and cannot be changed since it will appear in the *Commencement Program*. The adviser must sign the copy submitted to the Graduate College.	Ch Comm Dean	Deadlines published yearly.
14. Advisory committee members formally acknowledge receipt of dissertation and concur in request to administer final examination to candidate (Form T-1).	Comm Dean	
15. Committee chairman notifies Graduate College of the examination results immediately following conclusion of the examination (Form T-2).	Ch Dean	
16. Make any changes in dissertation required by examining committee and by the Graduate College. Advisory committee members sign final copies of dissertation. The dissertation is submitted to the Graduate College, which makes the final decision on acceptance of the dissertation. Candidate submits at least three approved copies of the dissertation and six approved copies of the abstract along with clearance check (Form T-3) signed by the student and the major adviser.	Ch Comm Dean	Deadlines published yearly.
17. Pay binding and microfilming fees in Bursar's Office; complete questionnaire and microfilming agreement form and return all forms to the Graduate College.		Form to be obtained from the Graduate College after dissertation has been formally accepted by that office.
18. Rent or buy cap, gown, and hood at Student Union Bookstore and attend Commencement.		

dean of the Graduate College as soon as possible.

The plan of study is to be submitted prior to the pre-enrollment date during the second full semester of enrollment (beyond the master's degree).

Changes in the plan can be made with the approval of the advisory committee and the dean of the Graduate College. A final, accurate and approved plan must be filed at the beginning of the semester or summer session in which the degree is to be conferred.

Character of Work. Completing a number of courses with a "B" average (see "General Regulations") is one of the requirements for the doctoral degree. The student must also (1) pass a qualifying examination, (2) prepare an acceptable dissertation, (3) demonstrate the ability to do independent study, (4) show qualities of leadership in the chosen field, (5) pass a final examination, and (6) comply with other requirements of the major field or department.

Residence Requirements. A minimum of 30 semester credit hours must be taken in residence at Oklahoma State University. One academic year of the last two as determined by the appropriate department must be spent in continuous residence at this institution.

The residence requirement can be met by two semesters of full-time graduate study. Any other way of meeting the residence requirement must have the approval of the student's advisory committee and of the dean of the Graduate College.

Courses taken at the University Center at Tulsa (UCT) while registered through Oklahoma State University are considered residence credit. Courses taken from the other three cooperating universities are considered to be transfer credit.

Foreign Language and Research Instruments Proficiency. All candidates will be expected to have a command of those instruments necessary in the study of educational problems. The doctoral advisory committee of each candidate may require evidence of proficiency in one or more foreign languages, educational research, statistics, and computer usage.

Qualifying Examination. Before taking the qualifying examination, the student must have completed the main areas in a plan of study which has been approved by the advisory committee, have permission of the dean of the Graduate College to take the qualifying examination, have the approval of his or her advisory committee, and have an approved outline for the dissertation on file in the Graduate College and in the office of the department concerned.

The qualifying examination is designed to measure the student's proficiency in the field of specialization, the breadth and depth of his or her professional education background and his or her knowledge of cognate subjects. The examination may be both written and oral but part of it must be written. This examination must be passed and the result reported to the Graduate College on Form G-4 at least six months before the degree is granted (see "Admission to Candidacy" in the "Doctor of Philosophy" section).

In case of failure to pass this examination, the student will be notified by the examining committee of the condition under which another examination may be taken. A student who fails on either the qualifying or final examination cannot take another examination for four months. If the result of the second examination is unsatisfactory, no other examination may be given without the approval of the Graduate Council.

Dissertation. A dissertation (doctoral thesis) is required of each candidate for the Doctor of Education degree. The dissertation has three principal functions: (1) training in research, (2) promoting professional growth, and (3) contributing to professional knowledge in education. Not every dissertation will be expected to serve these three functions in the same way or to the same extent.

The format specifications, procedures, and regulations for the dissertation are the same as for the Ph.D. The Ed.D. candidate should refer to the "Doctor of Philosophy" section on dissertations and submission procedures through the Graduate College.

Time Limit. Students are expected to complete the requirements for the Doctor of Education degree within six years after filing a Notice of Intention. (The Notice of Intention is filed during the first semester of the doctoral program.) Otherwise a new program of study must be arranged with the advisory committee and filed in the Graduate College.

If all requirements for the degree are not completed within four years after the qualifying examination was passed, a second qualifying examination must be repeated successfully.

Continuous Enrollment. Continuous enrollment must be maintained during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which apply to the degree. Continuous enrollment can be met with six credit hours per year or two credit hours in each of the fall, spring and summer semesters.

Specialist in Education Degree Programs (Ed.S.)

Counseling and Student Personnel
Curriculum and Instruction
Educational Administration
Higher Education
Occupational and Adult Education

The Specialist in Education degree is conferred as an appropriate recognition of achievement as evidenced by:

1. Successful professional performance in the area of the student's specialization.
2. Satisfactory completion of a program of graduate study of approximately two academic years.
3. Satisfactory performance on examinations designed to reveal the student's undertaking of the field of specialization and its relation to other areas.
4. Preparation of a thesis dealing with some aspect of concern to the student's profession and its defense before a committee of the Graduate Faculty.

Programs leading to the Specialist in Education degree are offered at present only with the Teacher Education Group.

Admission. The student can secure application forms from the dean of the Graduate College along with information concerning areas and programs of study offered. The application will be evaluated by the faculty of the appropriate department and by the Graduate College and qualified applicants will be admitted provisionally for study toward the Specialist in Education degree.

Admission to a Program. The student planning to seek the Specialist in Education degree must complete a personnel folder which includes a vita and letters of recommendation as requested by the College of Education, transcripts, protocols of scholarly work and test scores. Test scores required are the Miller Analogies Test and/or the aptitude portion of the Graduate Record Examination. A student should contact the department head to determine which tests are required and obtain materials concerning the personnel folder.

When the student's personnel folder is complete, the graduate review committee for Specialist in Education programs will review the student's records and recommend to the dean of the Graduate College whether or not the student should be admitted to the program. The dean of the Graduate College will inform the student by letter regarding admission.

Notice of Intention. Before taking additional courses after completing the requirements for a master's degree, a student who expects to work toward the Specialist in Education degree should file in the Graduate College a Notice of Intention to become a candidate for the degree. The Notice of Intention form can be obtained from the Graduate College. Unless the form is filed, courses taken may not count toward the degree. The "Notice of Intention" is to be filed prior to midsemester of the first semester of enrollment beyond the master's degree, or prior to the second summer enrollment.

Temporary Adviser. Upon receiving a Notice of Intention from a student to become a candidate for the Specialist in Education degree, the dean of the Graduate College will designate a member of the Graduate Faculty to serve as temporary adviser to the student. The temporary adviser will guide the student in the selection of courses for the first semester or summer session.

Advisory Committee. If the recommendation of the graduate review committee is favorable, the dean of the Graduate College will appoint an advisory committee nominated by the head of the department in which the student wishes to specialize. This committee (1) conducts the preliminary examination and conference, (2) approves the proposed plan of study, (3) supervises the student's progress in the program, (4) supervises on the study, and (5) arranges for and conducts the final examination.

Plan of Study. As soon as practicable after the appointment of the committee, the student will arrange with the chairman for a conference for the purpose of planning a program of study. The plan of study will include all graduate work required to complete the program. It will be filed, in duplicate, in the Graduate College. This plan may be modified with the approval of the advisory committee and the dean of the Graduate College.

Credit-hour Requirements. A minimum of two academic years of full-time graduate study, or equivalent (a minimum of 60 semester credit hours beyond the baccalaureate degree), is required for the Specialist in Education degree. This may include as many as 10 credit hours for the practicum study and accompanying report.

Character of Work. Completing an appropriate number of courses with a "B" average (see "General Regulations") is only one of the requirements for this degree. The student must also (1) pass a qualifying examination, (2) conduct an appropriate study of education, (3) show qualities of professional leadership, and (4) pass a final examination.

Residence Requirements. The candidate must be enrolled full-time in residence study for one academic year of the two years required for the degree. Two summer sessions are considered equivalent to one semester for purposes of meeting the residence requirement.

Ordinarily the last 20 hours, including the study and report, must be earned in residence on the Stillwater campus of Oklahoma State University. Any deviation must be recommended by the advisory committee and approved by the dean of the Graduate College.

Qualifying Examination. A qualifying examination is required of all candidates for the Specialist in Education degree. Conditions governing it are essentially similar to those required for candidates for the Ed.D. (see "Doctor of Education" section).

Other Regulations. Other requirements for the Specialist in Education degree are similar to those for the Ed.D. (see "Doctor of Education" section).

Time Limit. The time limits applicable to candidates for the Specialist in Education degree are the same as those which apply to the Ed.D. candidate.

Graduate Faculty

The four groups of the Graduate Faculty are full members and emeriti, and associate members and emeriti. Members of the Graduate Faculty, their degrees held and degree-granting institutions, and most recent academic title at OSU are listed below. Dates following indicate: first, the year that the faculty member was appointed to his or her present position; second, the year that the faculty member was initially appointed to a position at Oklahoma State University. A single date means that these two coincided. Dates in parentheses represent periods not at OSU.

Members

MOHAMED ABDEL-HADY, B.C.E. (Ein-Shams Univ., Cairo), M.S. (Univ. of Illinois), Ph.D. (ibid); P.E.; *Professor of Civil Engineering;* 1971, 1963.

BRUCE J. ACKERSON, B.S. (Univ. of Nebraska), M.S. (Univ. of Colorado), Ph.D. (ibid); *Professor of Physics*; 1986, 1977.

ALAN C. ADOLPHSON, B.A. (Western Washington Univ.), Ph.D. (Princeton Univ.); *Professor of Mathematics;* 1987, 1983.

MOHAMED SAMIR AHMED, B.S. (Ein-Shams Univ., Cairo), M.S. (McGill Univ.), Ph.D. (Univ. of Oklahoma); P.E.; *Associate Professor of Civil Engineering;* 1984, 1980.

DOUGLAS B. AICHELE, A.B. (Univ. of Missouri), A.M. (ibid), Ed.D. (ibid); *Professor and Head of the Department of Curriculum and Instruction;* 1980, 1969.

ZUHAIR F. AL-SHAIEB, B.S. (Univ. of Damascus), M.S. (Univ. of Missouri-Rolla), Ph.D. (ibid); *Professor of Geology;* 1981, 1972.

CRAIG ALLISON, B.A. (Rice Univ.), M.S. (Univ. of Illinois at Urbana-Champaign), Ph.D. (ibid); *Associate Professor of Physics;* 1988, 1983.

H. JACK ALLISON, B.S. (Louisiana State Univ.), M.S. (ibid), Ph.D. (O.S.U.); P.E.; *Professor of Electrical and Computer Engineering;* 1976, 1961.

DALE E. ALSPACH, B.S. (Univ. of Akron), Ph.D. (Ohio State Univ.); *Professor of Mathematics;* 1985, 1979.

ORLEY M. AMOS, JR., B.A. (Wichita State Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor of Economics;* 1988, 1979.

KIM B. ANDERSON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Agricultural Economics;* 1985, 1982.

MICHAEL APPLEGATE, B.A. (Brigham Young Univ.), Ph.D. (Iowa State Univ.); *Associate Professor of Economics;* 1978, 1974.

DALE ELLSWORTH ARMSTRONG, B.A. (Centenary College), M.P.A. (Univ. of Texas), Ph.D. (ibid); *Associate Professor of Accounting;* 1967, 1965.

LYNN A. ARNEY, B.S. (Univ. of Tulsa), M.E. (Northeastern Oklahoma State Univ.), Ed.D. (O.S.U.); *Associate Professor of Educational Administration and Higher Education;* 1988, 1985.

RICHARD ARTHUR AUKERMAN, B.S. (Univ. of North Dakota), M.S. (ibid), Ph.D. (ibid); *Professor of Management;* 1987, 1980.

CHARLES M. BACON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Michigan State Univ.); P.E.; *Professor of Electrical and Computer Engineering;* 1972, 1966.

DANIEL DELANO BADGER, B.S. (Virginia Polytechnic Inst.), M.S. (O.S.U.), Ph.D. (Michigan State Univ.); *Professor of Agricultural Economics;* 1969, 1964.

CAROLYN JUNE BAUER BAIRD, B.S.(O.S.U.), M.S.(ibid), Ed.D.(ibid); *Associate Professor of Curriculum and Instruction;* 1985, 1966.

JOHN THOMAS BALE, JR., B.S. (O.S.U.), M.S. (ibid), Ed.D. (Univ. of Oklahoma); *Professor of Administrative Services and Associate Dean of the College of Business Administration;* 1977, 1967.

DONALD J. BANKS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Georgia); *Professor of Agronomy;* 1977, 1966.

JOHN A. BANTLE, B.A. (Eastern Michigan Univ.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Professor of Zoology;* 1987, 1976.

ROBERT W. BARKER, B.S. (Northeastern Oklahoma State Univ.), Ph.D. (O.S.U.); *Associate Professor of Entomology;* 1980, 1976.

BENNETT LEE BASORE, B.S. (O.S.U.), Sc.D. (Massachusetts Inst. of Technology); P.E.; *Professor of Electrical and Computer Engineering, Head of the School of General Engineering, and Interim Associate Dean;* 1978, 1967.

GERALD R. BASS, B.S.Ed. (Univ. of North Dakota), M.Ed. (ibid), Ed.D. (ibid), P.E.; *Associate Professor of Educational Administration and Higher Education;* 1988, 1985.

MARCIA HEADSTREAM BATES, B.S. (Texas Woman's Univ.), M.S. (Texas Tech. Univ.), Ph.D. (ibid); P.E.; *Associate Professor of Civil Engineering;* 1980, 1975.

CALVIN GREENWOOD BEAMS, JR., B.A. (New Mexico Highlands Univ.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor of Zoology;* 1979, 1962.

KENNETH JOHN BELL, B.S. (Case Inst. of Technology), M.Ch.E. (Univ. of Delaware), Ph.D. (ibid); P.E.; *Regents Professor of Chemical Engineering;* 1977, 1961.

RICHARD C. BERBERET, B.A.(Carroll College), Ph.D. (Univ. of Nebraska); *Professor of Entomology;* 1980, 1971.

KENNETH DARRELL BERLIN, B.A. (North Central College, Illinois), Ph.D. (Univ. of Illinois); *Regents Professor of Chemistry;* 1971, 1960.

JOE G. BERRY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor of Animal Science;* 1988, 1980.

GARY R. BICE, B.S. (Cornell Univ.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Associate Professor of Occupational and Adult Education;* 1985.

WILLIAM ROGER BILES, B.A. (Univ. of Illinois, Urbana), M.S. (ibid), Ph.D. (Univ. of Illinois at Chicago); *Associate Professor and Head of the Department of History;* 1986, 1984.

HANS RUDOLF BILGER, Ph.D. (Univ. of Basel); *Professor of Electrical and Computer Engineering;* 1975, 1963.

JAMES T. BLANKEMEYER, A.B. (Temple Univ.), M.A. (ibid), Ph.D. (ibid); *Associate Professor of Physiological Science;* 1982, 1977.

JAMES H. BOGGS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor of Mechanical and Aerospace Engineering and Vice-President for Academic Affairs and Research;* 1966, 1943.

JAMES E. BOSE, B.S. (O.S.U.), M.S.(ibid), Ph.D. (ibid); P.E.; *Professor and Director of the Division of Engineering Technology;* 1977, 1960.

DONNA H. BRANSON, B.A. (Rosary College), M.S. (Univ. of Rhode Island), Ph.D. (Michigan State Univ.); *Professor of Clothing, Textiles and Merchandising;* 1987, 1983.

MICHAEL BRANSON, B.S. (Illinois Benedictine College), M.A. (Arizona State Univ.), Ph.D. (ibid); *Associate Professor of Industrial Engineering and Management;* 1985.

JAMES E. BREAZILE, B.S. (Univ. of Missouri), D.V.M (ibid), Ph.D. (Univ. of Minnesota); *Professor of Physiological Science and Director of Laboratory Animal Resources;* 1986, 1978.

ANTHONY EDWARD BROWN, B.A. (Baylor Univ.), M.P.A. (Univ. of Tennessee), Ph.D. (ibid); *Associate Professor of Political Science and Coordinator of Programs, University Center at Tulsa;* 1988, 1980.

DONALD N. BROWN, B.A. (Harvard Univ.), M.A. (Univ. of Arizona), Ph.D. (ibid); *Professor of Sociology;* 1982, 1971.

LARRY TODD BROWN, B.A. (Univ. of Kentucky), Ph.D. (Princeton Univ.); *Professor of Psychology;* 1973, 1961.

ALAN W. BRUNKEN, B. Arch. (O.S.U.), M. Arch. (Massachusetts Inst. of Technology); *Professor of Architecture;* 1986, 1973.

GERALD HENRY BRUSEWITZ, B.S. (Univ. of Wisconsin), B.S.M.E. (ibid), M.S. (ibid), Ph.D. (Michigan State Univ.); *Professor of Agricultural Engineering;* 1980, 1969.

DAVID S. BUCHANAN, B.S. (North Dakota State Univ.), M.S. (Univ. of Nebraska), Ph.D. (ibid); *Professor of Animal Science;* 1988, 1980.

KAY SATHER BULL, B.S.B.A. (Roosevelt Univ.), M.B.A. (ibid), Ph.D. (Univ. of Wisconsin); *Professor of Applied Behavioral Studies;* 1988, 1979.

RICHARD A. BUNCE, B.S. (Marietta College), Ph.D. (Univ. of Wisconsin, Madison); *Associate Professor of Chemistry;* 1988, 1983.

HERMANN G. BURCHARD, Dipl.-Math. (Univ. of Hamburg), Ph.D. (Purdue Univ.); *Professor of Mathematics;* 1977, 1972.

STERLING LEON BURKS, B.S. (Southwestern Oklahoma State Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Professor of Zoology;* 1984, 1969.

GEORGE E. BURROWS, B.S. (Univ. of California, Davis), D.V.M., M.S. (Washington State Univ.), Ph.D. (ibid); *Professor of Physiological Science;* 1983, 1978.

ROBERT L. BURTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Entomology;* 1975, 1970.

JACK EDWARD BYNUM, B.A. (Pacific Union College), M.A. (Andrews Univ.), M.S. (Southern Oregon College) Ph.D. (Washington State Univ.); *Professor of Sociology;* 1982, 1972.

JOSEPH F. BYRNES, B.A., B.D. (Montfort Seminary), M.S. (Univ. of Notre Dame, Chicago), Ph.D. (Univ. of Chicago); *Professor of Religious Studies;* 1986, 1976.

JOHN LEVIS CADDEL, B.S. (Texas A. & I. Univ.), Ph.D. (O.S.U.); *Professor of Agronomy;* 1986, 1977.

H. STEPHEN CALDWELL, A.B. (Hanover College), M.S. (DePauw Univ.), Ph.D. (Purdue Univ.); *Professor of Psychology;* 1980, 1971.

JOHN R. CAMPBELL, B.S. (Univ. of Missouri), M.S. (ibid), Ph.D. (ibid); *Professor of Animal Science and President;* 1988.

NOMA JO CAMPBELL, B.S. (O.S.U.), M.S. (Kansas State Univ.), Ed.D. (Virginia Polytechnic Inst. and State Univ.); *Professor of Applied Behavioral Studies and Director of the University Testing and Evaluation Service;* 1981, 1975.

LOWELL CANEDAY, B.A. (Le Tourneau College), M.A. (Univ. of Wyoming), Ph.D. (Univ. of Minnesota); *Associate Professor of Health, Physical Education and Leisure, Coordinator, Leisure, and Coordinator of Graduate Studies;* 1986, 1981.

ALFRED CARLOZZI, B.A. (Iona College), M.A. (Trinity Univ.), Ed.D. (Univ. of Houston); *Associate Professor of Applied Behavioral Studies;* 1983, 1979.

GEORGE OLNEY CARNEY, B.A. (Central Missouri State College), M.A. (ibid), Ph.D. (O.S.U.); *Professor of Geography;* 1981, 1968.

BRIAN J. CARTER, B.S. (Rutgers Univ.), M.S. (Penn State Univ.), Ph.D. (ibid); *Associate Professor of Agronomy;* 1987, 1982.

TRACY S. CARTER, B.S. (Iowa State Univ.) M.S. (Michigan State Univ.), Ph.D. (ibid); *Visiting Assistant Professor of Zoology;* 1985, 1978.

BRETT E. CARVER, B.S. (Univ. of Georgia), M.S. (North Carolina State Univ.), Ph.D. (ibid); *Associate Professor of Agronomy;* 1988, 1985.

KENNETH E. CASE, B.S.E.E. (O.S.U.), M.S.I.E. (ibid), Ph.D. (ibid); P.E.; *Regents Professor of Industrial Engineering and Management;* 1987, 1975.

KATHRYN CASTLE, B.A. (Univ. of Oklahoma), M.A. (Emory Univ.), Ed.D. (Univ. of Virginia); *Professor of Curriculum and Instruction;* 1985, 1975.

JOHN P. CHANDLER, B.S. (Lehigh Univ.), M.S. (Indiana Univ.), Ph.D. (ibid); *Associate Professor of Computing and Information Science;* 1974, 1970.

LANNY GORDON CHASTEEN, B.B.A. (Univ. of Texas), M.B.A. (Univ. of Arkansas), Ph.D. (ibid); *Professor and Head of the School of Accounting;* 1987, 1969.

JAMES RICHARD CHOIKE, B.S. (Univ. of Detroit), M.S. (Purdue Univ.), Ph.D. (Wayne State Univ.); *Professor of Mathematics;* 1983, 1970.

BOBBY L. CLARY, B.S. (Univ. of Georgia), Ph.D. (O.S.U.); P.E.; *Professor of Agricultural Engineering;* 1978, 1966.

P. LARRY CLAYPOOL, B.S. (Southwest Missouri State College), M.A. (Univ. of Missouri), Ph.D. (Texas A & M Univ.); *Professor of Statistics;* 1979, 1967.

JAMES W. COGDELL, B.S. (Yale Univ.), Ph.D. (ibid); *Associate Professor of Mathematics;* 1988, 1987.

MARTHA W. COMBS, B.A. (Univ. of Florida), M.Ed. (ibid), Ed.D. (ibid); *Associate Professor of Curriculum and Instruction;* 1988, 1983.

A. W. CONFER, B.S. (O.S.U.), M.S. (Ohio State Univ.), D.V.M. (O.S.U.), Ph.D. (Univ. of Missouri); *Professor and Head of the Department of Veterinary Pathology;* 1985, 1981.

JOHN BRIAN CONREY, B.A. (Univ. of Santa Clara), Ph.D. (Univ. of Michigan); *Associate Professor of Mathematics;* 1987, 1983.

KENNETH E. CONWAY, B.A. (State Univ. of New York College at Potsdam), M.S. (State Univ. of New York College at Syracuse), Ph.D. (Univ. of Florida); *Professor of Plant Pathology;* 1987, 1978.

R. JEWELL CRABTREE, B.S. (Univ. of Missouri), M.S. (Iowa State Univ.) Ph.D. (Michigan State Univ.); *Associate Professor of Agronomy;* 1981, 1975.

LARRY A. CROWDER, B.S. (Eastern Illinois Univ.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Entomology;* 1985.

LAVOY I. CROY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Illinois); *Professor of Agronomy;* 1978, 1955.

ROBERT EMMETT DARCY, B.A. (Univ. of Wisconsin), M.A. (Univ. of Kentucky), Ph.D. (ibid); *Professor of Political Science;* 1985, 1977.

ROBERT C. DAUFFENBACH, B.A. (Wichita State Univ.), M.A. (ibid), Ph.D. (Univ. of Illinois); *Professor of Economics and Director of Business and Economic Research;* 1987, 1977.

WILLIAM P. DAWKINS, B.A. (Rice Institute), B.S.C.E. (ibid), M.S. (ibid), Ph.D. Univ. of Illinois); P.E.; *Professor of Civil Engineering;* 1973, 1969.

JOSEPH PAUL DEVLIN, B.S. (Regis College), Ph.D. (Kansas State Univ.); *Professor of Chemistry;* 1970, 1961.

GEORGE SUMTER DIXON, Jr., B.S. (Univ. of Georgia), M.S. (ibid), Ph.D. (ibid); *Professor of Physics;* 1985, 1970.

JUDITH SHELTON DOBSON, B.S. (Univ. of Wisconsin), M.S. (Univ. of Nebraska), Ph.D. (Univ. of Wyoming); *Professor of Applied Behavioral Studies;* 1977, 1971.

RUSSELL LEE DOBSON, B.A. (Northeastern State College, Oklahoma), M.T. (ibid), Ed.D. (Univ. of Oklahoma); *Professor of Curriculum and Instruction;* 1973, 1967.

RICHARD A. DODDER, A.B. (Univ. of Kansas), M.A. (ibid), Ph.D. (ibid); *Professor of Sociology;* 1980, 1969.

GERALD ARTHUR DOEKSEN, B.S. (South Dakota State Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Regents Professor of Agricultural Economics;* 1986, 1978.

PATRICK B. DORR, B.S. (O.S.U.), M.S. (ibid), Ph.D. (North Texas State Univ.); *Associate Professor of Accounting;* 1981, 1977.

WILLIAM A. DREW, A.B. (Marietta College), Ph.D. (Michigan State Univ.); *Professor of Entomology;* 1984, 1958.

CECIL W. DUGGER, B.S. (Texas A & M Univ.), M.Ed. (ibid), Ed.D. (O.S.U.); *Associate Professor of Technical Education;* 1970, 1965.

NORMAN NEVILL DURHAM, B.S. (North Texas State Univ.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor of Microbiology and Dean of the Graduate College;* 1967, 1954.

LEA L. EBRO, B.S. (Univ. of the Philippines), B.S. (ibid), M.S. (Iowa State Univ.),Ph.D. (Ohio State Univ.); *Professor and Interim Head of the Department of Food, Nutrition and Institution Administration;* 1984, 1978.

ANTHONY A. ECHELLE, B.S. (Southeastern Okla. State Univ.), M.S. (Univ. of Oklahoma), Ph.D. (ibid); *Professor of Zoology;* 1985, 1980.

CHARLES K. EDGLEY, B.A. (Wayland College), M.A. (Texas Tech Univ.), Ph.D. (State Univ. of New York-Buffalo); *Professor and Head of the Department of Sociology;* 1982, 1972.

MICHAEL R. EDGMAND, B.A. (Washington State Univ.), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor of Economics;* 1983, 1966.

LEWIS H. EDWARDS, B.S. (O.S.U.), Ph.D. (North Dakota State Univ.); *Professor of Agronomy;* 1976, 1967.

STEVEN WILLIAM EDWARDS, B.P.E. (Purdue Univ.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Health, Physical Education and Leisure;* 1984, 1982.

RICHARD W. EGGERMAN, B.A. (Baylor Univ.), M.A. (Univ. of Illinois), Ph.D. (ibid); *Professor of Philosophy;* 1984, 1970.

RAYMOND D. EIKENBARY, B.S. (O.S.U), M.S. (Clemson Univ.), Ph.D. (ibid); *Regents Professor of Entomology;* 1988, 1964.

RONALD L. ELLIOTT, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (Colorado State Univ.); PE; *Associate Professor of Agricultural Engineering;* 1985, 1981.

GODFREY J. ELLIS, B.A. (Brigham Young Univ.), M.S. (ibid), Ph.D. (Washington State Univ.); *Associate Professor of Family Relations and Child Development;* 1982, 1978.

ROBERT E. ENGLAND, B.A. (Oklahoma College of Liberal Arts), M.P.A. (Univ. of Oklahoma), Ph.D. (ibid); *Associate Professor of Political Science;* 1986, 1982.

DAVID M. ENGLE, B.S.(Abilene Christian College), M.S. (ibid), Ph.D. (Colorado State Univ.); *Professor of Agronomy;* 1987, 1982.

FRANCIS M. EPPLIN, B.S. (Southern Illinois Univ.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Associate Professor of Agricultural Economics;* 1984, 1979.

MARGARET K. ESSENBERG, A.B. (Oberlin College), Ph.D. (Brandeis Univ.); *Professor of Biochemistry;* 1984, 1973.

RICHARD ESSENBERG, B.S. (California Inst. of Technology), Ph.D. (Harvard Univ.); *Professor of Biochemistry;* 1984, 1973.

CARL B. ESTES, B.S. (Univ. of Oklahoma), M.S. (O.S.U.), Ph.D. (ibid); P.E.;*Professor and Head of the School of Industrial Engineering and Management;* 1980, 1969.

I. DWAINE EUBANKS, B.S. (Univ. of Texas), Ph.D. (ibid); *Professor of Chemistry;* 1982, 1967.

BENNY EVANS, B.S. (O.S.U.), M.A. (Univ. of Michigan), Ph.D. (ibid); *Professor of Mathematics;* 1979, 1972.

MARGARET S. EWING, B.A. (Oberlin College), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor of Zoology;* 1987, 1980.

SIDNEY A. EWING, B.S.A. (Univ. of Georgia), M.S. (Univ. of Wisconsin), D.V.M. (Univ. of Georgia), Ph.D. (O.S.U.); *Professor of Veterinary Parasitology, Microbiology and Public Health;* 1979.

W. SCOTT FARGO, B.S. (Ohio State Univ.), M.S. (Texas A & M Univ.), Ph.D. (ibid); *Associate Professor of Entomology;* 1988, 1981.

LLOYD C. FAULKNER, D.V.M. (Colorado State Univ.), Ph.D. (Cornell Univ.); *Professor and Interim Head of the Department of Physiological Science and Associate Dean of Research and Graduate Studies of the College of Veterinary Medicine;* 1987, 1981.

RAYMOND P. FISK, B.S. (Arizona State Univ.), M.B.A. (ibid), D.B.A. (ibid); *Associate Professor and Interim Head of the Department of Marketing;* 1984, 1980.

JACQUELINE FLETCHER, B.S. (Emory Univ.), M.S. (Univ. of Montana), Ph.D. (Texas A & M Univ.); *Associate Professor of Plant Pathology;* 1988, 1983.

JOHN LEROY FOLKS, B.A. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor and Head of the Department of Statistics;* 1981, 1961.

WARREN T. FORD, B.A. (Wabash College), Ph.D. (Univ. of California-Los Angeles); *Professor of Chemistry;* 1983, 1978.

DAVID G. FOURNIER, B.A. (Univ. of Missouri-Kansas City), M.A. (ibid), Ph.D. (Univ. of Minnesota); *Associate Professor of Family Relations and Child Development;* 1983, 1978.

GARY L. FOUTCH, B.S. (Univ. of Missouri, Rolla), M.S. (ibid), Ph.D. (ibid); P.E.; *Associate Professor of Chemical Engineering;* 1985, 1980.

JOSEPH CARL FOX, B.S. (Brigham Young Univ.), M.S. (ibid), Ph.D. (Montana State Univ.); *Associate Professor of Veterinary Parasitology, Microbiology and Public Health;* 1983, 1978.

STANLEY F. FOX, M.S. (Univ. of Illinois), M.Phil. (Yale Univ.), Ph.D. (ibid); *Associate Professor of Zoology;* 1982, 1977.

DAVID A. FRANCKO, B.S. (Kent State Univ.), M.S. (ibid), Ph.D. (Michigan State Univ.); *Associate Professor of Botany and Director of Research of the College of Arts and Sciences;* 1985, 1981.

JOYCE S. FRISKE, B.S. (O.S.U.), M.Ed. (Univ. of Texas, Austin), Ph.D. (ibid); *Associate Professor of Curriculum and Instruction;* 1988, 1983.

DONALD KARL FROMME, B.M. (Boston Univ.), Ph.D. (Univ. of Iowa); *Professor of Psychology;* 1976, 1967.

ROBERT WESLEY FULTON, B.S. (O.S.U.), M.S. (Washington State Univ.), Ph.D. (Univ. of Missouri-Columbia), D.V.M. (O.S.U.); *Professor and Head of the Department of Veterinary Parasitology, Microbiology and Public Health;* 1986, 1982.

DALE R. FUQUA, B.A. (Eastern Illinois Univ.), M.A. (ibid), Ph.D. (Indiana Univ.); *Professor and Head of the Department of Applied Behavioral Studies;* 1987.

RONDAL ROSS GAMBLE, B.S. (Central State College, Oklahoma), M.Ed. (Adams State College), Ph.D. (Univ. of Oklahoma); *Professor of Applied Behavioral Studies;* 1971, 1966.

SANDRA KAY GANGSTEAD, B.S. (Univ of Wisconsin, LaCrosse), M.S. (Univ. of Wyoming), Ph.D. (Univ. of Utah); *Associate Professor of Health, Physical Education and Leisure and Coordinator, Physical Education;* 1987, 1983.

SANTIAGO GARCIA, B.A. (Instituto No. 1, Havana, Cuba), M.A. (Univ. of Oriente), Ph.D. (Univ. of Pittsburgh); *Professor of Foreign Languages and Literatures;* 1985, 1978.

JOHN JACOB GARDINER, B.A. (Univ. of Florida), Ph.D. (ibid); *Professor of Educational Administration and Higher Education;* 1987, 1979.

RODNEY D. GEISERT, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Univ. of Florida); *Associate Professor of Animal Science;* 1986, 1982.

JOHN I. GELDER, B.S. (Western Washington Univ.), M.S. (Univ. of Wisconsin), Ph.D. (Univ. of Arkansas); *Associate Professor of Chemistry;* 1982, 1977.

AFSHIN J. GHAJAR, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Mechanical and Aerospace Engineering;* 1985, 1981.

ROBERT KARL GHOLSON, B.A. (Univ. of Chicago), B.S. (Univ. of Illinois), Ph.D. (ibid); *Professor of Biochemistry;* 1969, 1962.

AMIT GHOSH, B.Sc. (Imperial College-London), Ph.D. (Nottingham Univ.); *Associate Professor of Mathematics;* 1987, 1983.

DONALD R. GILL, B.S. (Montana Univ.), M.S. (ibid), Ph.D. (Oregon State Univ.); *Regents Professor of Animal Science;* 1985, 1966.

ROBERT L. GILLEN, B.S. (Colorado State Univ.), Ph.D. (Oregon State Univ.); *Associate Professor of Agronomy;* 1988, 1983.

STANLEY E. GILLILAND, B.S. (O.S.U.), M.S. (ibid), Ph.D. (North Carolina State Univ.); *Regents Professor of Animal Science;* 1986, 1976.

G. STEVEN GIPSON, B.S. (Louisiana State Univ.) M.S. (ibid), Ph.D. (ibid); *Associate Professor of Civil Engineering;* 1986.

JAMES KEITH GOOD, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Mechanical and Aerospace Engineering;* 1987, 1980.

GEORGE GORIN, A.B. (Brooklyn College), M.A. (Princeton Univ.), Ph.D. (ibid); *Professor of Chemistry;* 1962, 1955.

ANNA M. GORMAN, B.S. (Illinois State Northern Univ.), M.S. (Univ. of Wisconsin), Ed.D. (Univ. of Illinois); *Professor of Home Economics Education and Community Services;* 1976.

FRANCIS J. GOUGH, B.S. (West Virginia Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Plant Pathology;* 1974.

VICKI GREEN, M.A. (Univ. of California-Berkeley), M.A. (ibid), Ph.D. (Colorado State Univ.); *Associate Professor and Head of the Department of Psychology;* 1986, 1974.

MARY M. GRULA, B.A. (Univ. of Minnesota), Ph.D.(ibid); *Assistant Professor of Microbiology;* 1977, 1962.

JOEL K. HAACK, B.A. (Univ. of Iowa), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Mathematics;* 1984, 1979.

CHARLES THOMAS HAAN, B.S. (Purdue Univ.), M.S. (ibid), Ph.D. (Iowa State Univ.); P.E.; *Regents Professor of Agricultural Engineering;* 1987, 1978.

MARTIN T. HAGAN, B.S. (Univ. of Notre Dame), M.S. (Georgia Inst. of Tech), Ph.D. (Univ. of Kansas); *Associate Professor of Electrical and Computer Engineering;* 1986.

JAKIE ALEXANDER HAIR, B.S. (Clemson Univ.), M.S. (ibid), Ph.D. (Virginia Polytechnic Inst.); *Regents Professor of Entomology;* 1980, 1967.

LARRY EUGENE HALLIBURTON, B.S. (Univ. of Missouri), M.S. (ibid), Ph.D. (ibid); *Professor and Head of the Department of Physics;* 1981, 1971.

B. CURTIS HAMM, B.S. (O.S.U.), M.B.A. (ibid), Ph.D. (Univ. of Texas); *Professor of Marketing;* 1973, 1966.

LAWRENCE H. HAMMER, B.S. (Sam Houston State Univ.), M.B.A. (North Texas State Univ.), D.B.A. (Indiana Univ.); *Associate Professor of Accounting;* 1981, 1977.

BERTIL LENNART HANSON, B.S. (Northwestern Univ.), M.A. (Univ. of Chicago), Ph.D. (ibid); *Professor of Political Science;* 1976, 1959.

H. JAMES HARMON, B.S. (Purdue Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Zoology;* 1988, 1977.

ARTHUR E. HARRIMAN, A.B. (Bucknell Univ.), Ph.D. (Cornell Univ.); *Professor of Psychology;* 1966.

LYNDA C. HARRIMAN, B.S. (Colorado State Univ.), M.S. (Univ. of Illinois), Ph.D. (ibid); *Professor of Home Economics Education and Community Services and Associate Dean for Home Economics Cooperative Extension;* 1987, 1984.

RICHARD DOUGLAS HECOCK, A.B. (Albion College), A.M. (Wayne State Univ.), Ph.D. (Clark Univ.); *Professor and Head of the Department of Geography;* 1981, 1969.

GEORGE E. HEDRICK, B.A. (Adams State College), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor and Head of the Department of Computing and Information Science;* 1985, 1970.

BOB HELM, B.A. (Wichita State Univ.), M.A. (ibid), Ph.D. (State Univ. of New York-Albany); *Associate Professor of Psychology;* 1976, 1972.

DAVID M. HENNEBERRY, B.S. (Univ. of Minnesota), M.S. (ibid), Ph.D. (Univ. of Wisconsin, Madison); *Associate Professor of Agricultural Economics;* 1988, 1984.

THOMAS C. HENNESSEY, B.S. (Univ. of Northern Iowa), Ph.D. (Iowa State Univ.); *Associate Professor of Forestry;* 1980, 1976.

CHARLES A. HIBBERD, B.S. (Univ. of Nebraska-Lincoln), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor Animal Science;* 1987, 1982.

BEULAH MARIE HIRSCHLEIN, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Home Economics Education and Community Services and Director of Home Economics University Extension;* 1981, 1970.

LARRY HOCHHAUS, B.S. (Iowa State Univ.), M.A. (ibid), Ph.D. (ibid); *Associate Professor of Psychology;* 1975, 1971.

ELIZABETH M. HOLT, B.A. (Smith College), Ph.D. (Brown Univ.); *Professor of Chemistry;* 1987, 1981.

SMITH L. HOLT, B.S. (Northwestern Univ.), Ph.D. (Brown Univ.); *Professor of Chemistry and Dean of the College of Arts and Sciences;* 1980.

GERALD W. HORN, B.S. (Texas Tech Univ.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Animal Science;* 1981, 1974.

ARTHUR W. HOUNSLOW, B.SC. (Univ. of Melbourne), M.SC. (Carleton Univ.), Ph.D. (ibid); *Professor of Geology;* 1981.

ROBERT K. HUGHES, B.S. (The Citadel), M.S. (O.S.U.), Ph.D. (ibid); *Professor and Head of the School of Civil Engineering;* 1983.

PAUL DWIGHT HUMMER, B.S. (Pennsylvania State Univ.), Ph.D. (ibid); *Professor of Agricultural Economics and Associate Dean of Resident Instruction of the College of Agriculture;* 1982, 1969.

ROBERT M. HUNGER, B.S. (Colorado State Univ.), M.S. (ibid), Ph.D. (Oregon State Univ.); *Associate Professor of Plant Pathology;* 1987, 1982.

JAMES L. HUSTON, B.A. (Univ. of Florida), M.A. (Columbia Univ.), Ed.D. (ibid); *Associate Professor of History;* 1988, 1980.

CHRISWELL G. HUTCHENS, B.S. (South Dakota State Univ.), M.S. (ibid), Ph.D. (Univ. of Missouri); *Associate Professor of Electrical and Computer Engineering;* 1986.

LAWRENCE M. HYNSON, JR., B.A. (Texas Christian Univ.), M.A. (ibid), Ph.D. (Univ. of Tennessee); *Associate Professor of Sociology;* 1976, 1972.

TIMOTHY C. IRELAND, B.S. (Phillips Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor of Management;* 1985, 1978.

JAMES FORBES JACKSON, B.B.A. (Univ. of Texas), M.B.A. (ibid), Ph.D. (ibid); *Associate Professor of Finance;* 1967, 1964.

WILLIAM H. JACO, B.A. (Fairmont State College), M.A. (Pennsylvania State Univ.), Ph.D. (Univ. of Wisconsin); *Professor of Mathematics;* 1982.

JOSEPH M. JADLOW, JR., B.A. (Central Missouri State College), M.S.(ibid), Ph.D. (Univ. of Virginia); *Professor of Economics;* 1976, 1968.

GEORGE FREDERICK JEWSBURY, B.A. (Mankato State College), M.A. (Univ. of Washington), Ph.D. (ibid); *Professor of History;* 1985, 1967.

JOHN JOBE, B.S. (Univ. of Tulsa), M.S. (O.S.U.), Ph.D. (ibid); *Professor of Mathematics;* 1979, 1964.

ARLAND H. JOHANNES, B.S. (Illinois State Univ.), M.S.E. (West Virginia Univ.), Ph.D. (Univ. of Kentucky); P.E.;*Associate Professor of Chemical Engineering;* 1984.

BECKY L. JOHNSON, B.S. (O.S.U.), M.S. (Univ. of Illinois-Urbana), Ph.D. (ibid); *Professor of Botany;* 1988, 1969.

JERRY ALAN JOHNSON, B.S. (O.S.U.), M.S. (Univ. of Illinois), Ph.D. (ibid); *Professor of Mathematics;* 1979, 1969.

WILBUR D. 'DEKE' JOHNSON, B.S. (Rocky Mountain College), M.Ed. (Univ. of Montana), Ed.D. (Western Michigan Univ.); *Associate Professor of Educational Administration and Higher Education;* 1979, 1974.

THOMAS D. JOHNSTEN, B.S. (Kansas State Teachers College), M.S. (Fort Hays Kansas State College), Ed.D. (Univ. of Neb.); *Professor of Curriculum and Instruction;* 1973, 1969.

LAURA DUNN JOLLY, B.S. (Univ. of Mississippi), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor of Clothing, Textiles and Merchandising;* 1988, 1983.

HELEN ELAINE JORDAN, B.A. (Bridgewater College), M.S. (Virginia Polytechnic Inst.), D.V.M. (Univ. of Georgia), Ph.D. (ibid); *Professor of Veterinary Parasitology, Microbiology, and Public Health;* 1969.

D. ELAINE JORGENSON, B.A. (Colorado State College), M.A. (ibid), Ed.D. (O.S.U.); *Professor of Home Economics Education and Community Services and Interim Dean of the College of Home Economics;* 1976, 1968.

BRIAN A. KAHN, B.S. (Delaware Valley Col. of Science and Agriculture), M.S. (Cornell Univ.), Ph.D. (ibid); *Associate Professor of Horticulture;* 1987, 1982.

THOMAS ALLAN KARMAN, A.B. (Albion College), M.A. (Harvard Univ.), Ph.D. (Univ. of Toledo); *Professor and Head of the Department of Educational Administration and Higher Education;* 1978, 1972.

MARVIN STANFORD KEENER, B.S. (Birmingham Southern College), M.A. (Univ. of Missouri), Ph.D. (ibid); *Professor and Head of the Department of Mathematics;* 1988, 1970.

ALLEN EUGENE KELLY, B.S. (Texas A & M Univ.), M.E. (ibid), Ph.D. (Univ. of Texas); P.E.; *Professor of Civil Engineering and Interim Associate Dean of Research of the College of Engineering, Architecture and Technology;* 1980, 1970.

DOUGLAS CHARLES KENT, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Geology;* 1980, 1969.

DAROLD L. KETRING, B.S. (Univ. of California), Ph.D. (ibid); *Adjunct Associate Professor of Agronomy;* 1978.

JAMES PERRY KEY, B.S. (Univ. of Tennessee), M.Ed. (Virginia Polytechnic Inst.) Ed.D. (North Carolina State Univ.); *Professor of Agricultural Education;* 1975, 1969.

JANET I. KIMBRELL, B.S. (Southeastern Oklahoma State Univ.), M.P.A. (Univ. of Texas-Arlington), Ph.D. (O.S.U.); *Associate Professor of Accounting;* 1983, 1979.

KENNETH L. KING, B.A. (Southwestern State College, Oklahoma), M.Ed. (Univ. of Oklahoma), Ed.D. (ibid); *Professor of Curriculum and Instruction, Dean of the College of Education, and Director of Teacher Education;* 1989, 1972.

JAMES STEVEN KIRBY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Agronomy;* 1983, 1969.

PAUL J. KLEMP, B.A. (Univ. of Nottingham, England), M.A. (Univ. of Toronto), Ph.D. (ibid); *Associate Professor of English;* 1986, 1981.

DARREL DEAN KLETKE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Agricultural Economics;* 1979, 1966.

MARILYN G. KLETKE, B.A. (The Colorado College), M.S. (Iowa State Univ.), Ph.D. (O.S.U.); *Associate Professor of Management;* 1985, 1976.

CLYDE B. KNIGHT, B.S. (East Central State College, Oklahoma), M.S. (O.S.U.), Ed.D. (ibid); *Associate Professor of Trade and Industrial Education;* 1975, 1966.

ANDREW ALAN KOCAN, B.A. (Hiram College), M.S.P.H. (Univ. of North Carolina), Ph.D. (ibid); *Professor of Veterinary Parasitology, Microbiology and Public Health;* 1984, 1974.

KATHERINE M. KOCAN, B.A. (Hiram College), M.S.P.H. (Univ. of North Carolina at Chapel Hill), Ph.D. (O.S.U.); *Associate Professor of Veterinary Parasitology, Microbiology, and Public Health;* 1988, 1980.

ROGER ERDMAN KOEPPE, A.B. (Hope College), M.S. (Univ. of Illinois), Ph.D. (ibid); *Professor and Head of the Department of Biochemistry;* 1963, 1959.

J. RANDALL KOETTING, B.A. (LaSalette Major Seminary College), M.A. (St. Louis Univ.), Ph.D. (Univ. of Wisconsin-Madison); *Associate Professor of Curriculum and Instruction;* 1982, 1979.

IGNACY I. KOTLARSKI, Magister (M.S.), (Warsaw, Poland), Ph.D. (Univ. of Croclaw, Poland), Docent in Mathematics (Technical Univ. of Warsaw); *Professor of Statistics;* 1970, 1969.

GLENN A. KRANZLER, B.S.A.E. (North Dakota State Univ.), M.S.A.E. (ibid), Ph.D. (Iowa State Univ.); *Professor of Agricultural Engineering;* 1985, 1982.

EUGENE G. KRENZER, JR., B.S. (Cornell Univ.), M.S. (Univ. of Minnesota), Ph.D. (ibid); *Associate Professor of Agronomy;* 1981, 1978.

RUTH HAAS KRIEGER, B.B.A. (Ohio Univ.), M.B.A. (Univ. of Cincinnati), Ph.D. (ibid); *Associate Professor of Marketing;* 1987, 1982.

EARL EDWARD LAFON, B.S. (Univ. of Oklahoma), M.S. (ibid), Ph.D. (ibid); *Professor of Physics;* 1971, 1968.

RAYMOND W. LAFORGE, B.S. (Univ. of South Carolina), M.B.A. (ibid), D.B.A. (Univ. of Tennessee); *Associate Professor of Marketing;* 1984, 1982.

GERALD M. LAGE, B.S. (Iowa State Univ.), Ph.D. (Univ. of Minnesota); *Professor of Economics;* 1987, 1966.

DAVID S. LANE, JR., B.A. (St. Olaf College), Ph.D. (Florida State); *Associate Professor of Applied Behavioral Studies;* 1987, 1983.

JAMES N. LANGE, B.S. (Pennsylvania State Univ.), M.S. (ibid), Ph.D. (ibid); *Regents Professor of Physics;* 1984, 1965.

AMY HING-LING LAU, B.A. (Univ. of Singapore), M.A. (Texas Christian Univ.), Ph.D. (Washington Univ. at St. Louis); *Associate Professor of Accounting;* 1984.

HON-SHAING LAU, B.Eng. (Univ. of Singapore), Ph.D. (Univ. of North Carolina, Chapel Hill); *Regents Professor of Management;* 1987, 1984.

JAMES J. LAWLER, B.A. (Univ. of Pittsburgh), M.A. (ibid), M.P.I.A. (ibid), J.D. (Harvard Univ.), Ph.D. (Univ. of Pittsburgh); *Professor of Political Science;* 1980, 1970.

EDWARD G. LAWRY, B.A. (Fordham Univ.), M.A. (Univ. of Pittsburgh), Ph.D. (Univ. of Texas); *Associate Professor and Head of the Department of Philosophy;* 1985, 1971.

FRANKLIN ROLLIN LEACH, B.A. (Hardin-Simmons Univ.), Ph.D. (Univ. of Texas); *Professor of Biochemistry;* 1968, 1959.

LEONARD J. LEFF, B.B.A. (Univ. of Texas, Austin), M.A. (Univ. of Houston), Ph.D. (Northern Illinois Univ.); *Associate Professor of English;* 1983, 1979.

DAVID G. LILLEY, B.SC. (Sheffield Univ.), M.SC. (ibid), Ph.D. (ibid); P.E.; *Professor of Mechanical and Aerospace Engineering;* 1982, 1978.

LARRY J. LITTLEFIELD, B.S. (Cornell Univ.), M.S. (Minnesota Univ.), Ph.D. (ibid); *Professor and Head of the Department of Plant Pathology;* 1985.

JOHN P. LLOYD, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); P.E.; *Professor of Civil Engineering;* 1981, 1970.

RICHARD L. LOWERY, B.S.M.E. (Texas Tech. College), M.S. (O.S.U.), Ph.D. (Purdue Univ.); P.E.; *Professor of Mechanical and Aerospace Engineering;* 1967, 1961.

NEIL ROBERT LUEBKE, A.B. (Midland College), M.A. (Johns Hopkins Univ.), Ph.D. (ibid); *Professor of Philosophy;* 1979, 1961.

KEITH S. LUSBY, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Professor of Animal Science;* 1986, 1976.

THOMAS B. LYNCH, B.S. (Virginia Polytech Inst. & S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); *Associate Professor of Forestry;* 1987, 1982.

JULIAN QUENTIN LYND, B.S. (Univ. of Arkansas), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor of Agronomy;* 1957, 1951.

GILBERT J. MAINS, B.S. (Duquesne Univ.), Ph.D. (Univ. of California); *Professor of Chemistry;* 1971.

HARRY PARKS MAPP, JR., B.S. (Virginia Polytechnic Inst.), M.S. (ibid), Ph.D. (O.S.U.); *Regents Professor of Agricultural Economics;* 1988, 1974.

JUAN MANUEL MARCOS, B.A. (National Univ., Asuncion), M.A. (Univ. of Pittsburgh), Ph.D. (Univ. of Madrid), Ph.D. (Univ. of Pittsburgh); *Assistant Professor of Foreign Languages and Literatures;* 1983.

JOEL JEROME MARTIN, B.S. (South Dakota School of Mines and Technology), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Physics;* 1979, 1969.

ROBERT L. MATTS, B.S. (Hamline Univ.), Ph.D. (Univ. of Wisconsin); *Associate Professor of Biochemistry;* 1988, 1985.

ELIZABETH MAX, B.S. (Texas Woman's Univ.), M.L.S. (North Texas State Univ.), Ed.D. (O.S.U.); *Associate Professor of Curriculum and Instruction;* 1978, 1970.

CHARLES V. MAXWELL, B.S. (Univ. of Georgia), M.S. (ibid), Ph.D. (Univ. of Wisconsin); *Professor of Animal Science;* 1984, 1968.

CHARLES SIDNEY McCAIN, M.S. (Univ. of Missouri), D.V.M.(Auburn Univ.); *Associate Professor of Veterinary Parasitology, Microbiology and Public Health;* 1981.

STEPHEN W. S. MCKEEVER, B.S. (Univ. College of North Wales, Bangor), M.S. (ibid), PH.D. (ibid); *Associate Professor of Physics;* 1986, 1983.

KENNETH H. McKINLEY, B.A. (Tarkio College, Missouri), M.A. (Univ. of Iowa), Ph.D. (ibid); *Professor of Educational Administration and Higher Education, Director of Education Research and Projects, and Interim Director of Education Extension;* 1982, 1973.

C. WARREN McKINNEY, B.S.Ed. (Georgia Southern College), M.Ed. (Georgia Southwestern College), Ed.D. (Univ. of Georgia); *Associate Professor of Curriculum and Instruction;* 1988, 1987.

WILFRED E. McMURPHY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor of Agronomy;* 1976, 1964.

RONALD W. McNEW, B.S. (Colorado State Univ.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Statistics;* 1980, 1970.

JAMES K. McPHERSON, B.S. (Univ. of Idaho), M.A. (Univ. of California), Ph.D. (ibid); *Professor of Botany;* 1982, 1968.

FAYE C. McQUISTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); P.E.; *Professor of Mechanical and Aerospace Engineering;* 1976, 1962.

GARY K. MEEK, B.B.A. (Texas Christian Univ.), M.B.A. (ibid), Ph.D. (Univ. of Washington); *Associate Professor of Accounting;* 1984, 1980.

WAYNE ALAN MEINHART, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); *Professor and Head of the Department of Management;* 1988, 1962.

DAVID W. MEINKE, B.A. (College of Wooster), Ph.D. (Yale Univ.); *Associate Professor of Botany;* 1986, 1982.

ULRICH K. MELCHER, B.S. (Univ. of Chicago), Ph.D. (Michigan State Univ.); *Professor of Biochemistry;* 1983, 1975.

HASSAN A. MELOUK, B.SC. (Alexandria Univ., Egypt), M.Sc. (Oregon State Univ.), Ph.D.(ibid); *Professor of Plant Pathology;* 1976.

OWEN G. MERKLE, B.S. (O.S.U.), Ph.D. (Texas A & M Univ.); *Professor of Agronomy;* 1974.

EDWIN L. MILLER, B.S. (Iowa State Univ.), M.S. (ibid), Ph.D. (ibid); *Associate Professor and Head of the Department of Forestry;* 1989, 1986.

MELVIN D. MILLER, B.S. (Oregon State Univ.), M.S. (ibid), Ed.D. (ibid); *Professor and Director of the School of Occupational and Adult Education;* 1981.

RONALD K. MILLER, B.S.B.A. (Univ. of Missouri), M.B.A. (ibid), Ph.D. (ibid); *Associate Professor of Finance and Director of Business Administration Graduate Studies;* 1981.

RUDOLPH JOHN MILLER, B.S. (Cornell Univ.), M.S. (Tulane Univ.), Ph.D. (Cornell Univ.); *Professor of Zoology;* 1969, 1962.

STEPHEN J. MILLER, B.S. (O.S.U.), M.B.A. (ibid), Ph.D. (Univ. of California, Los Angeles); *Professor of Marketing;* 1979, 1971.

TERENCE JOHN MILLS, B.S. (Western Illinois Univ.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor of Curriculum and Instruction;* 1978, 1970.

EARL DOUGLAS MITCHELL, JR., B.S. (Xavier Univ.), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor of Biochemistry;* 1978, 1967.

JOE H. MIZE, B.S.I.E. (Texas Tech. Univ.), M.S.I.E. (Purdue Univ.), Ph.D. (ibid); P.E.; *Regents Professor of Industrial Engineering and Management;* 1981, 1972.

RONALD L. MOOMAW, B.A. (Univ. of Virginia), M.A. (Princeton Univ.), Ph.D. (ibid); *Professor and Head of the Department of Economics;* 1981, 1972.

JAMES D. MORAN, III, B.A. (Duke Univ.), M.S. (Univ. of Oklahoma), Ph.D. (O.S.U.); *Professor and Head of the Department of Family Relations and Child Development;* 1985.

PETER M. MORETTI, B.S. (California Inst. of Technology), M.S. (ibid), Ph.D. (Stanford Univ.); P.E.; *Professor of Mechanical and Aerospace Engineering;* 1976, 1970.

PATRICK MONROE MORGAN, D.V.M. (Univ. of Georgia), M.P.H.(Tulane Univ.), Dr.P.H. (ibid); *Regents Service Professor of Veterinary Parasitology, Microbiology and Public Health;* 1985, 1977.

LAWRENCE G. MORRILL, B.S. (Utah State Univ.), M.S. (ibid), Ph.D. (Cornell Univ.); *Professor of Agronomy;* 1976, 1966.

ANDREW J. MORT, B.S.C. (McGill Univ.), Ph.D. (Michigan State Univ.); *Associate Professor of Biochemistry;* 1985, 1981.

JAMES E. MOTES, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Horticulture;* 1982, 1977.

DENNIS L. MOTT, B.A.E. (Wayne State College), M.S. (Univ. of Nebraska, Omaha), Ed.D. (Univ. of Nebraska, Lincoln); *Professor of Administrative Services;* 1980, 1974.

HORACIO A. MOTTOLA, Licentiate (Univ. of Buenos Aires), Ph.D. (ibid); *Professor of Chemistry;* 1975, 1967.

JOHN C. MOWEN, B.A. (William and Mary College), Ph.D. (Arizona State Univ.); *Professor of Marketing;* 1988, 1978.

MARYANNE M. MOWEN, B.A. (The Colorado College), M.S. (Arizona State Univ.), Ph.D. (ibid); *Associate Professor of Accounting;* 1986, 1978.

DONALD S. MURRAY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Agronomy;* 1985, 1978.

JAY CLARENCE MURRAY, B.S. (Utah State Univ.), M.S. (Colorado State Univ.), Ph.D. (Cornell Univ.); *Professor of Agronomy;* 1984, 1959.

J. ROBERT MYERS, B.A. (Rice Univ.), M.A. (ibid), Ph.D.(ibid); *Associate Professor of Mathematics;* 1982, 1979.

SATYANARAYAN NANDI, B.S. (University of Calcutta), M.S. (ibid), Ph.D. (University of Chicago); *Associate Professor of Physics;* 1988, 1986.

AZIM NANJI, B.A. (Makerere Univ.), M.A. (McGill Univ.), Ph.D. (ibid); *Professor of Religious Studies;* 1987, 1973.

JOHN W. NAZEMETZ, B.S.I.E. (Lehigh Univ.), Ph.D. (ibid); *Associate Professor of Industrial Engineering and Management;* 1982, 1978.

ELDON CARL NELSON, B.S. (Ohio State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Biochemistry;* 1975, 1963.

JAMES RALPH NELSON, B.A.Ag.Ec. (Texas Tech. Univ.), M.S.Ag.Ec. (ibid), Ph.D. (O.S.U.); *Professor of Agricultural Economics;* 1983, 1972.

DAVID L. NOFZIGER, B.A. (Goshen College), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Agronomy;* 1986, 1974.

G. DARYL NORD, B.S. (Mayville State College), M.S. (Univ. of North Dakota-Grand Forks), Ph.D. (ibid); *Professor of Management* 1980, 1977.

ROBERT E. NORRIS, B.S. (Arizona State Univ.), M.A. (ibid), Ph.D. (Univ. of Iowa); *Professor of Geography;* 1980, 1974.

AUDREY ELEANOR OAKS, B.S. (State Univ. of New York, Buffalo), M.S. (Univ. of Wisconsin), Ed.D. (O.S.U.); *Associate Professor of Curriculum and Instruction;* 1972, 1964.

GAROLD D. OBERLENDER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor of Civil Engineering;* 1978, 1974.

GEORGE VAN ODELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Texas A & M Univ.); *Professor of Biochemistry;* 1970; 1956.

ROBERT LEE OEHRTMAN, B.S. (Ohio State Univ.), M.S. (Oregon State Univ.), Ph.D. (Iowa State Univ.); *Professor of Agricultural Economics;* 1985, 1970.

KENT W. OLSON, B.S. (Arizona State Univ.), M.A. (Univ. of Oregon), Ph.D. (ibid); *Professor of Economics;* 1985, 1974.

JAMES W. OLTJEN, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (Univ. of California, Davis); *Associate Professor of Animal Science;* 1988, 1983.

METE ONER, B.S. (Middle East Technological Univ.), M.S. (ibid), Ph.D. (Norwegian Institute of Technology); *Associate Professor of Civil Engineering;* 1985.

JAMES E. OSBORN, B.S. (O.S.U.), Ph.D. (ibid); *Professor and Head of the Department of Agricultural Economics;* 1977.

FREDERIC N. OWENS, B.S. (Univ. of Minnesota), Ph.D. (ibid); *Regents Professor of Animal Science;* 1986, 1974.

CHARLOTTE L. OWNBY, B.S. (Univ. of Tennessee), M.S. (ibid), Ph.D. (Colorado State Univ.); *Professor of Physiological Science;* 1984, 1974.

JAMES DONALD OWNBY, B.S. in Ed. (Univ. of Tennessee), M.S. (ibid), Ph.D. (Colorado State Univ.); *Professor of Botany;* 1987, 1975.

JOHN M. PANAGOS, B.A.Ed. (Western Washington State Univ.), M.A. (Washington State Univ.), Ph.D. (Ohio State Univ.); *Professor and Head of the Department of Speech and Language Pathology and Audiology;* 1985.

ROGER JERO PANCIERA, D.V.M. (O.S.U.), M.S. (Cornell Univ.), Ph.D. (ibid); *Professor of Veterinary Pathology;* 1979, 1956.

WILLIAM M. PARLE, B.S. (College of William and Mary, Virginia), M.S. (Univ. of South Carolina), Ph.D. (ibid); *Associate Professor of Political Science;* 1988, 1981.

DAVID PATTERSON, B.A. (Univ. of Oregon), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Foreign Languages and Literatures;* 1985, 1982.

DENNIS HENRY PATZ, B.S. (Northern Illinois Univ.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor of Accounting;* 1988.

DONNA PAYNE, B.S. (Oklahoma College for Women), M.S. (Univ. of Oklahoma), Ph.D. (Univ. of Missouri); *Associate Professor of Health, Physical Education and Leisure;* 1981, 1972.

JOSEPH H. PEARL, A.B. (Univ. of Michigan), Ph.D. (ibid); *Associate Professor of Applied Behavioral Studies;* 1974, 1971.

CLAUDIA J. PECK, B.S. (Univ. of Oklahoma), M.S. (Univ. of Missouri, Columbia), Ph.D. (Iowa State Univ.); *Professor of Housing, Interior Design and Consumer Studies;* 1988, 1981.

THOMAS F. PEEPER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (North Carolina State Univ.); *Professor of Agronomy;* 1986, 1976.

ARTHUR L. PENTZ, B.S. (Bloomsburg State College), M.Ed. (ibid), Ph.D. (Pennsylvania State Univ.); *Associate Professor of Speech;* 1987, 1982.

JACQUES H. H. PERK, Candidat (Univ. of Amsterdam), Doctorandus (ibid), Doctor (Univ. Leiden, Netherlands); *Associate Professor of Physics;* 1988.

LARRY M. PERKINS, B.S. (Univ. of Nebraska), Ph.D. (Syracuse Univ.); *Professor of Sociology;* 1971, 1968.

DON CLAYTON PETERS, A.B. (Tabor College), M.S. (Kansas State Univ.), Ph.D. (ibid); *Professor of Entomology;* 1971.

BRUCE A. PETTY, B.S. (Fort Hays State College), M.S. (Kansas State Univ.), Ph.D. (ibid); *Associate Professor of Curriculum and Instruction;* 1982, 1978.

WAYNE A. PETTYJOHN, B.A. (Univ. of South Dakota), M.A. (ibid), Ph.D. (Boston Univ.); *Sun Chair and Head of the School of Geology;* 1986, 1980.

JAMES L. PHILLIPS, B.A. (Univ. of Arizona), M.A. (Southern Illinois Univ.), Ph.D. (ibid); *Professor of Psychology;* 1977.

WILLIAM H. PIXTON, A.B. (George Washington Univ.), M.A. (ibid), Ph.D. (Univ. of North Carolina, Chapel Hill); *Associate Professor of English;* 1980, 1977.

RICHARD WILLIAM POOLE, B.S. (Univ. of Oklahoma), M.B.A. (ibid), Ph.D. (O.S.U.); *Professor of Economics;* 1984, 1960.

GENE L. POST, B.A. (Bethany Nazarene College), M.Ed. (Univ. of Oklahoma), Ed.D. (O.S.U.); *Professor of Curriculum and Instruction;* 1986, 1961.

RICHARD C. POWELL, B.S. (U.S. Naval Academy), M.S. (Arizona State Univ.), Ph.D. (ibid); *Regents Professor of Physics;* 1985, 1971.

WAYNE B. POWELL, B.S. (Texas Lutheran College), M.S. (Texas A & M Univ.), Ph.D. (Tulane Univ.); *Associate Professor of Mathematics;* 1984, 1980.

CHRISTOPHER ERIC PRICE, B.S. (Univ. of Wales), Ph.D. (ibid); PE; *Professor of Mechanical and Aerospace Engineering;* 1980, 1966.

EDWARD OLLINGTON PRICE, III, B.A. (Texas A&M Univ.), Ph.D. (ibid); *Associate Professor of Economics;* 1984.

JAMES MANUEL PRICE, B.S. (Univ. of Oklahoma), B.A. (ibid), Ph.D. (ibid); *Associate Professor of Psychology;* 1984, 1977.

RICHARD GRAYDON PRICE, B.S. (O.S.U.), M.S. (ibid), Ph.D.(ibid); *Professor of Entomology;* 1978, 1965.

NEIL PURDIE, B.S. (Univ. of Glasgow), (ibid); *Professor and Head of the Department of Chemistry;* 1982,

CHARLES WAYNE QUALLS, JR., (O.S.U.), D.V.M. (ibid), Ph.D. (California, Davis); *Professor of Pathology;* 1988, 1982.

ZANE K. QUIBLE, B.S. (Univ. Lincoln), M.Ed. (ibid), Ph.D State Univ.); *Professor of Services;* 1983, 1981.

ROBERT THOMAS RADF Univ.), M.A. (ibid), Ph. *Associate Professor* 1963.

LIONEL MISCHA RAF homa), M.S. (ibid) *Regents Profess* 1964.

RAMACHANDRA (Univ. of Mad Technology) *Professor of Engineerin*

KENNETH EDWARD WIGGINS, B.S. (Troy State Univ., Alabama), M.S. (Auburn Univ.), Ed.D. (ibid); *Professor of Curriculum and Instruction and Head of the Department of Aviation and Space Education;* 1987, 1962.

JOHN H. WILGUESS, B.S. (Indiana State Univ.), M.S. (ibid), Ph.D. (Univ. of Arkansas); *Associate Professor of Accounting;* 1982, 1979.

JERRY LEO WILHM, B.S. (Kansas State Teachers College), M.S. (ibid), Ph.D. (O.S.U.); *Professor and Head of the Department of Zoology;* 1982, 1966.

JANET BARBARA WILKINSON, B.A. (Univ. of New Hampshire), M.S. (Purdue Univ.), Ph.D. (ibid); *Associate Professor of Applied Behavioral Studies;* 1980, 1972.

KEITH D. WILLETT, B.S. (Nebraska Wesleyan Univ.), M.S. (Univ. of Nebraska at Omaha), Ph.D. (Univ. of New York); *Associate Professor of Economics;* 1986, 1981.

JOSEPH E. WILLIAMS, B.S. (New Mexico State Univ.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Agricultural Economics;* 1980, 1975.

SUE E. WILLIAMS, B.S. (New Mexico State Univ.), M.A. (Iowa State Univ.), Ph.D. (O.S.U.); *Associate Professor of Housing, Interior Design, and Consumer Studies;* 1985, 1977.

LINDA J. WILLSON, B.S. (West Texas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Associate Professor of Statistics;* 1985, 1981.

BRUCE N. WILSON, B.S.A.E. (Univ. of Minnesota), M.S.A.E. (ibid), Ph.D. (Univ. of Kentucky); *Associate Professor of Agricultural Engineering;* 1987, 1983.

TIMOTHY MICHAEL WILSON, B.S. (Univ. of Florida), Ph.D.(ibid); *Professor of Physics;* 1982, 1969.

ROBERT F. WITTWER, B.S. (State Univ. of New York), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Forestry;* 1982.

HARRY S. WOHLERT, B.S. (O.S.U.), M.S. (Univ. of Oklahoma), Ed.D. (O.S.U.); *Professor of Foreign Languages and Literatures;* 1987, 1967.

L.E. WOLFE, B.A. (Bucknell Univ.), M.A. of California), Ph.D. (ibid); *Associate or of Mathematics;* 1978, 1974.

DS, B.S. (Arkansas Tech Univ.), Arkansas), Ph.D. (O.S.U.); *ssor of Agricultural*

DS, JR., A.B. id), Ph.D. (Yale 1965, 1956.

(Univ. of Ph.D.

Ph.D

965.

S. of niv. of Veterinary

Nebraska, (Michigan dministrative

RD, B.A. (Baylor (Univ. of Texas), Philosophy; 1972,

B.S. (Univ. of Okla- Ph.D. (Univ. of Illinois); of Chemistry; 1978,

G. RAMAKUMAR, B.E. as), M.Tech. (Indian Inst. of Ph.D. (Cornell Univ.), P.E.; Electrical and Computer ; 1976, 1967.

GARY E. YOUNG, B.S. (Univ. of California, Davis), M.S. (ibid), Ph.D. (Univ. of California, Berkeley); *Associate Professor of Mechanical and Aerospace Engineering;* 1986, 1982.

JERRY H. YOUNG, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of California); *Professor of Entomology;* 1965, 1959.

CHANG-AN YU, B.S. (National Taiwan Univ.), M.S. (ibid), Ph.D. (Univ. of Illinois, Urbana); *Regents Professor of Biochemistry;* 1985, 1981.

LINDA YU, B.S. (National Taiwan Univ.), M.S. (Univ. of Illinois), Ph.D. (ibid); *Professor of Biochemistry;* 1988, 1981.

WILLIAM G. ZIKMUND, B.A. (Univ. of Colorado), M.S. (Southern Illinois Univ.); D.B.A. (Univ. of Colorado); *Professor of Marketing;* 1980, 1972.

LARRY D. ZIRKLE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Texas); P.E.; *Professor of Mechanical and Aerospace Engineering and Director of Engineering Student Academic Services;* 1987, 1970.

PHILLIP J. ZWANK, B.A. (Central College-Pella), M.S. (Univ. of Missouri-Columbia), Ph.D. (Utah State Univ.); *Associate Professor of Zoology;* 1987.

Full Members Emeriti

DONALD CLAYTON ABBOTT, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Biochemistry;* 1986, 1954.

BETTY ABERCROMBIE, B.S. (O.S.U.), M.Ed. (Phillips Univ.), Ed.D. (O.S.U.); *Professor Emeritus of Health, Physical Education and Leisure;* 1975, 1970.

FREDERICK GENE ACUFF, B.A. (Manhattan Bible College), M.S. (Kansas State Univ.), Ph.D. (Univ. of Missouri); *Professor Emeritus of Sociology;* 1988, 1962.

THEODORE LEE AGNEW, B.A. (Univ. of Illinois), M.A. (ibid), M.A. (Harvard Univ.), Ph.D. (ibid); *Professor Emeritus of History;* 1984, 1947.

DONALD EMERSON ALLEN, B.S. (Ohio State Univ.), M.A. (ibid); *Associate Professor Emeritus of Sociology;* 1969, 1967.

WILTON T. ANDERSON, B.S. (Northwestern State College), M.C.E. (Univ. of Oklahoma), Ed.D. (Univ. of Colorado); *Professor and Head Emeritus of the Department of Accounting;* 1960.

E. BURL AUSTIN, B.S. (Univ. of Arkansas), C.P.A. (Iowa-Oklahoma), M.S. (Univ. of Iowa); *Associate Professor Emeritus of Accounting and Assistant Internal Auditor Emeritus;* 1979, 1947.

HELEN FRANCIS BARBOUR, B.S. (Univ. of Oklahoma), M.H.EcEd. (ibid), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor Emeritus of Food, Nutrition and Institution Administration;* 1974, 1960.

EORGE LEWIS BARNES, B.S. (Michigan State Univ.), M.S. (ibid), Ph.D. (Oregon te Univ.); *Professor Emeritus of Plant logy;* 1986, 1958.

LER, JR., B.S. (Univ. of Okla- S. (ibid), Ph.D. (Washington *Professor Emeritus of Botany;* 1986,

GEORGE BATCHELDER, B.S. (Kansas tate Univ.), M.S. (O.S.U.); PE; *Professor Emeritus of Agricultural Engineering;* 1985, 1955.

RUSSELL HUGH BAUGH, B.A. (Southwest Missouri State College), M.A. (Univ. of Wisconsin); *Professor Emeritus of Economics;* 1979, 1935.

BERNARD R. BELDEN, B.Ed. (State Univ. of New York, Plattsburg), M.A. (New York Univ.), Ph.D. (Syracuse Univ.); *Professor Emeritus of Curriculum and Instruction;* 1987, 1959.

DAVID SHELLEY BERKELEY, A.B. (Juniata College), A.M. (Harvard Univ.), Ph.D. (ibid); *Professor Emeritus of English;* 1987, 1948.

LEO VERNON BLAKLEY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Chicago); *Professor Emeritus of Agricultural Economics;* 1986, 1947.

LAWRENCE L. BOGER, B.S. (Purdue Univ.), M.A. (Michigan State Univ.), Ph.D. (ibid); *Professor Emeritus of Agricultural Economics and President Emeritus;* 1988, 1977.

LLOYD ALLEN BRINKERHOFF, B.S. (Univ. of Arizona), M.S. (ibid), Ph.D. (Univ. of Minnesota); *Professor Emeritus of Plant Pathology;* 1978, 1948.

HARRY KERN BROBST, A.B. (Brown Univ.), M.A. (Univ. of Pennsylvania), Ph.D. (ibid); *Professor Emeritus of Psychology;* 1974, 1946.

RALPH GUPTON BUCKNER, A.B. (Westminster College), B.S. (Kansas State Univ.), D.V.M. (ibid), M.S. (Univ. of Oklahoma); *Professor Emeritus of Veterinary Pathology;* 1986, 1956.

LINVILLE JOHN BUSH, B.S. (Univ. of Kentucky), M.S. (Ohio State Univ.), Ph.D. (Iowa State Univ.); *Professor Emeritus of Animal Science;* 1987, 1958.

WILLIAM GEORGE CHAMBERLAIN, B.Arch. (O.S.U.), M.Arch (ibid); Registered Architect (Oklahoma and Arkansas; A.I.A., NCARB); *Professor Emeritus of Architecture;* 1988, 1947.

BERLIN BASIL CHAPMAN, B.A. (West Virginia Univ.), M.A. (Harvard Univ.), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of History;* 1966, 1927.

IVAN CHAPMAN, B.A. (San Francisco State College), M.S. (ibid), Ph.D. (Univ. of Missouri); *Professor Emeritus of Sociology;* 1985, 1969.

HAROLD A. COONRAD, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor Emeritus of Administrative Services and Business Education;* 1979, 1948.

JERRY CROCKETT, B.S. (Northwestern State College), M.S. (Fort Hays Kansas State College), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Botany;* 1978, 1968 (1962-1968).

FRANKLIN R. CROW, B.S. (Pennsylvania State Univ.), M.S. (O.S.U.); *Professor Emeritus of Agricultural Engineering;* 1983, 1949.

CLARENCE MARION CUNNINGHAM, B.S. (Texas A & M Univ.), M.S. (Univ. of California), Ph.D. (Ohio State Univ.); *Associate Professor Emeritus of Chemistry;* 1985, 1954.

OTIS CLIFFORD DERMER, B.S. (Bowling Green State College), Ph.D. (Ohio State Univ.); *Regents Service Professor Emeritus of Chemistry;* 1975, 1934.

RICHARD NORMAN DEVRIES, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Utah State Univ.); *Professor Emeritus of Civil Engineering;* 1987, 1969.

GUY R. DONNELL, A.B. (Univ. of Oklahoma), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Political Science;* 1970, 1946.

TROY CLYDE DORRIS, B.Ed. (Southern Illinois Univ.), M.S. (ibid), Ph.D. (Univ. of Illinois); *Professor Emeritus of Zoology;* 1977, 1956.

CLARK ALLAN DUNN, B.S. (Univ. of Wisconsin), M.S. (O.S.U.), Professional Degree of C.E. (ibid), Ph.D. (Cornell Univ.); PE; *Professor Emeritus of Civil Engineering and Associate Dean Emeritus of the College of Engineering;* 1967, 1929.

FRANK MARSHALL DURBIN, B.S. (State Teachers College, Kirksville, Missouri), M.S. (Univ. of Chicago), Ph.D. (ibid); *Professor Emeritus of Physics;* 1960, 1929.

WILLIAM HARRISON EASTON, B.S. (Univ. of Florida), M.S. (Univ. of Minnesota); PE; *Professor Emeritus of Mechanical Engineering;* 1969, 1942.

MARVIN TIPTON EDMISON, B.A (Univ. of Nebraska), M.S. (ibid), Ph.D. (O.S.U.); *Professor Emeritus of Chemistry;* 1978, 1955.

EDMUND JULIUS EISENBRAUN, B.S. (Univ. of Wisconsin), M.S. (ibid), Ph.D. (ibid); *Regents Professor Emertius of Chemistry;* 1987, 1962.

BERNARD WILLIAM EISSENSTAT, B.S. (Univ. of Rochester), M.S. (Univ. of Iowa), Ph.D. (Univ. of Kansas); *Professor Emeritus of History;* 1969.

HAMED K. ELDIN, B.S. (Cairo Univ.), M.S. (California Inst. of Technology), Ph.D. (Univ. of Iowa) P.E.; *Professor Emeritus of Industrial Engineering and Management;* 1988, 1967.

WILLIAM PRICE EWENS, B.S. (Univ. of Missouri), M.Ed. (ibid), Ed.D. (Stanford Univ.); *Professor Emeritus of Applied Behavioral Studies;* 1979, 1959.

EARL JOHN FERGUSON, B.S. (Texas A & M Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Professor Emeritus of Industrial Engineering and Management;* 1986, 1956.

LEROY HENRY FISCHER, B.A. (Univ. of Illinois), M.A. (ibid), Ph.D. (ibid); *Oppenheimer Professor Emeritus of History;* 1984, 1946.

DONALD D. FISHER, B.A. (Washington State Univ.), M.A. (ibid), Ph.D. (Stanford Univ.); *Regents Service Professor Emeritus of Computing and Information Science;* 1988, 1969.

ERNEST CHESTER FITCH, JR., B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Mechanical and Aerospace Engineering;* 1984, 1953.

ROBERT CARL FITE, B.A. (Central State College), M.S. (O.S.U.), Ph.D. (Northwestern Univ.); *Professor Emeritus of Geography and Director Emeritus of Programs for Professionals;* 1946.

JOHN RICHARD FRANZMANN, B.S. (Univ. of Connecticut), M.S. (ibid), Ph.D. (O.S.U.); *Professor Emeritus of Agricultural Economics;* 1987, 1964.

ROBERT DAVID FREEMAN, B.S. (North Georgia College), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor Emeritus of Chemistry;* 1988, 1955.

LLOYD LEE GARRISON, B.S. (State Teachers College, Missouri), M.Ed. (Univ. of Missouri), Ed.D. (ibid); *Regents Service Professor Emeritus of Administrative Services and Business Education;* 1986, 1951.

JAMES ELMER GARTON, B.S. (O.S.U.), M.S. (Utah State Univ.), Ph.D. (Univ. of Missouri); PE; *Professor Emeritus of Agricultural Engineering;* 1985, 1949.

LYNN LAMARR GEE, A.B. (Brigham Young Univ.), M.S. (Colorado A & M College), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Microbiology;* 1977, 1954.

ROY GLADSTONE, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Applied Behavioral Studies;* 1980, 1949.

BRYAN P. GLASS, A.B. (Baylor Univ.), M.S. (Texas A & M Univ.), Ph.D. (O.S.U.); *Professor Emeritus of Zoology and Director Emeritus of University Museum;* 1985, 1946.

BERTIS LAMON GLENN, D.V.M. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Veterinary Pathology;* 1984, 1953.

DONALD W. GRACE, B.S. (Carnegie Inst. of Technology), M.S. (ibid), M.S. (Stanford Univ.), Ph.D. (ibid); *Professor Emeritus of Computing and Information Sciences;* 1987, 1970.

FENTON GRAY, B.S. (Univ. of Utah), Ph.D. (Ohio State Univ.); *Professor Emeritus of Agronomy;* 1982, 1951.

KATHRYN MOORE GREENWOOD, B.S. (O.S.U.), M.S. (New York Univ.), Ed.D. (O.S.U.); *Professor Emeritus of Clothing, Textiles and Merchandising;* 1985, 1955.

GEORGE ALEXANDER GRIES, A.B. (Miami Univ.), M.S. (Kansas State Univ.), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Botany;* 1968.

MACK HALL GRIFFIN, A.B. (Univ. of Georgia), A.M. (Univ. of North Carolina), Ph.D. (ibid); *Professor Emeritus of Foreign Languages;* 1968, 1932.

JOHN JAMES GUENTHER, B.S. (Louisiana State Univ.), M.S. (ibid), Ph.D. (Texas A&M Univ.); *Professor Emeritus of Animal Science;* 1987, 1958.

RAYMOND N. HABIBY, B.A. (American Univ.), L.L.B. (Univ of Jerusalem), M.A.P.A. (Univ of Minnesota), Ph.D. (ibid); *Professor Emeritus of Political Science;* 1988, 1965.

DONALD ALAN HAMILTON, B.Arch. (Carnegie Inst. of Technology), M.Arch. (ibid), Certif. (Beaux-Arts Inst. of Design), Licensed Architect (Oklahoma); *Professor and Head Emeritus of the School of Architecture and Applied Art;* 1958, 1930.

JOHN DAVID HAMPTON, B.G.D. (Omaha Univ.), M.S. (Trinity Univ.), Ph.D. (Univ. of Texas); *Professor Emeritus of Applied Behavioral Studies;* 1983, 1967.

AIX BANARD HARRISON, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (Michigan State Univ.); *Professor Emeritus of Health, Physical Education and Leisure;* 1985, 1950.

HARRY EUGENE HEATH, JR., B.A. (Univ. of Tulsa), M.S. (Northwestern Univ.), Ph.D. (Iowa State Univ.); *Regents Service Professor Emeritus of Journalism and Broadcasting;* 1986, 1961.

HERBERT JAMES HENDERSON, A.B. (Boston Univ.), M.A. (Columbia Univ.), Ph.D. (ibid); *Professor Emeritus of History;* 1970, 1966.

ROBERT L. HENRICKSON, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (Univ. of Missouri); *Professor Emeritus of Animal Science;* 1986, 1956.

JAMES C. HILLIER, B.S. (Iowa State Univ.), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor and Head Emeritus of the Department of Animal Science and Industry;* 1976, 1937.

ORA ALMON HILTON, B.S. (Southwest Missouri State College), Ph.M. (Univ. of Wisconsin), Ph.D.(ibid); *Professor Emeritus of History;* 1966, 1929.

ERNEST M. HODNETT, B.S. (Univ. of Florida), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Chemistry;* 1979, 1945.

JOSEPHINE HOFFER, B.S. (OSU), M.S. (ibid), Ed.D. (ibid); *Associate Professor Emeritus of Family Relations and Child Development;* 1965, 1948.

DARIEL ELZA HOWELL, B.S. (Univ. of California), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Entomology;* 1976, 1939.

WAYNE WINFIELD HUFFINE, B.S. (O.S.U.), M.S. (ibid), Ph.D.(Purdue Univ.); *Professor Emeritus of Agronomy;* 1981, 1946.

WILLIAM L. HUGHES, B.S. (South Dakota School of Mines and Technology), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor Emeritus of Electrical and Computer Engineering and Director Emeritus of Engineering Energy Laboratory;* 1986, 1960.

DEWITT TALMADGE HUNT, B.S. (Valparaiso Univ.), B.M.T. (ibid), B.S. (O.S.U.), M.A. (Ohio State Univ.), Ph.D. (ibid); *Professor and Head Emeritus of the Department of Industrial Arts Education;* 1955, 1915.

HAZEL INGERSOLL, B.S. (Univ. of Nebraska), M.A. (ibid), Ph.D. (Ohio State Univ.); *Professor Emeritus of Family Relations and Child Development;* 1973, 1950.

ROBERT LEE JANES, B.S. (California Inst. of Technology), M.S. (ibid), Ph.D. (Illinois Inst. of Technology); PE; *Professor Emeritus of Civil Engineering;* 1980, 1963.

WILLIAM ELBERT JAYNES, B.S. (Ohio State Univ.), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Psychology;* 1988, 1967.

HERBERT M. JELLEY, B.S. (Univ. of Minnesota), Ed.M. (Univ. of Cincinnati), Ed.D. (ibid); *Professor Emeritus of Administrative Services and Business Education;* 1988, 1970.

LLOYD WAYNE JOHNSON, A.B. (Central State College), M.A. (Univ. of Oklahoma), M.A. (Princeton Univ.), Ph.D. (ibid); *Professor and Head Emeritus of the Department of Mathematics and Statistics;* 1951.

ERIC WYNN JONES, M.R.C.V.S. (Royal Veterinary College, London), Ph.D. (Cornell Univ.); *Professor Emeritus of Veterinary Medicine and Surgery and Director Emeritus of Clinical Research;* 1981, 1954.

RANDALL JEFFRIES JONES, B.S. (O.S.U.), M.S. (Univ. of Wisconsin), Ph.D. (ibid); *Professor Emeritus of Agronomy and Associate Dean Emeritus of Resident Instruction in Agriculture;* 1981, 1951.

ROY WINFIELD JONES, A.B. (Oklahoma City Univ.), M.S. (Kansas State Univ.), Ph.D. (Univ. of Oklahoma); *Professor and Head Emeritus of the Department of Zoology;* 1971, 1947.

RICHARD PHILIP JUNGERS, B.E. (LaCrosse State College), Ph.M. (Univ. of Wisconsin), Ph.D.(ibid); *Professor Emeritus of Education;* 1957.

ROBERT B. KAMM, B.A. (Univ. of Northern Iowa), M.A. (Univ. of Minnesota), Ph.D. (ibid); *University Professor Emeritus and President Emeritus;* 1988, 1958.

WILLIAM RAYMOND KAYS, B.S. (O.S.U.), M.S. (Michigan State Univ.); *Professor Emeritus of Horticulture;* 1981, 1942.

DON F. KINCANNON, B.A. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Regents Professor Emeritus of Civil Engineering;* 1987, 1966.

JOSEPH J. KLOS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Economics;* 1980, 1946.

MONROE WERNER KRIEGEL, B.S. (Univ. of Texas), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Chemical Engineering;* 1978, 1964.

KATHERINE WALTER KUMLER, B.A. (West Virginia Univ.), M.A. (Teachers College, Columbia Univ.), Ph.D. (Ohio State Univ.); *Professor Emeritus of Home Economics Education;* 1956, 1941.

JOHN EDWARD LANGWIG, B.S. (Univ. of Michigan), M.S. (State Univ. of New York, College of Forestry), Ph.D. (ibid); *Professor Emeritus of Forestry;* 1986, 1971.

GLENN EDWIN LAUGHLIN, A.B. (O.S.U.), L.L.B. (Univ. of Oklahoma), S.J.D. (Univ. of Wisconsin); *Professor Emeritus of Administrative Services and Business Education;* 1947.

RICHARD H. LEFTWICH, A.B. (Southwestern College, Kansas), M.A. (Univ. of Chicago), Ph.D. (ibid); *Regents Professor Emeritus of Economics;* 1985, 1948.

WILLIAM JOHN LEIVO, B.S. (Carnegie Inst. of Technology), M.S. (ibid), D.Sc. (ibid); *Professor Emeritus of Physics;* 1981, 1955.

DANIEL DEE LINGELBACH, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Professor Emeritus of Electrical and Computer Engineering;* 1987, 1955.

MITCHELL O. LOCKS, A.B. (Central YMCA College, Chicago), A.M. (Univ. of Chicago), Ph.D.(ibid); *Professor Emeritus of Management;* 1986, 1970.

IDELLA LOHMANN, B.A. (O.S.U.), M.A. (ibid), Ed.D. (Univ. of Tulsa); PE; *Professor Emeritus of Curriculum and Instruction;* 1975, 1961.

MELVIN RUDOLPH LOHMANN, B.S. in M.E. (Univ. of Minnesota), M.S. in I.E. (Univ. of Pittsburgh), Ph.D. (Univ. of Iowa); PE; *Professor Emeritus of Industrial Engineering and Management and Dean Emeritus of the College of Engineering;* 1977, 1941.

ROBERT ARNOLD LOWERY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor Emeritus of Administrative Services and Business Education;* 1975, 1944.

ROBERT N. MADDOX, B.S. (Univ. of Arkansas), M.S. (Univ. of Oklahoma), Ph.D. (O.S.U.); P.E.; *Professor Emeritus of Chemical Engineering, Director, PPL, SHEE;* 1986, 1953.

NORBERT R. MAHNKEN, A.B. (Southwestern College, Kansas), M.A. (Univ. of Nebraska), Ph.D. (ibid); *Professor Emeritus of History;* 1983, 1947.

PHILLIP GORDON MANKE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Texas A&M Univ.); P.E.; *Professor Emeritus of Civil Engineering;* 1988, 1959.

CARL E. MARSHALL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor Emeritus of Mathematics and Statistics;* 1969, 1931.

KENNETH ALLEN McCOLLOM, B.S. (O.S.U.), M.S. (Univ. of Illinois), Ph.D. (Iowa State Univ.); PE; *Professor Emeritus of Electrical and Computer Engineering and Dean Emeritus of the College of Engineering, Architecture and Technology;* 1986, 1964.

JOHN C. McCULLERS, B.A. (Univ. of Texas, Austin), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Family Relations and Child Development;* 1988, 1976.

FRANK EUGENE McFARLAND, B.A. (Baylor Univ.), M.A. (Columbia Univ.), Ed.D. (ibid); *Professor Emeritus of Applied Behavioral Studies and Director Emeritus of Student Services;* 1984, 1959.

JULIA LOIS McHALE, A.B. (Syracuse Univ.), Ph.D. (Univ. of Minnesota); *Professor Emeritus of Psychology;* 1985, 1960.

HARRISON SHEPLER MENDENHALL, A.B. (Miami Univ.), Ph.D. (Univ. of California); *Professor Emeritus of Mathematics;* 1968, 1937.

DANIEL JUDSON MILBURN, B.S. (O.S.U.), M.A. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of English;* 1978, 1941.

CLAYTON BLAKE MILLINGTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Michigan State Univ.); *Professor Emeritus of Administrative Services and Business Education;* 1969, 1960.

JOHN MILSTEAD, B.A. (Univ. of New Mexico), M.A. (Univ. of Iowa), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of English;* 1986, 1965.

ANDREW W. MONLUX, D.V.M. (Iowa State Univ.), M.S. (ibid), Ph.D. (George Washington Univ.); *Professor Emeritus of Veterinary Pathology;* 1985, 1956.

V. BROWN MONNETT, B.S. (Univ. of Oklahoma), Ph.D. (Univ. of Michigan); *Professor Emeritus of Geology and Associate Dean Emeritus of the College of Arts and Sciences;* 1980, 1947.

GEORGE AZRO MOORE, B.S. (O.S.U.), M.S. (Univ. of Oklahoma), Ph.D. (Univ. of Michigan); *Professor Emeritus of Zoology;* 1965, 1931.

THOMAS EDWIN MOORE, B.A. (Univ. of Texas), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Chemistry* 1982, 1947.

CLAYTON A. MORGAN, B.A. (Millsaps College), M.Ed. (Univ. of Texas), Ed.D. (ibid); *Professor Emeritus of Psychology;* 1984, 1958.

ROBERT DEAN MORRISON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (North Carolina State Univ.); *Professor Emeritus of Statistics;* 1981, 1946.

TED RICHARD NELSON, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (O.S.U.); *Professor Emeritus of Agricultural Economics;* 1987, 1965.

WILBUR STANLEY NEWCOMER, B.S. (Pennsylvania State Univ.), M.S. (Cornell Univ.), Ph.D. (ibid); *Professor Emeritus of Physiological Science;* 1985, 1950.

JOSEPH RANDOLPH NORTON, B.S. (O.S.U.), M.S. (ibid), Ph.D.(Univ. of Texas); *Professor Emeritus of General Engineering;* 1978, 1946.

LELA O'TOOLE, B.S. (O.S.U.), M.S. (ibid), Ph.D.(Ohio State Univ.); *Professor Emeritus of Home Economics;* 1975, 1950.

HAROLD CECIL OLSON, B.S. (South Dakota College), M.S. (West Virginia Univ.), Ph.D. (Iowa State Univ.); *Professor Emeritus of Dairy Science;* 1971, 1940.

ALEXANDER MEIR OSPOVAT, B.S. (Univ. of Oklahoma), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of History;* 1988, 1962.

ARNOLA C. OWNBY, B.S. (O.S.U.), M.S. (ibid), Ed.D.(ibid); *Professor Emeritus of Administrative Services and Business Education;* 1985, 1960.

JAMES VERNON PARCHER, B.S. (O.S.U.), M.S. (ibid), A.M. (Harvard), Ph.D. (Univ. of Arkansas); PE; *Professor Emeritus of Civil Engineering;* 1985, 1947.

JERALD DWAIN PARKER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); P.E.; *Professor Emeritus of Mechanical and Aerospace Engineering;* 1987, 1955.

RICHARD NEWTON PAYNE, B.S. (O.S.U.), M.S. (Ohio State Univ.), Ph.D. (ibid); *Professor Emertius of Horticulture;* 1987, 1957 (1953-54).

JAMES SAM PLAXICO, B.S. (Clemson College), M.S. (ibid), Ph.D. (Univ. of Minnesota); *Professor Emeritus of Agricultural Economics;* 1988, 1955.

HAROLD JACKSON POLK, B.A. (San Jose State College), M.A. (ibid), Ed.D. (Univ. of Missouri); *Associate Professor Emeritus of Industrial Arts Education;* 1986, 1969.

JAY G. PORTERFIELD, B.S. (Iowa State Univ.), M.S. (ibid); PE; *Professor Emeritus of Agricultural Engineering;* 1982, 1952.

ROBERT RAYMOND PRICE, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Pennsylvania State Univ.); *Professor Emeritus of Agricultural Education;* 1965, 1948.

LESTER WINFIELD REED, B.S. (O.S.U.), M.S. (ibid), Ph.D.(Univ. of Missouri); *Professor Emeritus of Agronomy;* 1983, 1947.

ROBERT MCLEOD REED, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Agronomy;* 1987, 1950.

CLIFFORD ARTHUR LEROY RICH, B.F.S. (Univ. of Southern California), M.A. (ibid), Ph.D. (Univ. of California); *Professor Emeritus of Political Science;* 1984, 1953.

DONALD W. ROBINSON, A.B. (Carthage College), M.A. (Bradley Univ.), Ph.D. (ibid); *Professor Emeritus of Psychology and Educational Administration and Higher Education, Dean Emeritus of the College of Education, and Director Emeritus of Teacher Education;* 1988, 1972.

LAWRENCE O. ROTH, B.S. (Univ. of Wisconsin), M.S. (O.S.U.), Ph.D. (ibid); P.E.; *Professor Emeritus of Agricultural Engineering;* 1987, 1951.

ROSCOE ROUSE, B.A. (Univ. of Oklahoma), M.A. (Univ of Michigan), Ph.D. (ibid); *Librarian Emeritus of the Edmon Low Library;* 1987, 1967.

F. CUTHBERT SALMON, B.Arch. (Univ. of Pennsylvania), M.Arch. (ibid); R.A.; NCARB; *Professor Emeritus of Architecture;* 1980, 1959.

EUGENE THOMAS SCHAUER, B.A. (Northeastern State College, Oklahoma), M.S. (O.S.U.), C.P.A. (Oklahoma); *Professor Emeritus of Accounting;* 1970, 1942.

ERVIN WILLIAM SCHROEDER, B.S. in Ag.E. (Univ. of Wisconsin), M.E. (ibid), M.S. (Pennsylvania State Univ.); PE; *Professor Emeritus of Agricultural Engineering;* 1974, 1947.

LEON WILLIAM SCHROEDER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Indiana State Univ.); *Professor Emeritus of Physics;* 1984, 1947.

MARY MARGUERITE SCRUGGS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor Emeritus of Home Economics Education and Associate Dean Emeritus of the College of Home Economics;* 1985, 1973.

ANSEL MIREE SHARP, B.S. (Howard College), M.A. (Univ. of Virginia), Ph.D. (Louisiana State Univ.); *Professor Emeritus of Economics;* 1985, 1957.

JOHN C. SHEARER, B.S. (New York School of Industrial and Labor Relations), A.M. (Princeton Univ.), Ph.D. (ibid); *Professor Emeritus of Economics;* 1987, 1967.

LEONARD FRANCIS SHEERAR, B.S. (Alfred Univ.), M.S. (Ohio State Univ.), Professional Engineering Degree (Alfred Univ.); P.E.; *Professor Emeritus of Chemical Engineering and Executive Director Emeritus of Engineering and Industrial Extension;* 1966, 1931.

IDA TOWNSEND SMITH, B.A. (Central State College, Oklahoma), M.A. (Colorado State College), Ed.D. (ibid); *Professor Emeritus of Education;* 1964, 1948.

HELMER ELLSWORTH SORENSON, B.E. (Eau Claire State Teachers College), Ph.M. (Univ. of Wisconsin), Ph.D. (ibid); *Professor Emeritus of Education and Dean Emeritus of the College of Education;* 1973, 1949.

ROBERT M. SPAULDING, A.B. (Univ. of Michigan), A.M. (ibid), Ph.D. (ibid); *Professor Emeritus of History;* 1987, 1971.

EDWARD EARL STURGEON, B.S.F. (Univ. of Michigan), M.F.(ibid), Ph.D.(ibid); *Professor Emeritus of Forestry;* 1986, 1966.

JOHN EARLE SUSKY, B.A. (Univ. of Florida), M.A. (ibid), Ed.D. (O.S.U.); *Professor Emeritus of Philosophy;* 1984, 1961.

NHYAYAPATHI V.V.J. SWAMY, B.S. (Siddarth College), M.S. (Wilson College), Ph.D. (Florida State Univ.); *Professor Emeritus of Physics;* 1987, 1968.

FRED TEWELL, B.A. (DePauw Univ.), M.A. (Louisiana State Univ.), Ph.D.(ibid); *Professor Emeritus of Speech Communication;* 1984, 1959.

ROLLIN HAROLD THAYER, B.S. (O.S.U.), M.S. (Univ. of Nebraska), Ph.D. (Washington State Univ.); *Professor Emeritus of Animal Science;* 1980, 1943.

JOHN E. THOMAS, B.S. (Ohio State Univ.), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Plant Pathology;* 1981, 1950.

RUDOLPH W. TRENTON, Dr. of Law (Univ. of Rome), Dr. of Political Science (Univ. of Turin, Italy); *Professor Emeritus of Economics;* 1979, 1948.

BILLY BOB TUCKER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ of Illinois); *Regents Professor Emeritus of Agronomy;* 1987, 1956.

ELBERT JEROME TURMAN, B.S. (O.S.U.) M.S. (Purdue Univ.), Ph.D. (ibid); *Professor Emeritus of Animal Science;* 1987, 1955.

LUTHER GILBERT TWEETEN, B.S. (Iowa State Univ.), M.S. (O.S.U.), Ph.D. (Iowa State Univ.); *Regents Professor Emeritus of Agricultural Economics;* 1987, 1962.

HIROSHI UEHARA, Rigakushi (Univ. of Tokyo), Sc.D. (Osaka Univ.); *Professor Emeritus of Mathematics;* 1988, 1964.

MILTON F. USRY, B.B.A. (Baylor Univ.), M.B.A. (Univ. of Houston), Ph.D. (Univ. of Texas); *Regents Professor Emeritus of Accounting;* 1965, 1961.

LOUIS P. VARGA, B.A. (Reed College), M.S. (Univ. of Chicago); *Associate Professor Emeritus of Chemistry;* 1986, 1961.

DALLAS FREEMONT WADSWORTH, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of California); *Professor Emeritus of Plant Pathology;* 1984, 1949.

NATHANIEL WALKER, B.S. (Colorado College), M.S. (Pennsylvania State Univ.), Ph.D. (North Carolina Univ.); *Professor Emeritus of Forestry;* 1974, 1947.

GEORGE R. WALLER, B.S. (North Carolina State College), M.S. (Univ of Delaware), Ph.D. (O.S.U.); *Professor Emeritus of Biochemistry;* 1988, 1956.

LOWELL EUGENE WALTERS, B.S. (O.S.U.), M.S. (Massachusetts State College), Ph.D. (O.S.U.); *Professor Emeritus of Animal Science;* 1984, 1946.

JAMES ELIAS WEBSTER, B.S. (Ohio State Univ.), Ph.D. (ibid); *Professor Emeritus of Biochemistry;* 1968, 1927.

DALE ELDON WEIBEL, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor Emeritus of Agronomy;* 1986, 1958.

JAMES ARNOLD WHATLEY, JR., B.S. (Texas A & M Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor Emeritus of Animal Science;* 1981, 1939.

JOE VERNON WHITEMAN, B.S. (New Mexico College of A.), M.A. (O.S.U.), Ph.D. (ibid); *Professor Emeritus of Animal Science;* 1983, 1952.

JOHN ALBERT WIEBELT, B.S. (Texas Technological College), M.S. (Southern Methodist Univ.), Ph.D. (O.S.U.); *Professor Emeritus of Mechanical and Aerospace Engineering;* 1985, 1958.

ESTHER ANN WINTERFELDT, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Regents Professor Emeritus of Food, Nutrition and Institution Administration;* 1988, 1970.

KYLE M. YATES, B.S. (Wake Forest College), B.D. (Southern Baptist Theological Seminary), Th.D. (ibid); *Professor Emeritus of Religious Studies;* 1986, 1969.

HARRY C. YOUNG, JR., B.S. (Ohio State Univ.), M.S. (Univ. of Minnesota), Ph.D. (ibid); *Professor Emeritus of Plant Pathology;* 1956, 1950.

JAMES HOWARD ZANT, A.B. (Southern Methodist Univ.), M.A. (Columbia Univ.), Ph.D. (ibid); *Professor Emeritus of Mathematics;* 1963, 1930.

Associate Members

EARL PIERCE AALSETH, JR., B.S. (Montana State Univ.), M.S. (Washington State Univ.), Ph.D. (Virginia Polytechnic); *Assistant Professor of Animal Science;* 1981.

MARIAN F. ABBOTT, B.M.E. (Central Methodist College), M.M. (Wichita State Univ.); *Associate Professor of Music;* 1970.

CHRISTOPHER MITCHEL ADAMS; B.S. (Univ. of California, Los Angeles), M.S. (Univ. of Wyoming), Ph.D. (Univ. of Nevada, Reno); *Assistant Professor of Chemistry;* 1987.

MARSHALL E. ALLEN, B.A. (Miami Univ.), M.A. (ibid); *Associate Professor of Journalism and Broadcasting and Director of; Educational Television Services;* 1967.

PETER AMSTUTZ, B.M. (Peabody Conservatory of Music), M.M. (ibid), D.M.A. (ibid); *Associate Professor of Music;* 1982.

CRAIG KENNETH ANDERSON, B.S.Ed. (Oregon College), M.Ed. (Colorado State Univ.), Ph.D. (ibid); *Assistant Professor of Occupational and Adult Education;* 1982.

JEFFREY ANDERSON, B.A. (Rugers Univ.), Ph.D. (Univ. of Florida); *Assistant Professor of Horticulture and Landscape Architecture;* 1986.

STEVEN ANDERSON, B.S. (Cook College, Rutgers Univ.), M.S. (Univ. of Washington, Seattle), Ph.D. (North Carolina State Univ.); *Assistant Professor of Forestry;* 1987.

ERIC NEIL ANGEVINE, B.S. (Univ of Texas at Austin), M.S. (ibid); *Associate Professor of Architecture;* 1985.

NUALA ARCHER, B.A. (Wheaton College), M.A. (Univ. of Wisconsin, Milwaukee), Ph.D. (ibid); *Assistant Professor of English;* 1985, 1984.

GEORGE EDWARD ARQUITT, B.A. (Union Univ.), M.S. (Univ. of Tennessee), Ph.D. (ibid); *Associate Professor of Sociology;* 1974, 1970.

JOEL ATHEY, B.S. (Kansas State Univ.), M.A. (ibid), Ph.D. (Univ. of Texas, Austin); *Assistant Professor of English;* 1987.

LYNN A. ATKINSON, B.A. (Phillips Univ.), M.S.W. (Univ. of Okla.), Ph.D. (O.S.U.); *Assistant Professor of Sociology;* 1988, 1985.

LINDA AUSTIN, B.A. (SUNY, Stony Brook), M.S. (Univ. of Illinois), M.A. (Univ. of Rochester), Ph.D. (ibid); *Assistant Professor of English;* 1985.

JOHN LAWRENCE BAIRD, B.S. (Washburn Univ.), M.S. (Kansas State Univ.), Ed.D. (O.S.U.); *Associate Professor of Technical Education;* 1980, 1977.

JAMES E. BAKER, B.S. (U.S. Naval Academy), B.S.E.E. (O.S.U.), M.S.E.E. (ibid), Ph.D. (ibid); *Professor and Head of the School of Electrical and Computer Engineering;* 1984.

CHARLES A. BALDWIN, B.S. (Univ. of Massachusetts), D.V.M. (Cornell Univ.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Physiological Science;* 1985.

WILLIAM L. BALLENGER, B.A. (Univ. of Iowa), M.A. (Northeast Missouri State Univ.); *Assistant Professor of Music;* 1987.

DONNA KAY BANDY, B.A. (Univ. of Iowa), M.A. (Drexel Univ.), Ph.D. (ibid); *Assistant Professor of Physics;* 1987.

STEVEN HUGH BARR, B.B.A. (Texas Tech Univ.), M.S. (ibid), Ph.D. (Univ. of Iowa); *Associate Professor of Management;* 1988, 1982.

KENNETH E. BARTELS, M.S. (Colorado State Univ.), D.V.M. (Iowa State Univ.); *Associate Professor of Veterinary Medicine and Surgery;* 1984, 1982.

LOUIS OTTO BASS, B.A. (O.S.U.), B.A.E. (ibid), M.A.E. (ibid); PE; *Professor of Architecture;* 1976, 1963.

RICHARD P. BATTEIGER, B.A. (Ohio Univ.), M.A. (Univ. of Florida), Ph.D. (ibid); *Associate Professor of English;* 1985.

D. JACK BAYLES, B.S.M.E. (Univ. of Oklahoma), M.S.M.E.(ibid), Ph.D. (O.S.U.); *Associate Professor in the School of Technology;* 1979, 1974.

JOHN GILBERT BAYLESS, B.S. (Phillips Univ.), M.Ed. (ibid), Ed.D. (O.S.U.); *Professor of Health, Physical Education and Leisure;* 1972, 1966.

GARY J. BEEBY, B.S. (Phillips Univ.), M.A. (Univ. of Illinois); *Assistant Professor of Speech and Language Pathology and Audiology;* 1974.

RONALD S. BEER, B.S. (Illinois State Univ.), M.A. (Michigan State Univ.), Ph.D. (Kent State Univ.); *Professor of Educational Administration and Higher Education and Vice-President of Student Services;* 1980.

PATRICIA A. BELL, B.S. (O.S.U.), M.S. (ibid), Ph.D.(Univ. of Texas); *Assistant Professor of Sociology;* 1987, 1981.

CAROL L. BENDER, B.S. (Texas Tech Univ.), M.S. (Oregon State Univ.), Ph.D. (Univ. of California, Riverside);*Assistant Professor of Plant Pathology;* 1986.

DANIEL J. BERNARDO, B.S. (Univ. of California, Davis), Ph.D. (Washington State Univ.); *Assistant Professor of Agricultural Economics;* 1985.

DENNIS EARL BERTHOLF, B.S. (Univ. of Kansas), M.A. (New Mexico State Univ.), Ph.D. (ibid); *Professor of Mathematics;* 1988, 1968.

DAVID M. BILLEAUX, B.S.Ed. (Illinois State Univ.), M.A. (Univ. of Kansas), M.Phil. (ibid), Ph.D. (ibid); *Assistant Professor of Political Science;* 1988, 1986.

BIRNE BINEGAR, B.S. (Univ. of California, Los Angeles), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Mathematics;* 1988.

JOHN PAUL BISCHOFF, B.A. (Univ. of Maryland), Ph.D. (Yale Univ.); *Assistant Professor of History;* 1984, 1976.

GEORGE BAKER BOKORNEY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Univ. of Oregon); *Professor and Director of the School of Hotel and Restaurant Administration;* 1983, 1971.

MARY S. BROSKE, A.B. (Sweet Briar College), Ph.D. (Univ. of Florida); *Assistant Professor of Finance;* 1985.

GLENN OWEN BROWN, B.S. (Arizona State Univ.), M.S. (Colorado State Univ.), Ph.D. (ibid); *Assistant Professor of Agricultural Engineering;* 1987.

L. HERBERT BRUNEAU, B.S.(McGill Univ.), M.A. (Univ. of Texas), Ph.D. (ibid); *Professor of Zoology and Program Director of Natural Science;* 1966, 1955.

JOHN H. BRYANT, B.Arch. (O.S.U.), M.Arch. (Univ. of Illinois); A.I.A.; NCARB Certified; *Professor of Architecture;* 1977.

DAVID KIM BURNHAM, B.S. (Brigham Young Univ.), M.S. (ibid), Ph.D. (Univ. of Texas Health Sciences Center, Dallas); *Assistant Professor of Botany and Microbiology;* 1988.

MARILYN M. BURNS, B.S. (Univ. of Colorado, Boulder), M.A. (Univ. of Northern Colorado, Greeley), Ph.D. (O.S.U.); *Associate Professor of Clothing, Textiles and Merchandising;* 1983.

LOWELL M. BUSMAN, B.S. (Southwest State Univ. Minnesota), M.S. (Univ. of Minnesota), Ph.D. (Iowa State Univ.); *Assistant Professor of Agronomy;* 1987.

CHARLES M. BYLES, B.S. (Univ. of the West Indies), M.B.A. (Univ. of Toledo), D.B.A. (Kent State Univ.); *Assistant Professor of Management;* 1987.

MARGARET S. CALLSEN, B.A. (Concordia College), M.S. (Univ. of Wisconsin), Ph.D. (Kansas State Univ.); *Associate Professor and Interim Head of the Department of Home Economics Education and Community Services;* 1977, 1973.

RAYMOND E. CAMPBELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor of Horticulture and Landscape Architecture;* 1986, 1974.

VIRGIL R. CARTER, B. Arch (O.S.U.), M. Arch (Univ. of Illinois at Urbana-Champaign); *Professor and Head of the School of Architecture;* 1986.

JOHN W. CARTINHOUR, B.S. (Univ. of Arkansas, Little Rock), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor of Electrical and Computer Engineering;* 1987.

ROBERT CARTWRIGHT, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Virginia Tech.); *Assistant Professor of Entomology;* 1987.

CHRISTINE M. CASHEL, B.S. (Russell Sage College), M.S. (ibid), Ed.D. (Temple Univ.); *Assistant Professor of Health, Physical Education and Leisure;* 1985.

IBRAHIM CEMEN, B.S. (Istanbul Univ.), M.S. (Ohio State Univ.), Ph.D. (Pennsylvania State Univ.); *Associate Professor of Geology;* 1987, 1984.

DAVID M. CLARK, B.A. (Cornell Univ.), D.V.M. (ibid); *Associate Professor of Veterinary Medicine and Surgery;* 1988, 1985.

CYRIL ROY CLARKE, B.V.Sc. (Univ. of Pretoria, RSA), Ph.D. (Louisiana State Univ.); *Assistant Professor of Physiological Science;* 1987.

WILLIAM WADE CLARKSON, B.S.E. (Duke Univ.), M.S. (Clemson Univ.), Ph.D. (Cornell Univ.); *Assistant Professor of Civil Engineering;* 1987.

ARTHUR W. CLEAVES, A.B. (Brown Univ.), M.A. (Univ. of Texas, Austin), Ph.D. (ibid); *Associate Professor of Geology;* 1984, 1981.

KENNETH CLINKENBEARD. B.S. (Univ. of California), Ph.D. (Johns Hopkins Univ., California), D.V.M. (ibid); *Assistant Professor of Veterinary Pathology;* 1987, 1986.

ARCHIE C. CLUTTER, B.S. (Iowa State Univ.), M.S. (Univ. of Nebraska, Lincoln), Ph.D. (ibid); *Assistant Professor of Animal Science;* 1987.

SAMUEL W. COLEMAN, B.S. (Univ. of Tennessee), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of USDA, SEA at El Reno, Okla.;* 1976.

MICHAEL ARLEN COLLIER, D.V.M. (Washington State Univ.); *Professor of Veterinary Medicine and Surgery;* 1988, 1986.

DONNA COUCHENOUR, B.S. (Clarion Univ. of Pennsylvania), M.S. (West Virginia Univ.), Ph.D. (Ohio State Univ.); *Assistant Professor of Family Relations and Child Development;* 1987.

RICK L. COWELL, B.S. (O.S.U.), D.V.M. (ibid), M. S.(ibid); *Assistant Professor of Veterinary Pathology;* 1985.

KENNETH COX, B.A. (Lindenwood College), M.A. (Univ. of Nebraska), Ph.D. (ibid); *Professor and Head of the Department of Theater;* 1977, 1970.

BRUCE CRAUDER, B.A. (Haverford College), M.A. (Columbia Univ.), Ph.D. (ibid); *Assistant Professor of Mathematics;* 1986.

REBECCA C. CRAVEN, B.A. (Vanderbilt Univ.), M.S. (Univ. of Tennessee), Ph.D. (ibid); *Assistant Professor of Microbiology;* 1984.

JERRY D. CROFT, B.A. (O.S.U.), M.A. (Kansas State Univ.), Ed.D. (Univ. of Tulsa); *Associate Professor of Geography;* 1976, 1966.

JOHN R. CROSS, B.A. (O.S.U.), M.A. (Univ. of Tulsa), Ph.D. (Univ. of Missouri, Columbia); *Assistant Professor of Sociology;* 1988, 1985.

RICHARD LEE CUMMINS, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Electrical and Computer Engineering;* 1979, 1963.

GERRIT CUPERUS, B.S. (Univ. of Minnesota, Morris), M.S. (Univ. of Minnesota, St. Paul), Ph.D. (ibid); *Associate Professor of Entomology;* 1987, 1982.

KEVIN M. CURRIER, B.S. (State Univ. of New York, Albany), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Economics;* 1984.

JAMES ROBERT CURTIS, B.A. (San Jose State Univ.), M.A. (ibid), Ph.D. (Univ of California at Los Angeles); *Assistant Professor of Geography;* 1988.

PAUL CZARNIECKI, B.S. (Univ. of Wisconsin, River Falls), M.S. (Univ. of Wisconsin), Ph.D. (O.S.U.); *Assistant Professor of Agricultural Education;* 1976.

CHARLES ROBERT DAVIS, B.S. (Univ. of Oklahoma), M.Ed. (ibid), Ph.D. (ibid); *Associate Professor of Applied Behavioral Studies;* 1988, 1978.

JAMES A. DAVIS, B.A. (Stephen F. Austin State Univ.), M.A. (Miami Univ.), Ph.D. (ibid); *Assistant Professor of Political Science;* 1980, 1978.

JERRY L. DAVIS, B.S. (Kansas State College, Pittsburg), M.A. (Univ. of Kansas), Ph.D. (ibid); *Professor and Technical Director of University Theater;* 1981, 1971.

JOHN J. DEVENY, B.A. (State Univ. of New York, Buffalo), Ph.D. (Univ. of Florida); *Associate Professor of Foreign Languages and Literatures;* 1976, 1971.

MARCIA M. DICKMAN, B.S. (Purdue Univ.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Applied Behavioral Studies;* 1986.

JACK W. DILLWITH, B.S. (California State Polytechnic), M.S. (St. Mary's Univ.), Ph.D. (Univ. of Nevada, Reno); *Assistant Professor of Entomology;* 1986.

HOWARD GLEN DOLEZAL, B.S. (Texas A & M Univ.), M.S. (ibid), Ph.D. (Colorado State Univ.); *Associate Professor of Animal Science;* 1988, 1983.

JEAN MICHEL D'OFFAY, B.V.Sc. (Pretoria, S. Africa), Dip. T.V.M. (Edinburgh, Scotland), Ph.D. (Univ. of Missouri, Columbia); *Assistant Professor of Veterinary Parasitology, Microbiology & Public Health;* 1986.

KENNETH DOLLARHIDE, B.S. (New York Univ.), M.A. (Indiana Univ.), Ph.D. (McMaster Univ.); *Associate Professor of Foreign Languages and Literatures;* 1985, 1977.

REX C. DONAHEY, B.S.C.E. (Univ. of Kansas), M.S.C.E. (ibid), Ph.D. (ibid); *Assistant Professor of Civil Engineering;* 1986.

KEVIN J. DONNELLY, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (Colorado State Univ.); *Associate Professor of Agronomy;* 1987, 1982.

RONALD L. DOUGHERTY, B.S. (Univ. of Missouri, Rolla), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Mechanical and Aerospace Engineering;* 1985.

H. WILLARD DOWNS, B.S. (Colorado State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Associate Professor of Agricultural Engineering;* 1984, 1979.

DAMONA G. DOYE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Agricultural Economics;* 1986.

RICHARD W. EBERLE, B.A. (University of California, Los Angeles), Ph.D. (Baylor College of Medicine); *Assistant Professor of Veterinary Parasitology, Microbiology & Public Health;* 1986.

BETTY M. EDGLEY, B.S. (Wayland College), M.Ed. (Univ. of Oklahoma), Ed.D. (O.S.U.); *Associate Professor of Health, Physical Education and Leisure;* 1983, 1977.

R. DAN EDWARDS, B.S.B.A. (Univ. of Arkansas), M.B.A. (Univ. of Chicago), Ph.D. (Southern Illinois Univ.); *Assistant Professor of Accounting;* 1985.

WILLIAM C. EDWARDS, B.S. (Kansas State Univ.), D.V.M. (ibid), M.S. (Iowa State Univ.); *Professor of Physiological Science;* 1983, 1969.

ZIAD EL-RASSI, B.S. (Lebanese Univ., Beirut), M.S. (Claude-Bernard Univ., France), Ph.D. (ibid); *Assistant Professor of Chemistry;* 1988.

RANDI ELDEVIK, B.A. (Univ. of Minnesota), M.A. (Harvard Univ.), Ph.D. (ibid); *Assistant Professor of English;* 1987.

PAUL EPSTEIN, B.A. (Trinity College, Univ. of Toronto), M.A. (Dalhousie), Ph.D. (ibid); *Assistant Professor of Foreign Languages and Literatures;* 1981.

RUTH CAMPBELL ERBAR, B.S. (O.S.U.), M.S. (ibid), Ph.D.(ibid); *Assistant Professor of Chemical Engineering;* 1984.

THOMAS ALBERT ESCH, B.S. (Michigan State Univ.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Agricultural Engineering;* 1988.

NANCY F. FAGLEY, B.A. (Univ. of Utah), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Applied Behavioral Studies;* 1987.

JAMES ROBERT FAIN, B.A. (Univ. of Texas, Austin), M.S. (Purdue Univ.), Ph.D. (ibid); *Assistant Professor of Economics;* 1986.

HARRY L. FIELD, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (Univ. of Nebraska, Lincoln); *Assistant Professor of Agricultural Engineering;* 1987.

ALEXANDER B. FILONOW, B.S. (Univ. of Rhode Island), M.S. (Michigan State Univ.), Ph.D. (ibid), *Assistant Professor of Plant Pathology;* 1984.

GEORGE EDWARD FINLEY, B.S. (Texas Tech Univ.), M.Ed. (ibid), Ed.D. (O.S.U.); *Associate Professor of Agricultural Education;* 1987, 1982.

CHARLES ARTHUR FLEMING, B.S. (Univ. of Washington), M.A. (Univ. of Wisconsin), Ed.D. (O.S.U.); *Associate Professor of Journalism and Broadcasting* 1988, 1987

MICHAEL FOLK, B.S. (Univ. of North Carolina), M.A.T. (Univ. of Chicago), Ph.D. (Syracuse Univ.); *Associate Professor of Computing and Information Science;* 1980, 1979.

JOE WILEY FOWLER, B.S. (O.S.U.), J.D. (Oklahoma City Univ.); *Professor and Head of the Department of Administrative Services;* 1987, 1972.

GERALD D. FRANK, B.A. (Valparaiso Univ.), S.M.S. (Union Theological Seminary), D.M.A. (Univ. of Cincinnati); *Professor and Head of the Department of Music;* 1987, 1985.

DAVID W. FREEMAN, B.S. (Texas A & M Univ.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Animal Science;* 1988.

ERIC JEFFREY FRIED, B.M. (Indiana Univ.), M.A. (Univ. of Denver), D.M.A. (Univ. of Arizona); *Associate Professor of Music;* 1986, 1982.

VANCE H. FRIED, B.S. (O.S.U.), J.D. (Michigan); *Assistant Professor of Management;* 1987.

ARLENE M. FULTON, B.S. (Stout State Univ.), M.S. (ibid), Ph.D. (Louisiana State Univ., Baton Rouge); *Assistant Professor of Family Relations and Child Development;* 1985, 1982.

MARY NELL GADE, B.S. (Univ. of Wisconsin, Oshkosh), M.A. (Michigan State Univ.), Ph.D. (ibid); *Assistant Professor of Economics;* 1987.

BETTYE J. GAFFNEY, B.S. (Langston Univ.), M.S. (O.S.U.), Ed.D. (ibid); *Associate Professor of Home Economics Education and Community Services;* 1979, 1973.

JAMES C. GALLOTT, B.S. (Univ. of Maine at Orono), M.S. (Cornell Univ.), Ph.D. (ibid); *Assistant Professor of Horticulture and Landscape Architecture;* 1985.

PAUL W. GENO, B.S. (Univ. of Louisville), Ph.D. (Texas A & M Univ.); *Assistant Professor of Chemistry;* 1988.

K. M. GEORGE, B.S. (Univ. of Madras, India), M.S. (ibid), Ph.D. (SUNY, Stony Brook); *Associate Professor of Computing and Information Science;* 1988, 1986.

PERRY GETHNER, B.A. (Carleton College), M.A. (Yale Univ.), Ph.D. (ibid); *Associate Professor of Foreign Languages and Literatures;* 1986, 1984.

ROBERT L. GILLEN, B.S. (Colorado State Univ.), Ph.D. (Oregon State Univ.); *Associate Professor of Agronomy;* 1988, 1983.

GERALD KENNETH GOFF, B.A. (Phillips Univ.), Ed.M. (ibid), Ed.D. (O.S.U.); *Professor of Mathematics;* 1970, 1965.

DOROTHY A. GOSS, B.S. (Purdue Univ.), M.S. (Univ. of Illinois), Ph.D. (Cornell Univ.); *Professor of Housing, Interior Design and Consumer Studies;* 1985.

HOWARD A. L. GREER, B.S. (Berea College), M.S. (Univ. of Kentucky), Ph.D. (Iowa State Univ.); *Professor of Agronomy;* 1974, 1965.

ELIZABETH GRUBGELD, B.A. (Lewis & Clark College), Ph.D. (Univ. of Iowa, Iowa City); *Assistant Professor of English;* 1986.

NEIL JOHN HACKETT, JR., B.A. (Southern Illinois Univ.), M.A. (ibid), Ph.D. (Univ. of Cincinnati); *Associate Professor of History and Associate Dean of the College of Arts and Sciences;* 1981, 1969.

WILLIAM H. HAIRE, M.S. Mgmt; A.I.A. *Professor of Architecture;* 1985, 1983.

STEPHEN W. HALLGREN, B.S. (Univ. of Minnesota), M.S. (Oregon State Univ.), Ph.D. (Univ. of California, Berkeley); *Assistant Professor of Forestry;* 1986.

JANE N. HAMMER, B.A. (North Texas State Univ.), M.B.Ed. (ibid), Ed.D. (Indiana Univ.); *Associate Professor of Administrative Services;* 1978.

LARRY W. HAND, B.S. (Texas A & M Univ.), M.S. (ibid), Ph.D. (Univ of Nebraska); *Assistant Professor of Animal Science;* 1988.

CHRISTA F. HANSON, B.S. (Univ. of Massachusetts), M.S. (Cornell Univ.), Ph.D. (O.S.U.); *Assistant Professor of Food, Nutrition and Institution Administration;* 1985, 1984.

MIKE L. HARDIN, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Agricultural Economics;* 1986, 1968.

ALAN R. HARKER, B.S. (Univ. of Utah), Ph.D. (ibid); *Assistant Professor of Microbiology;* 1987.

PAUL D. HARPER, B.A. (Kansas State College), M.A. (ibid), Ph.D. (Univ. of Kansas); *Associate Professor and Interim Head of the Department of Speech Communication;* 1979, 1974.

HELGA H. HARRIMAN, B.A. (Wells College), M.A. (O.S.U.), Ph.D. (ibid); *Associate Professor of History;* 1982, 1975.

STEPHEN EARL HAWKINS, B.S. (Purdue Univ.), M.S. (Iowa State Univ.), Ph.D. (Purdue Univ.); *Assistant Professor of Agronomy;* 1985.

BOB E. HEATLY, B.Arch. (O.S.U.), M.Arch. (Univ. of Illinois); *Professor of Architecture;* 1982, 1978.

MARY ANNE HEMPE, B.F.A. (Central Michigan Univ.), M.F.A. (Western Illinois Univ.); *Associate Professor of Theater;* 1987, 1982.

JANET C. HENDERSON, B.S. (South Dakota State Univ.), M.S. (Kansas State Univ.), Ph.D. (Texas A & M Univ.); *Assistant Professor of Horticulture and Landscape Architecture;* 1988.

SHIDA RASTEGARI HENNEBERRY, B.S. (National Univ. of Iran), M.S. (Iowa State Univ.), Ph.D. (ibid); *Assistant Professor of Agricultural Economics* 1987, 1984.

CAROLYN S. HENRY, B.S.E. (Oklahoma Christian College), M.S. (O.S.U.), M.S. (Univ. of Tennessee, Knoxville), Ph.D. (ibid); *Assistant Professor of Family Relations and Child Development;* 1988.

PAUL JACOB HILTPOLD, B.A. (University of Texas, Austin), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of History;* 1982.

CHRWAN-JYN (DAVID) HO, B.S. (National Chao-Tun Univ.), M.B.A. (Univ. of Georgia), Ph.D. (Michigan State Univ.); *Associate Professor of Management;* 1987, 1985.

C. WESLEY HOLLEY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Associate Professor of Agricultural Education and Assistant Dean of Resident Instruction of the College of Agriculture;* 1989, 1980.

JOAN A. HOLLOWAY, B.A. (Univ. of Colorado), Ph.D. (Univ. of Oklahoma Health Sciences Center); *Assistant Professor of Psychology;* 1985.

JOHN TERRY HOMER, B.A. (Thiel College), M.A. (California State Univ.,Sacramento), Ph.D. (Univ. of Oklahoma); *Associate Professor of Veterinary Parasitology, Microbiology and Public Health;* 1977, 1974.

YOO SOO HONG, B.S. (Seoul National Univ.), M.A. (Sogang Univ.), Ph.D. (Northwestern Univ.); *Assistant Professor of Economics;* 1985.

JOHN P. HOOVER, B.S. (Colorado State Univ.), M.S. (ibid), D.V.M. (ibid); *Associate Professor of Veterinary Medicine and Surgery;* 1988, 1983.

JERRETTA A. HORN, B.S. (Southeastern Oklahoma State Univ.), M.B.S. (ibid), Ed.D. (ibid); *Associate Professor of Management* 1986, 1982.

JIM DUFF HUGHEY, B.A. (O.S.U.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Speech Communication;* 1981, 1970.

RAYMOND L. HUHNKE, B.S. Ag. Engr. (Purdue Univ.), M.S. Ag. Engr. (Univ. of Illinois), Ph.D. (Iowa State Univ.); P.E.; *Associate Professor of Agricultural Engineering;* 1985, 1980.

JERRY GLENWOOD HURST, B.A. (Hardin-Simmons Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor of Zoology;* 1969, 1964.

ADRIENNE EVANS HYLE, B.A. (Kansas State Univ.), M.A. (Univ. of Kansas), Ed.D (Kansas State Univ.); *Assistant Professor of Educational Administration and Higher Education;* 1987.

JANICE WICKSTEAD JADLOW, B.A. (Miami Univ.), M.A. (Univ. of Virginia), Ph.D. (O.S.U.); *Assistant Professor of Finance;* 1984, 1981.

JOEL M. JENSWOLD, B.S. (Univ. of Wisconsin), M.A. (Univ. of Kansas), M. Phil. (ibid), Ph.D. (ibid); *Assistant Professor of Political Science;* 1988, 1984.

RALEIGH A. JOBES, B.S. (O.S.U.), M.S. (Univ. of Arizona), Ph.D. (O.S.U.); *Professor of Agricultural Economics;* 1977, 1975.

BILL J. JOHNSON, D.V.M. (O.S.U.), Diplomate (American College of Veterinary Pathology); *Assistant Professor of Veterinary Pathology;* 1982, 1977.

GORDON VERNON JOHNSON, B.S. (North Dakota State Univ.), M.S. (Univ. of Nevada), Ph.D. (Univ. of Nebraska); *Professor of Agronomy;* 1983, 1977.

LOUIS JOHNSON, B.S. (Massachusetts Inst. of Technology), M.S. (ibid), Ph.D. (ibid) *Associate Professor of Electrical and Computer Engineering;* 1983, 1979.

MARK E. JOHNSON, B.A. (Univ. of California, Santa Barbara), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Applied Behavioral Studies;* 1985.

EDWARD JONES, B.A. (Central Connecticut), M.A. (Ohio Univ.), Ph.D. (ibid); *Assistant Professor of English;* 1987.

JERRY J. JORDAN, B.S. (Central State Univ.), M.S. (Univ. of Oklahoma), Ed.D. (Temple Univ.); *Associate Professor of Health, Physical Education and Leisure;* 1985.

SHELDON KATZ, B.S. (Massachusetts Institute of Technology), Ph.D. (Princeton Univ.); *Assistant Professor of Mathematics;* 1987.

MICHAEL P. KENNA, B.S. (California St. Polytechnic Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor of Horticulture and Landscape Architecture;* 1985.

BRIAN K. KIRKPATRICK, B.S. (Iowa State Univ.), M.S. (Univ. of Wisconsin), Ph.D. (ibid); *Assistant Professor of Animal Science;* 1988.

KENNETH J. KISER, B.A. (O.S.U.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Associate Professor of Sociology;* 1977, 1970.

JAMES F. KNIGHT, B.Arch. (O.S.U.), M.Arch. (Univ. of Illinois); *Professor of Architecture;* 1979.

NORMA SUE KNIGHT, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Food, Nutrition and Institution Administration;* 1987, 1980.

J. DAVID KNOTTNERUS, B.A. (Beloit College), M.A. (Southern Illinois Univ.), Ph.D. (ibid); *Assistant Professor of Sociology;* 1988.

PAMELA L. KNOX, B.S. (College of Charleston), M.S. (Virginia Commonwealth Univ.), Ph.D. (ibid); *Assistant Professor of Applied Behavioral Studies;* 1987.

PAULINE W. KOPECKY, B.B.A. (Southwestern Univ.), M.Ed. (Univ. of Texas), Ph.D. (Univ. of Houston); *Associate Professor of Economics* 1976, 1967.

BERNICE H. KOPEL, B.S. (Univ. of Minnesota), M.S. (Northern Colorado Univ.), Ed.D. (O.S.U.); *Associate Professor of Food, Nutrition and Institution Administration;* 1979, 1970.

JOHNNIE ROBERT KROPP, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Animal Science;* 1988, 1975.

CHALMER LABIG, B.A. (Ohio State Univ.), M.A. (Univ. of Tennessee), Ph.D. (Univ. of Texas, Austin); *Associate Professor of Management;* 1988, 1984.

MELVIN E. LACY, B.S. (California State Univ.), M.S. (ibid), D.B.A. (Univ. of Colorado, Boulder); *Associate Professor of Accounting;* 1981.

IMOGENE L. LAND, B.S.E. (Arkansas State Univ.), M.S.E. (ibid), Ed.D. (O.S.U.); *Associate Professor of Applied Behavioral Studies;* 1983, 1977.

KEVIN E. LANSEY, B.S. (State Univ. of New York), M.S. (Virginia Polytechnic Institute), Ph.D. (Univ. of Texas); *Assistant Professor of Civil Engineering;* 1987.

CARL D. LATINO, B.S. (City College of the City Univ. of New York), M.S. (Pennsylvania State Univ.), Ph.D. (ibid); *Associate Professor of Electrical Engineering;* 1986.

CONSTANCE W. LAWRY, B.A. (Univ. of Texas at Austin), M.L.S. (Univ. of Oklahoma), Ed.D. (O.S.U.); *Assistant Professor of Journalism and Broadcasting;* 1988, 1982.

LINDA LEAVELL, B.A. (Baylor Univ.), M.A. (Rice Univ.), Ph.D. (ibid); *Assistant Professor of English;* 1986.

FRANK E. LEGRAND, B.S. (O.S.U.), Ph.D. (North Dakota Univ.); *Professor of Agronomy;* 1974, 1963.

CHARLES L. LEIDER, B.S. (Michigan State Univ.), M.C.P. (Yale Univ.); *Associate Professor of Horticulture and Landscape Architecture;* 1985.

JERROLD K. LEONG, B.S. (Cornell Univ.), M.P.S. (ibid), M.S. (Florida International Univ.), M.S. (Univ. of Hawaii), Ph.D. (ibid); *Associate Professor of Food, Nutrition and Institution Administration;* 1985.

DAVID M. LESLIE, JR., B.A. (Prescott College), M.S. (Univ. of Nevada), Ph.D. (Oregon State Univ.); *Adjunct Assistant Professor of Zoology;* 1985.

DAVID L. LEVINE, B.A. (St. John's College), M.A. (Pennsylvania State Univ.), Ph.D. (ibid); *Associate Professor of Philosophy;* 1981, 1975.

DAVID K. LEWIS, B.S. (Univ. of Minnesota), M.F. (Yale Univ.), Ph.D. (Oxford Univ.); *Associate Professor of Forestry;* 1982.

PAUL Y. LIN, M.A. (Univ. of Texas, Austin), Ph.D. (ibid); *Associate Professor of Foreign Languages and Literatures;* 1982, 1973.

ROBERT L. LOCHMILLER, B.S. (Univ. of Georgia), M.S. (Virginia Polytechnic Institute and State Univ.), Ph.D. (Texas A & M); *Assistant Professor of Zoology;* 1985.

ROSS O. LOVE, B.S. (Cornell Univ.), M.S. (Michigan State Univ.), Ph.D. (ibid); *Associate Professor of Agricultural Economics;* 1982.

WILLIAM G. LUCE, B.S. (Univ. of Kentucky), M.S. (Univ. of Nebraska), Ph.D. (ibid); *Regents Professor of Animal Science;* 1987, 1968.

CHARLES G. MACALLISTER, D.V.M. (Auburn Univ.); *Associate Professor of Veterinary Medicine and Surgery;* 1988, 1979.

DAVID E. MANDEVILLE, B.S.I.E. (General Motors Institute), M.S.I.E. (Purdue Univ.), Ph.D. (ibid); *Associate Professor of Industrial Engineering and Manangement;* 1985.

LISA A. MANTINI, B.S. (Univ. of Pittsburgh), A.M. (Harvard Univ.), Ph.D. (ibid); *Assistant Professor of Mathematics;* 1985.

L. LEE MANZER, B.A. (O.S.U.), M.B.A. (ibid), Ph.D. (ibid); *Associate Professor of Marketing;* 1979, 1975.

VERNON AMOS MAST, B.S. (Eastern Mennonite College), M.S. (Univ. of Pennsylvania), Ph.D. (Ohio State Univ.); *Associate Professor of Civil Engineering;* 1985, 1980.

D. WAYNE MATTHEWS, B.S. (Harding College), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor of Family Relations and Child Development;* 1979.

KAREN MCBEE, B.S. (Baylor Univ.), M.S. (Texas Tech Univ.), Ph.D. (Texas A&M Univ.); *Assistant Professor of Zoology;* 1987.

JOSEPH P. MCCANN, B.Sc. (Edinburgh Univ., Scotland), M.S. (Cornell Univ.), Ph.D. (ibid); *Assistant Professor of Physiological Science;* 1987.

F. T. McCOLLOM, III, B.A. (Baylor Univ.), M.S. (New Mexico State Univ.), Ph.D. (ibid); *Associate Professor of Animal Science;* 1983.

T. GREGORY McCOLLUM, B.S. (Michigan State Univ.), M.S. (Univ. of Florida), Ph.D. (ibid); *Assistant Professor of Horticulture and Landscape Architecture;* 1987.

JERRY MICHAEL McCOY, B.M. (Univ. of Texas, Arlington), M.M. (Univ. of Texas, Austin), D.M.A. (ibid); *Assistant Professor of Music;* 1984.

BERNARD DEAN McCRAW, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Associate Professor of Horticulture and Landscape Architecture;* 1985.

EVANGIE McGLON, B.S. (Central State Univ., Oklahoma), M.T. (ibid), M.Ed. (ibid), Ph.D. (Univ. of Oklahoma); *Associate Professor of Applied Behavioral Studies;* 1984, 1978.

WILLIAM M. McMURTRY, B.M.E. (O.S.U.), M.M.E. (Univ. of Oklahoma), Ph.D. (North Texas State Univ.); *Associate Professor of Music;* 1975, 1968.

DANIEL W. McNEIL, B.S. (Univ. of Alabama), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Psychology;* 1985.

JEFF McQUILLEN, B.S. (Lockhaven State College), M.A. (Univ. of Okla.), Ph.D. (ibid); *Assistant Professor of Speech Communication;* 1988.

WILLIAM F.McTERNAN, B.S. (Univ. of Wyoming), M.S. (ibid), Ph.D. (Virginia Polytechnic Institute and State Univ.); *Associate Professor of Civil Engineering;* 1985.

HELEN C. MILLER, A.B. (Butler College), M.A. (Cornell Univ.), Ph.D. (ibid); *Associate Professor of Zoology;* 1980, 1972.

PAUL M. MILLER, B.S. (Ohio State Univ.), M.S. (Idaho State Univ.), Ph.D. (Univ. of Utah); *Assistant Professor of Applied Behavioral Studies;* 1986.

JOSEPH P. MISSAL, B.M. (Michigan State Univ.), M.M. (Univ. of Cincinnati), D.M.A. (Univ. of Colorado); *Assistant Professor of Music;* 1986.

CAROL LYNN MODER, B.A. (State Univ. of New York, Geneseo), M.A. (State Univ. of New York, Buffalo), Ph.D. (ibid); *Assistant Professor of English;* 1986.

NANCY MONROE, B.A. (Univ. of Iowa), M.A. (ibid), Ph.D. (Univ. of Kansas); *Associate Professor of Speech and Language Pathology and Audiology;* 1978.

GREGOR L. MORGAN, B.V.Sc. (Massey Univ.), M.V.Sc. (ibid), Ph.D. (O.S.U.); *Assistant Professor of Veterinary Medicine and Surgery;* 1980.

SHERYL J. MORGAN, B.Sc. (Kansas State Univ.), D.V.M. (ibid), Ph.D. (Texas A&M); *Assistant Professor of Veterinary Pathology;* 1987.

BARRY K. MOSER, B.S. (Illinois Benedictine), M.S. (Purdue Univ.), Ph.D. (ibid); *Assistant Professor of Statistics;* 1985.

DEREK A. MOSIER, B.S. (Kansas State Univ.), M.S. (O.S.U.), D.V.M. (Kansas State Univ.), Ph.D. (O.S.U.); *Assistant Professor of Veterinary Pathology;* 1985.

GREGORY C. MOSIER, B.S. (O.S.U.), J.D. (Kansas Univ.), Ed.D. (O.S.U.); *Assistant Professor of Administrative Services;* 1985, 1983.

KEVIN E. MURPHY, B.B.A. (Utah State Univ.), M.A. (ibid), D.B.A. (Univ. of Wisconsin); *Associate Professor of Accounting;* 1981.

DEBRA LYNN NELSON, B.B.A. (Texas Tech Univ.), M.B.A. (Univ. of Texas, Arlington), Ph.D. (ibid); *Assistant Professor of Management;* 1985.

MARGARET F. NELSON, B.A. (Northwestern Oklahoma State Univ.), M.A. (O.S.U.), Ph.D. (ibid); *Associate Professor of English;* 1984, 1970.

MARLAN DEE NELSON, B.A. (O.S.U.), M.A. (Stanford Univ.), Ed.D. (O.S.U.); *Professor and Director of the School of Journalism and Broadcasting;* 1982, 1977.

MAUREEN J. NEMECEK, B.A. (Univ. of Nebraska), M.A. (Univ. of Maryland), Ph.D. (ibid); *Assistant Professor of Journalism and Broadcasting;* 1984.

JAMES D. NETHERTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Chicago); *Professor of Agricultural Education;* 1976, 1970.

ALAN NOELL, B.A. (Texas A & M Univ.), M.A. (Princeton Univ.), Ph.D. (ibid); *Assistant Professor of Mathematics;* 1985.

ROBERT E. NOLAN, B.A. (Loyola Univ. of Chicago), M.A. (ibid), Ed.D. (Northern Illinois Univ.); *Assistant Professor of Occupational and Adult Education;* 1986.

ROBERT C. NUTTER, B.S. (Andrews Univ.), Ph.D. (Emory Univ.); *Associate Professor of Plant Pathology;* 1987.

GEORGE H. OBERLE, B.S. (Earlham College), M.S. (Butler Univ.), Ed.D. (Indiana Univ.); *Professor and Director of the School of Health, Physical Education and Leisure;* 1976, 1974.

ARLYN ORR, B.Arch. (O.S.U.), M.Arch.E. (ibid); P.E.; *Professor of Architecture;* 1973.

RICHARD A. ORTEZ, B.S. (Creighton Univ.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Microbiology;* 1982.

J. MACK OYLER, D.V.M. (O.S.U.), Ph.D. (ibid); *Professor of Veterinary Medicine and Surgery and Associate Dean of Student Affairs of the College of Veterinary Medicine;* 1980, 1974.

DAVID W. PARK, B.S. (Brigham Young Univ.), M.B.A. (ibid), Ph.D. (Cornell Univ.); *Assistant Professor of Agricultural Economics;* 1985.

PHILIP E. PAULIN, B.A. (Univ. of Kentucky), M.A. (ibid), Ed.D. (O.S.U.); *Professor of Journalism and Broadcasting;* 1987, 1971.

ETTA L. PERKINS, B.A. (Univ. of Oklahoma), M.A. (Indiana Univ.), Ph.D. (ibid); *Assistant Professor of History;* 1984, 1983.

KATYE M. PERRY, B.S. (Bishop College), M.Ed. (Southeastern O.S.U.), Ph.D. (O.S.U.); *Associate Professor of Applied Behavioral Studies;* 1988, 1979.

RONALD A. PETRIN, B.A. (Bridgewater State College), M.A. (Univ. of Rhode Island), M.A. (Clark Univ.), Ph.D. (ibid); *Assistant Professor of History;* 1985.

WILLIAM A. PHILLIPS, B.S. (Middle Tennessee State Univ.), M.S. (Virginia Polytechnic Inst. & State Univ.), Ph.D. (ibid); *Assistant Professor of Animal Science;* 1976.

KENNETH N. PINKSTON, B.S. (O.S.U.), Ph.D. (ibid); *Professor of Entomology;* 1983, 1970.

JOHN A. POLONCHEK, B.A. (Northwestern Univ.), M.S. (Georgia Inst. of Technology), Ph.D. (ibid); *Assistant Professor of Finance;* 1983.

JACK W. PRITCHARD, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Professor of Agricultural Education;* 1976, 1968.

DAVID ALLAN PYLES, B.S. (Texas Tech Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor of Agricultural Economics;* 1986, 1981.

CHARLES R. RANSOM, B.B.A. (Univ. of Wisconsin, Madison), M.B.A. (ibid), Ph.D. (ibid); *Associate Professor of Accounting;* 1986, 1981.

DOREN A. RECKER, B.A. (Southern Illinois), M.A. (ibid), M.A. (Univ. of Oklahoma), Ph.D. (ibid); *Assistant Professor of Philosophy;* 1988.

H. EUGENE REEVES, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor of Agronomy;* 1984, 1973.

ROBERT FRED REISBECK, B.S. (Colorado State Univ.), M.S. (O.S.U.), Ed.D. (ibid); *Assistant Professor of Agricultural Education;* 1981, 1966.

JEANINE N. RHEA, B.S. (Univ. of Nebraska), M.Ed. (Memphis State Univ.), Ed.D. (O.S.U.); *Associate Professor of Administrative Services;* 1981, 1976.

LAWRENCE RICE, B.S. (Colorado State Univ.), M.S. (ibid), D.V.M. (ibid); *Professor of Veterinary Medicine and Surgery;* 1981, 1976.

ARNON RIKIN, B.S. (Ben Gurion Univ., Israel), M.S. (ibid), Ph.D. (Weizmann Inst. of Sci., Israel); *Assistant Professor of Botany;* 1988.

SCOTT M. RITTER, B.S. (Brigham Young Univ.), M.S. (ibid), Ph.D. (Univ. of Wisconsin); *Assistant Professor of Geology;* 1986.

DAVID W. ROBINSON, B.S. (O.S.U.), M.F. (North Carolina State Univ.), Ed.D. (O.S.U.); *Professor of Forestry;* 1976, 1962.

JAMES ROGERS, B.B.A. (Univ. of Georgia), M.S. (San Francisco State Univ.), Ph.D. (Univ. of Utah); *Professor of Health, Physical Education and Leisure and Coordinator, Health;* 1979, 1974.

RICHARD CARLTON ROHRS, B.A. (Bucknell Univ.), M.A. (Univ. of Nebraska), Ph.D. (ibid); *Associate Professor of History;* 1982, 1976.

LOREN ROMMANN, B.S. (South Dakota State Univ.), Ph.D. (ibid); *Professor and Extension Specialist of Agronomy;* 1979, 1970.

WILLIAM JAMES RUGG, B.A. (Barrington College), M.S. (Utah State Univ.), Ph.D. (Univ. of Mississippi); *Associate Professor of Journalism and Broadcasting;* 1982.

LARRY D. SANDERS, B.A. (Chapman College), M.S. (New Mexico State Univ.), Ph.D. (Colorado State Univ.); *Assistant Professor of Agricultural Economics;* 1985.

RAY E. SANDERS, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Assistant Professor of Occupational and Adult Education;* 1988, 1985.

ANDREAS SAVVIDES, B.S./B.Com. (Univ. of Birmingham U.K.), M.A. (Univ. of Florida), Ph.D. (ibid); *Assistant Professor of Economics;* 1986, 1985.

GEORGE M. SCHEETS, B.S. (U.S. Military Academy), M.S. (Kansas State Univ.), Ph.D. (ibid); *Assistant Professor of Electrical and Computer Engineering;* 1987.

DOROTHY L. SCHRADER, B.A. (Agnes Scott College), M.A. (Middlebury College), Ph.D. (Florida State Univ.), Licence-es-lettres (Univ. de Paris III); *Associate Professor of Foreign Languages and Literatures;* 1982, 1977.

MARGARET M. SCOTT, B.A. (Univ. of Northern Colorado), M.A. (New Mexico State Univ.), Ph.D. (ibid); *Assistant Professor of Curriculum and Instruction;* 1987.

WALTER GAYLORD SCOTT, B.A. (Baylor Univ.), B.D. (Southwestern Baptist Theological Seminary), Th.M. (ibid), M.A. (Baylor Univ.), Ph.D. (Johns Hopkins Univ.); *Associate Professor of Philosophy;* 1970, 1960.

LOUIS SEIG, B.A. (Louisiana State Univ.), M.A. (ibid), Ph.D. (Univ. of Minnesota); *Assistant Professor of Geography;* 1986.

GORDON SELK, B.S. (Univ. of Nebraska, Lincoln), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor of Animal Science;* 1986.

RICHARD V. SHAWLEY, B.S. (O.S.U.), M.S. (ibid), D.V.M. (ibid); *Professor of Veterinary Medicine and Surgery;* 1988, 1973.

JAMES R. SHOLAR, B.S. (Univ. of Tennessee, Martin), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor of Agronomy;* 1987, 1975.

PETER OTTO SHULL, JR., A.B. (Princeton Univ.), M.S. (Rice Univ.), Ph.D. (ibid); *Assistant Professor of Physics;* 1984.

PHILLIP L. SIMS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Utah State Univ.); *Adjunct Associate Professor of Agronomy;* 1977.

STEVEN H. SLUSHER, B.S. (Kansas State Univ.), M.S. (O.S.U.), D.V.M. (Kansas State Univ.); *Associate Professor of Veterinary Medicine and Surgery;* 1985, 1978.

H. GENE SMITH, B.S. (O.S.U.), M.B.A. (ibid), Ed.D. (ibid); *Associate Professor of Occupational and Adult Education;* 1983, 1971.

MICHAEL MYRLE SMITH, B.A. (Southern Illinois Univ.), M.A. (ibid), Ph.D. (Texas Christian Univ.); *Associate Professor of History;* 1976, 1970.

LEON J. SPICER, B.S. (Univ. of Minnesota), M.S. (Univ. of Idaho), Ph.D. (Michigan State Univ.); *Assistant Professor of Animal Science;* 1988.

STEPHEN JOHN STADLER, B.S.Ed. (Miami Univ.), M.A. (ibid), Ph.D. (Indiana Univ.); *Associate Professor of Geography;* 1986, 1980.

MICHAEL EDWARD STANO, B.A. (Univ. of Nevada, Reno), M.A. (Univ. of Colorado), Ph.D. (Univ. of Minnesota); *Associate Professor of Speech Communication;* 1982, 1977.

GREGORY STEFANIAK, B.S. (Southern Illinois Univ.), M.S. (Brooklyn College), Ph.D. (Southern Illinois Univ.); *Assistant Professor of Journalism and Broadcasting;* 1982.

WILLIAM ROBERT STENG, JR., B.A. (Rutgers Univ.), M.A. (Univ. of Florida), Ed.D. (O.S.U.); *Professor of Journalism and Broadcasting;* 1985, 1969.

A. KENNETH STERN, B.A. (Messiah College), M.Ed. (Shippensburg State College), Ed.D. (Univ. of Oklahoma); *Assistant Professor of Educational Administration and Higher Education;* 1985, 1980.

GARY R. STEVENS, B.S. (Northern Illinois Univ.), M.S. (ibid), Ph.D. (Texas A&M Univ.); *Assistant Professor of Statistics;* 1986.

JANICE RAE STEWART, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Food, Nutrition and Institution Administration;* 1985.

JAMES H. STIEGLER, B.S. (Texas A & I Univ.), M.S.(O.S.U.), Ph.D.(Virginia Polytechnic Inst. and State Univ.); *Professor of Agronomy;* 1983, 1973.

JAMES H. STINE, B.A. (O.S.U.), M.S. (ibid); *Associate Professor of Geography;* 1976, 1957.

MARVIN L. STONE, B.S. (Colorado State Univ.), M.S. (ibid), Ph.D. (Washington State Univ.); *Associate Professor of Agricultural Engineering;* 1986, 1982.

LOUIE G. STRATTON, D.V.M. (O.S.U.), Ph.D. (ibid); *Assistant Dean of the College of Veterinary Medicine Outreach;* 1987, 1973.

DOROTHY STROM, B.S. (State Univ. of New York, College at Plattsburgh), M.S. (Univ. of Wisconsin-Superior), Ph.D. (Ball State Univ.); *Assistant Professor of Applied Behavioral Studies;* 1988.

TANA WOOD STUFFLEBEAN, B.S. (O.S.U.), M.E. (Central State Univ.), Ph.D. (O.S.U.); *Assistant Professor of Clothing, Textiles and Merchandising;* 1980, 1979.

EUI-HO SUH, B.S. (Seoul National Univ.), M.S. (Stanford Univ.), Ph.D. (Univ. of Illinois); *Assistant Professor of Management;* 1987.

JOHN ANDREW SYLVESTER, A.B. (Harvard Univ.), M.A. (Univ. of Wisconsin), Ph.D. (ibid); *Associate Professor of History;* 1970, 1966.

MICHAEL REED TAYLOR, B.S.E. (Bowling Green State Univ.), M.A. (ibid), Ph.D. (Florida State Univ.); *Assistant Professor of Philosophy;* 1984.

KEITH A. TEAGUE, B.S.E.E. (O.S.U.), M.S.E.E. (ibid), Ph.D. (ibid); *Associate Professor of Electrical and Computer Engineering;* 1988, 1983.

JAMES STEEL THAYER, B.A. (Indiana Univ.), M.A. (ibid), M.T.S. (Harvard Univ.), Ph.D. (Univ. of Michigan); *Associate Professor of Religious Studies;* 1985, 1981.

DAVID G. THOMAS, B.A. (Albion College), M.A. (Univ. of Denver); Ph.D. (ibid); *Assistant Professor of Psychology;* 1985.

MICHAEL F. THOMAS, B.S.B.A. (San Jose State Univ.), M.B.A. (ibid), Ph.D. (Univ. of Wisconsin); *Assistant Professor of Accounting;* 1985.

JOHN W. THORNTON, B.S. (O.S.U.), Ph.D. (Univ. of Washington); *Professor of Zoology;* 1974, 1960.

DONALD R. TOPLIFF, B.S. (Kansas State Univ.), M.S. (Texas A & M Univ.), Ph.D. (ibid); *Associate Professor of Animal Science;* 1988, 1983.

WILLIAM BRYAN TUCKER, B.S. (Mississippi State Univ.), M.S. (ibid), Ph.D. (Univ. of Kentucky); *Assistant Professor of Animal Science;* 1988.

GWENDOLYN Y. TURNER, B.A. (Arkansas State Univ.), M.Ed. (Univ. of Arkansas), Ed.D. (ibid); *Assistant Professor of Curriculum and Instruction;* 1986.

STEPHEN W. TWEEDIE, B.S. (Cornell Univ.), M.Ed. (ibid), Ph.D. (Syracuse Univ.); *Associate Professor of Geography;* 1976, 1971.

MOSES N. VIJAYAKUMAR, B.S. (Univ. of Madras, India), M.S. (ibid), M.S. (Univ. of Illinois, Chicago), Ph.D. (ibid); *Assistant Professor of Microbiology;* 1988.

FRANZ A. VON SAUER, A.B. (Univ. of Kansas), M.A. (ibid), Ph.D. (Georgetown Univ.); *Associate Professor of Political Science;* 1975, 1969.

IBRAHIM A. WAHEM, B.S. (Damascus Univ.), M.S. (Ohio State Univ.), Ph.D. (ibid); *Assistant Professor of Food, Nutrition and Institution Administration;* 1987.

MARTIN WALLEN, B.A. (Linfield College), M.A. (Vanderbilt), Ph.D. (ibid); *Assistant Professor of English;* 1987.

DAVID STEVEN WEBSTER, B.A. (Brandeis Univ.), M.A. (Univ. of Chicago), Ph.D. (Univ. of California, Los Angeles); *Assistant Professor of Educational Administration and Higher Education;* 1987.

B. PETER WESTERHOFF, B.A. (Wittenburg (Ohio) Univ.), M.F.A. (Univ. of Connecticut); *Assistant Professor of Theater;* 1986, 1985.

JOSEPH W. WESTPHAL, B.A. (Adelphi Univ.), M.A. (O.S.U.), Ph.D. (Univ. of Missouri); *Associate Professor Political Science;* 1984, 1975.

THOMAS S. WETZEL, B.S. (Northern Illinois Univ.), M.B.A. (ibid), PH.D. (O.S.U.); *Assistant Professor of Accounting;* 1986.

MARGARET A. WHITE, B.S. (Sam Houston State Univ.), M.B.A. (ibid), Ph.D. (Texas A&M, College Station); *Assistant Professor of Management;* 1986.

SAMUEL WHITSITT, B.A. (American Univ. of Beirut), M.A. (Sangamon State Univ.), Ph.D. (State Univ. of New York, Buffalo); *Assistant Professor of English;* 1988.

ELIZABETH J. WHITT, B.A. (Drake Univ.), M.A. (Michigan State Univ.), Ph.D. (Indiana Univ.); *Assistant Professor of Educational Administration and Higher Education;* 1988.

ROBERT C. WICKLEIN, B.S. (Western Kentucky Univ.), M.S. (Univ. of Alabama, Birmingham), Ed.D. (Virginia Polytechnic Institute and State Univ.); *Assistant Professor of Occupational and Adult Education;* 1986.

JAMES P. WICKSTED, B.A. (New York Univ.), M.A. (City College of New York), Ph.D. (ibid); *Assistant Professor of Physics;* 1985.

ELIZABETH A. WILLIAMS, B.A. (Univ. of Oklahoma), M.A. (Univ. of Oregon), Ph.D. (Indiana Univ.); *Assistant Professor of History;* 1986.

ERVIN WILLIAMS, JR., B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Associate Professor of Plant Pathology;* 1979, 1969.

JANICE WILLIAMS, B.S. (Frostburg State Univ.), M.P.A. (California State Univ.), Ph.D. (Univ. of California, Los Angeles); *Assistant Professor of Applied Behavioral Studies;* 1988.

WILLIAM JAMES WILLIS, III, B.A. (Univ. of Okla.), M.A. (East Texas State Univ.), Ph.D. (Univ. of Missouri); *Associate Professor of Journalism and Broadcasting;* 1988.

ELAINE WILSON, B.S. (Univ. of Southwestern Louisiana), M.S. (Univ. of Alabama), Ph.D. (O.S.U.); *Associate Professor of Family Relations and Child Development;* 1988, 1973.

JOHN R. WINGENDER, B.A. (Univ. of Nebraska), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Finance;* 1985.

PAULINE WINTER, B.S. (Texas Woman's Univ.), M.A. (ibid); *Associate Professor of Health, Physical Education and Leisure;* 1970, 1965.

ALTHEA WRIGHT, B.S. (O.S.U.), M.Ed. (West Texas State Univ.), Ed.D. (O.S.U.); *Associate Professor of Family Relations and Child Development;* 1981, 1971.

DAVID J. WRIGHT, A.B. (Cornell Univ.), A.M. (Harvard Univ.), Ph.D. (ibid); *Assistant Professor of Mathematics;* 1985.

JOHN H. WYCOFF, III, B.S. (Univ. of Florida), Ph.D. (ibid); *Assistant Professor of Veterinary Parasitology, Microbiology, & Public Health;* 1986.

LAWRENCE D. YATES, B.S. (Texas A & M Univ.), M.S. (ibid), Ph.D. (Univ. of Washington); *Assistant Professor of Animal Science;* 1988.

ALEXANDER V. ZALE, B.S. (Univ. of Massachusetts), M.S. (Virginia Polytechnic Institute & State Univ.), Ph.D. (Univ. of Florida); *Adjunct Assistant Professor of Zoology;* 1985.

MICHAEL TERRANCE ZAVY, B.S. (Cornell Univ.), M.S. (Univ. of Florida), Ph.D. (ibid); *Assistant Professor of Animal Science;* 1983.

ROGER ZIERAU, B.S. (Trinity College), Ph.D. (Univ. of California, Berkeley); *Assistant Professor of Mathematics;* 1988.

PETER ZUBER, B.S. (Univ. of Maine), Ph.D. (Univ. of Virginia); *Assistant Professor of Microbiology;* 1986.

FARREL J. ZWERNEMAN, B.S.C.E. (Univ. of Texas), M.S.C.E. (ibid), Ph.D. (ibid); *Assistant Professor of Civil Engineering;* 1985.

Associate Members Emeriti

JEANNE L. AGNEW, B.A. (Queen's Univ.), M.A. (ibid), Ph.D. (Radcliffe College); *Professor Emeritus of Mathematics;* 1984, 1953.

HAZEL JESSIE BAKER, B.S. (O.S.U.), M.S. (Iowa State Univ.); *Associate Professor Emeritus of Food, Nutrition and Institution Administration;* 1980, 1950.

ARMOND DUDLEY BAREFOOT, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agricultural Engineering;* 1986, 1953.

PAUL B. BARTO, D.V.M. (Univ. of Pennsylvania), M.S. (Oregon State Univ.), Ph.D. (ibid); *Professor Emeritus of Veterinary Parasitology, Microbiology and Public Health;* 1986, 1955.

GEORGE W. BAUMILLER, Diploma in Interior Architecture (State C. of Building, Warsaw Poland) M.S. (Warsaw Inst. of Technology); *Associate Professor Emeritus of Architecture;* 1988, 1972.

FREDERICK M. BLACK, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Business Administration;* 1979, 1953.

JOHN RICHARD BOSWORTH, B.A. (Univ. of Illinois), M.A. (ibid); *Assistant Professor Emeritus of Philosophy;* 1986, 1962.

WENDELL BOWERS, B.S. (Univ. of Illinois), M.S. (ibid); *Professor Emeritus of Agricultural Engineering;* 1985, 1967.

JULIAN H. BRADSHER, A.B. (Univ. of South Carolina), M.A. (Univ. of Colorado), Ph.D. (Univ. of California); *Professor Emeritus of Economics;* 1977, 1948.

RALPH A. BRANN, B.S. (Bethel College), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Educational Administration and Higher Education;* 1979, 1964.

CHARLIE A. BURNS, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Professor Emeritus of Agricultural Education;* 1985, 1953.

LORA BELLE CACY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Associate Professor Emeritus of Home Economics Education;* 1984, 1963.

RAYMOND E. CHAPEL, B.S. (O.S.U.), M.S. (ibid); *Professor Emeritus of Mechanical and Aerospace Engineering and Director Emeritus of Engineering Research and Budget;* 1978, 1947.

GEOFFREY PHILIP COLLINS, B.S.A. (Univ. of Toronto), M.S. (Univ. of Illinois); *Professor Emeritus of Agricultural Economics;* 1970, 1939.

HYLA S. CONVERSE, B.A. (Smith College), B.D. (Union Theological Seminary), Ph.D. (Columbia Univ.); *Professor Emeritus of Religious Studies;* 1986, 1968.

GEORGE EARL COOK, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agricultural Engineering;* 1986, 1952.

FRANK FRANZ DAVIES, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agronomy;* 1971, 1937.

CHARLES EDWARD DENMAN, B.S. (O.S.U.), M.S. (Utah State Univ.); *Associate Professor Emeritus of Agronomy;* 1985, 1949.

WILLIAM CLIFFORD ELDER, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agronomy;* 1968, 1935.

LADISLAUS J. FILA, B.S. (Webb Inst. of Naval Architecture), A.E. (New York Univ.); *Professor Emeritus of Mechanical and Aerospace Engineering;* 1978, 1947.

HOOVER PAGE FISHER, B.M.E. (O.S.U.), M.S. (ibid), D.M.E. (Univ. of Oklahoma); *Professor Emeritus of Music;* 1987, 1965.

MARY L. FRYE, B.A. (Univ. of Hamline), M.S. (O.S.U.), Ed. D (ibid); *Assistant Professor Emeritus of Health, Physical Education and Leisure;* 1988, 1968.

J. LLOYD GARNER, B.S. (East Central State College, Oklahoma), Ed.M. (Univ. of Oklahoma); *Associate Professor Emeritus of Business Education and Office Management;* 1976, 1942.

GORDON BRAZIL GILBERT, B.A. (Ouachita College), M.A. (George Peabody College for Teachers); *Associate Professor Emeritus of Health, Physical Education and Recreation;* 1973, 1940.

BRENDA GOULD, B.S. (O.S.U.), M.A. (Teachers College, Columbia Univ.); *Associate Professor Emeritus of Clothing, Textiles and Merchandising;* 1965, 1932.

LEMUEL D. GROOM, B.A. (Univ. of Oklahoma), M.S. (O.S.U.); *Associate Professor Emeritus of Journalism and Broadcasting;* 1977, 1946.

WERNER GRUNINGER, B.A. (Univ. of British Columbia), M.A. (Duke Univ.), Ph.D. (Univ. of Washington); *Professor Emeritus of Sociology;* 1985, 1974.

HERMAN HINRICHS, B.S. (O.S.U.), M.S. (ibid); *Professor Emeritus of Horticulture;* 1976, 1935.

JOHN EDWARD HOFFMAN, B.S. (Univ. of Oklahoma), M.A. (ibid); *Associate Professor Emeritus of Mathematics;* 1987, 1956.

DONALD D. HOLMES, M.S. (O.S.U.), D.V.M. (ibid); *Professor Emeritus of Veterinary Pathology;* 1986, 1979.

JAMES A. JACKSON, B.A. (Southwestern College), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor Emeritus of Veterinary Parasitology, Microbiology and Public Health;* 1986, 1968.

WILLIAM L. JOHNSTON, B.S. (Illinois State Univ.), M.S. (Univ. of Illinois), Ed.D. (ibid); *Professor Emeritus of Housing, Interior Design and Consumer Studies;* 1987, 1977.

EUGENE M. JONES, D.V.M. (Cornell Univ.),; *Professor Emeritus of Veterinary Medicine and Surgery;* 1986, 1965.

WILLIAM M. KINCAID, B.S. (Univ. of Colorado), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor Emeritus of Marketing;* 1986, 1969.

MILLARD CHARGES KRATZ, B.S. (O.S.U.), L.L.B. (Harvard Law School); *Professor Emeritus of Business Law;* 1972, 1938.

DANIEL RONALD KROLL, A.B. (Michigan State Normal College), A.M. (Univ. of Michigan), Ph.D. (Columbia Univ.); *Professor Emeritus of English and Director Emeritus of General Studies;* 1975, 1946.

FRED LECRONE, B.S. (O.S.U.), M.S. (Iowa State Univ.); *Associate Professor Emeritus of Horticulture and Assistant Dean Emeritus of Resident Instruction in Agriculture;* 1973, 1939.

MARY E. LEIDIGH, B.S. (Texas Technological College), M.S. (Univ. of Texas); *Professor Emeritus of Food, Nutrition and Institution Administration;* 1977, 1945.

GEORGE W. A. MAHONEY, B.S. (Univ. of Illinois), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor Emeritus of Agricultural Engineering;* 1986, 1949.

VIRGINIA LEWIS MARSDEN, B.S. (Central Missouri State College), M.A. (Colorado State College of Education); *Associate Professor Emeritus of Education;* 1975, 1953.

GLADYS BOBECK MARSHALL, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Family Relations and Child Development;* 1971, 1947 (1939-43).

SARA DORIS MEADOR, B.S. (Texas State College for Women), M.S. (Iowa State Univ.); *Associate Professor Emeritus of Clothing, Textiles and Merchandising;* 1971, 1939.

GERTRUDE McALLISTER MEANS, B.A. (Park College), B.S. (Northeast Missouri State Teachers College), M.S. (Virginia Polytechnic Inst.); *Assistant Professor Emeritus of Home Management, Equipment and Family Economics;* 1971, 1950.

LOU S. MORRISON, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Plant Pathology;* 1971, 1948.

J. BROWN MORTON, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Associate Professor Emeritus of Occupational and Adult Education;* 1978, 1971.

JOHN DAVIS NAFF, B.S. (Univ. of Alabama), M.S. (ibid), Ph.D. (Univ. of Kansas);*Professor Emeritus of Geology;* 1981, 1949.

ROBERT LEE NOBLE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor Emeritus of Animal Science;* 1985, 1949.

FAYNE H. OBERST, D.V.M. (Kansas State Univ.), M.S. (Cornell Univ.), Diplomate (The American College Theriogenologist Specialty Board in Veterinary Medicine); *Professor Emeritus of Veterinary Medicine and Surgery;* 1984, 1974.

DUANE RUSSELL PETERSON, D.V.M. (Kansas State Univ.), M.S. (ibid); *Professor Emeritus of Physiological Science;* 1986, 1948.

GEOFFREY PILL, B.A. (Oxford Univ.), M.A. (ibid), D-es-L (Grenoble); *Professor Emeritus of Foreign Languages and Literatures;* 1986, 1964.

DELBERT LEROY RUTLEDGE, B.S. (Univ. of New Mexico), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Physics;* 1986, 1957.

DAVID ADOLF SANDER, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Agronomy;* 1982, 1957.

HAROLD VICTOR SARE, B.A. (O.S.U.), M.A. (ibid); *Regents Professor Emeritus of Political Science;* 1982, 1963.

DOROTHY SAVILLE, B.S. (Univ. of Missouri), M.S. (Kansas State Univ.); *Professor Emeritus of Clothing, Textiles and Merchandising;* 1971, 1937.

ARLO R. SCHMIDT, B.S. (O.S.U.), M.S. (Iowa State Univ.); *Associate Professor Emeritus of Physics;* 1971, 1960.

HERBERT SCHOLZ, JR., A.B. (Elon College, North Carolina), M.A. (Univ. of North Carolina); *Associate Professor Emeritus of Mathematics;* 1966, 1929.

JOHN LOUIS SCHWEITZER, B.F.A. (Univ. of Arizona), M.A. (ibid), M.A. (Univ. of Michigan); *Associate Professor Emeritus of Foreign Languages and Literatures;* 1984, 1959.

MARJORIE M. SCHWEITZER, B.A. (Univ. of Colorado), M.A. (Univ. of Arizona), Ph.D. (Univ. of Oklahoma); *Assistant Professor Emeritus of Sociology;* 1986, 1982.

EMIL EDWARD SEBESTA, B.S. (South Dakota A&M College), M.S. (O.S.U.), Ph.D. (Cornell Univ.); *Professor Emeritus of Agronomy;* 1987, 1951.

CHARLES L. SMITH, B.M. (Central Methodist College), M.A. (Univ. of Colorado), M.A. (Univ. of Northern Colorado), Ed.D. (ibid); *Associate Professor Emeritus of Curriculum and Instruction;* 1986, 1972.

GORDON C. SMITH, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Industrial Engineering and Management;* 1976, 1967.

THOMAS J. SMITH, B.S.Ed. (East Central Oklahoma State Univ.), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Educational Administration and Higher Education;* 1988, 1979.

WALTER L. STARKS, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Assistant Professor Emeritus of Administrative Services and Business Education;* 1988, 1966.

HOBART E. STOCKING, B.A. (Johns Hopkins Univ.), Ph.D. (Univ. of Chicago); *Professor Emeritus of Geology;* 1972, 1959.

FRANCES L. STROMBERG, B.A. (O.S.U.), M.S. (ibid), Ph.D. (Florida State Univ.); *Professor and Head Emeritus of the Department of Family Relations and Child Development;* 1986, 1967.

ROY V. STURGEON, JR., B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Minnesota); *Professor Emeritus of Plant Pathology;* 1986, 1961.

JOHN BRUCE TATE, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Texas A & M Univ.); *Associate Professor of Industrial Arts Education;* 1971, 1947.

WARREN E. TAYLOR, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agricultural Engineering;* 1981, 1952.

HOUSTON EVERETT WARD, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Agricultural Economics;* 1977, 1935.

DAN WESLEY, B.A. (Berea College), M.S. (Boston Univ.) M.A. (George Peabody College for Teachers), Ph.D. (O.S.U.); *Professor Emeritus of Sociology and Director Emeritus of Arts and Sciences Student Services;* 1984, 1960.

CHRIS G. WHITE, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Agricultural Education;* 1968, 1938.

ERIC IDWAY WILLIAMS, M.R.C.V.S. (Royal Veterinary College), F.R.C.V.S. (Royal College of Veterinary Surgeons), M.S. (O.S.U.); *Professor Emeritus of Veterinary Medicine and Surgery;* 1988, 1961.

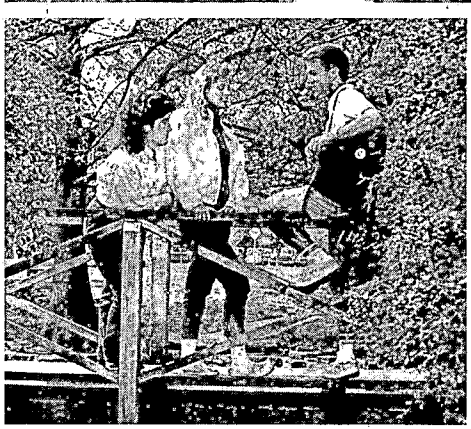
VICTOR WOLFRAM, B.S. (Julliard School of Music), M.S. (ibid); *Professor Emeritus of Music;* 1982, 1960.

WILLIAM ROSE WRAY, B.A. (Yale College), M.A. (Yale Univ.), Ph.D. (ibid); *Associate Professor Emeritus of English;* 1981, 1966.



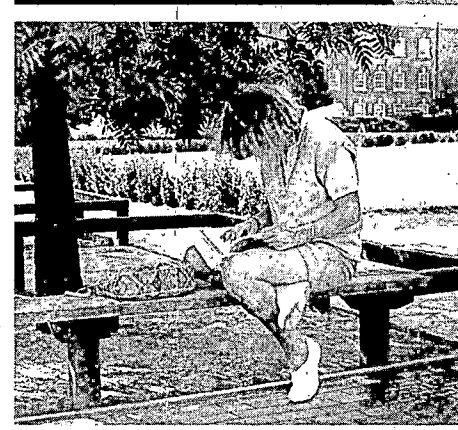




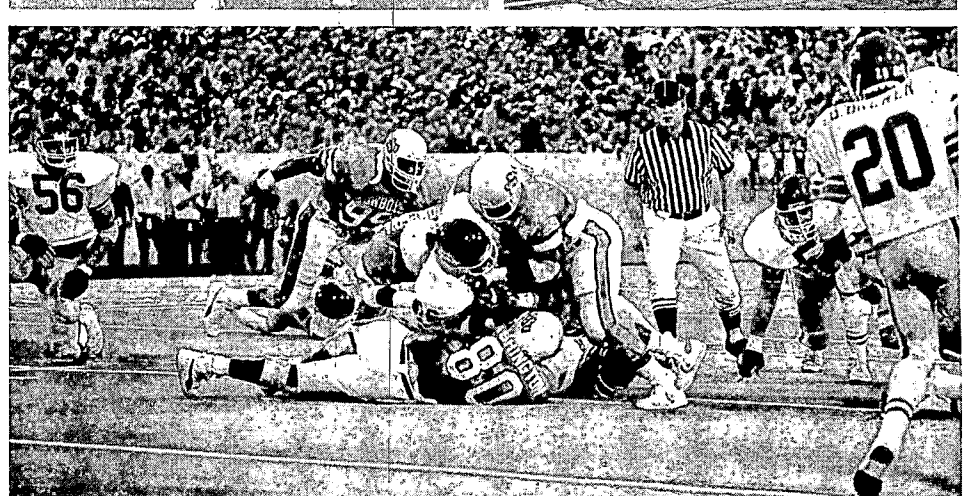



Cowboys








56
20

Course Listings

Contains course descriptions listed alphabetically by fields (See the *College of Osteopathic Medicine of OSU College Catalog* for osteopathic medicine course descriptions.)

Explanation of Course Listings

A course listing is comprised of the following elements, in order:

Course Number. All courses are identified by numbers composed of four digits. The first digit indicates the class year in which the subject is ordinarily taken, although enrollment is not exclusive as to student classification, the second and third digits identify the course within the field and the last digit identifies the number of semester credit hours the course carries. A course number beginning with 0 indicates that the course does not carry University credit. A course number ending in 0 indicates that the course carries variable credit. An asterisk (*) following the four-digit number indicates the course is approved for graduate credit.

Those numbered 5000 and above are primarily for graduate students, and only graduate students and selected seniors with consent of the instructor may enroll in them. Courses numbered 3000 and 4000 may be taken for graduate credit if the course number is labeled with an asterisk. Extra work may be required of a graduate student in a 3000- or 4000-level course.

General Education Requirements Codes. The capital letters in parentheses preceding some course titles designate courses fulfilling various undergraduate general education requirements. (See "Academic Regulations.")

Course Title. The title of the course is printed in bold-face letters.

Statement of Variable Credit. Each course number ending in zero is followed by a statement of the credit that may be earned. Typical entries are *1-6 credits, maximum 6* and *1-3 credits, maximum 12,* the first part of the entry indicating the permissible credit per enrollment, followed by a statement of the maximum credit which may be earned in the course through repeated enrollment.

Laboratory Hours. If a course contains a laboratory, the number per week of laboratory hours are stated, e.g., *Lab 3.*

Prerequisite(s). Prerequisites from the same department as the course being described are listed first, with no departmental abbreviation and in increasing numerical order. If from another department, that departmental abbreviation must precede the number of the prerequisite course. Those courses having prerequisites from both within and from outside the department bear combination entries such as *3303 and STAT 2012.* Prerequisites are listed in the following manner:

Prerequisites: A, B or C
A *or* B *or* C is acceptable

Prerequisites: A, B and C
A *and* B *and* C are required

Prerequisites: A, and B or C
A *and* either B or C

Prerequisites: A and B, or C
Both A and B, *or* C required

Prerequisites: A, or B and C
Either A *or* both B *and* C required

Prerequisites: A or equivalent, and B
Both A, or the equivalent of A, *and* B are required

Prerequisites: A, and B or equivalent
Both A *and* B, or the equivalent of B, are required

Prerequisites: A and B; or equivalents
Equivalents of both A and B are acceptable

Where no prerequisites are listed for courses numbered 3000 or 4000 level, it is understood that the prerequisite is 60 credit hours of work completed, or 45 credit hours completed with an overall grade-point average of 3.25. The prerequisite for courses numbered 5000 or 6000 level is graduate standing in addition to any other prerequisites listed. Instructors may waive prerequisites when student background justifies. Prior approval of instructor may be required in problems courses, independent study, internships, thesis and dissertation courses, and courses taught in a professional school.

Description of Course Content. The content of the course and its major emphases are described. Courses which are taught under another name and number are indicated by the statement *Same course as 0000.* Credit may not be earned in *both* courses so cross-referenced.

Abbreviations Used

A&S	Arts and Sciences
ABSED	Applied Behavioral Studies in Education
ACCTG	Accounting
AEROS	Aerospace Studies
AG	Agriculture
AGEC	Agricultural Economics
AGED	Agricultural Education
AGEN	Agricultural Engineering
AGRON	Agronomy
ANSI	Animal Science
ANTH	Anthropology
ARCH	Architecture
ART	Art
ASTRO	Astronomy
ATHL	Athletics
AVSED	Aviation and Space Education
BCOMM	Business Communications
BIOCH	Biochemistry
BISC	Biological Science
BOT	Botany
BUSAD	Business Administration
BUSED	Business Education
BUSL	Business Law
BUSPR	Business Professions
CHEM	Chemistry
CHENG	Chemical Engineering
CHIN	Chinese
CIED	Curriculum and Instruction Education
CIVEN	Civil Engineering
COMSC	Computing and Information Science
CONST	Construction Management Technology
CTM	Clothing, Textiles and Merchandising
EAHED	Educational Administration and Higher Education
ECEN	Electrical and Computer Engineering
ECON	Economics
EDUC	Education
ECT	Electronics and Computer Technology
ENGL	English
ENGR	Engineering
ENGSC	Engineering Science
ENTO	Entomology
ENVIR	Environmental Science
EPT	Electrical Power Technology
FIN	Finance
FIRET	Fire Protection and Safety Technology
FLL	Foreign Languages and Literatures
FNIA	Food, Nutrition and Institution Administration
FOR	Forestry
FRCD	Family Relations and Child Development
FRNCH	French
GENAD	General Administration
GENE	Genetics
GENEN	General Engineering
GENT	General Technology
GEOG	Geography
GEOL	Geology
GRAD	Graduate
GREEK	Greek
GRMN	German
HEC	Home Economics
HEECS	Home Economics Education and Community Services
HIDCS	Housing, Interior Design and Consumer Studies
HIST	History
HLTH	Health
HORT	Horticulture
HPELS	Health, Physical Education and Leisure
HRAD	Hotel and Restaurant Administration
IDS	Interdisciplinary Studies
INDEN	Industrial Engineering and Management
ITED	Industrial Technology Education
JAPAN	Japanese
JB	Journalism and Broadcasting
LA	Landscape Architecture
LATIN	Latin
LEIS	Leisure
LIBSC	Library Science
MAE	Mechanical and Aerospace Engineering

MATH	Mathematics
MC	Mass Communications
MECAG	Mechanized Agriculture
MECDT	Mechanical Design Technology
MFGT	Manufacturing Technology
MGMT	Management
MICRO	Microbiology
MILSC	Military Science
MKTED	Marketing Education
MKTG	Marketing
MPT	Mechanical Power Technology
MTCL	Medical Technology
MUSIC	Music
NATSC	Natural Science
OAED	Occupational and Adult Education
OFFMG	Office Management
PE	Physical Education
PET	Petroleum Technology
PHILO	Philosophy
PHSI	Physiological Science
PHYSC	Physics
PLP	Plant Pathology
POLSC	Political Science
PSYCH	Psychology
REL	Religious Studies
RUSS	Russian
SOC	Sociology
SPAN	Spanish
SPATH	Speech Pathology
SPCH	Speech
STAT	Statistics
TECED	Technical Education
TH	Theater
TIED	Trade and Industrial Education
UNIV	University
VMED	Veterinary Medicine
VMS	Veterinary Medicine and Surgery
VPARA	Veterinary Parasitology, Microbiology and Public Health
VPATH	Veterinary Pathology
ZOOL	Zoology

ACCOUNTING (ACCTG)

2103
Principles of Accounting. Prerequisite: 24 semester credit hours, including ENGL 1113 and MATH 1513 or equivalent. Financial accounting covering the accounting process and principles of accrual accounting.

2203
Principles of Accounting. Prerequisite: 2103. Managerial accounting concepts and objectives, planning and control of sales and costs, analysis of costs and profits.

3013
Federal Income Taxation. Prerequisite: 2203. Federal income tax and its relationship to other forms of taxation; primary emphasis on determination of federal income tax liability of an individual.

3103
Survey of Accounting Principles. Elementary financial and cost accounting with special emphasis on statement interpretation and industrial problems. No credit for students with credit in 2103 or 2203.

3203
Cost Accounting. Prerequisites: 2203 with a grade of "C" or better and STAT 2023. Cost accumulation systems, allocating product costs, planning and controlling costs, standard costing, and profitability analysis.

3303
Financial Accounting I. Prerequisite: 2203. Financial accounting theory and problems.

3403
Financial Accounting II. Prerequisite: 3303 with grade of "C" or better. Continuation of financial accounting theory and problems.

3603
Accounting Information Systems. Prerequisite: 2203. Accounting system design and installation.

4010
Accounting Projects. 1-6 credits, maximum 6. Prerequisites: consent of instructor and 3203 and 3403. Special topics, projects and independent study in accounting.

4013*
Federal Taxation II. Prerequisite: 3013. Federal income tax law applicable to corporations, partnerships, trusts and estates, and other specialized topics. Primary emphasis on determining tax liability of various entities.

4203*
Topics in Management Accounting. Prerequisites: 2203 with grade of "C" or better and MGMT 3223. Integrative course in cost and management accounting; use of accounting information for internal decision making.

4303*
Non-Business, Fiduciary and Institutional Accounting. Prerequisite: 3403 with grade of "C" or better. Fund and governmental accounting, bankruptcies, receiverships, estates and trusts.

4403*
Financial Accounting III. Prerequisite: 3403 with grade of "C" or better. Consolidated statements and other financial accounting topics.

4503*
Auditing. Prerequisite: 3403, 3603. Auditing theory, procedures and practices.

4713*
International Accounting. Prerequisite: senior level standing. Present-day multinational accounting problems, including world-wide differences in financial reporting, efforts at harmonizing these differences, and planning and control in multinational enterprises.

5000*
Thesis. 1-6 credits, maximum 6. For students writing reports and theses in accounting.

5013*
Seminar in Tax Research. Prerequisite: 3013 or consent of instructor. Development and administration of federal tax law with emphasis on the development of tax research skills.

5023*
Seminar in Estate and Gift Taxation. Prerequisite: 5013 or consent of instructor. Federal tax law applicable to estate and gift taxation and income taxation of estates and trusts.

5033*
Seminar in Oil and Gas Taxation. Prerequisite: 5013 or consent of instructor. Federal income tax laws applicable to the petroleum and other extractive industries.

5043*
Seminar in Partnership Taxation. Prerequisite: 5013 or consent of instructor. Federal income tax laws applicable to partners and partnerships.

5053*
Seminar in Corporate Taxation. Prerequisites: graduate standing and 5013 or consent of instructor. Federal income tax law applicable to corporations and to other entities in their capacity as corporate shareholders.

5103*
Managerial Accounting. Prerequisite: admission to MBA program or consent of MBA director. Interpretation of accounting data in planning, controlling and decision-making.

5110*
Graduate Reading or Individual Work in Accounting. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Individual work on special topics, projects, or readings selected to acquaint students with significant accounting literature.

5133*
Seminar in Oil and Gas Accounting. Financial accounting and reporting rules and practices in the petroleum industry.

5203*
Seminar in Contemporary Accounting Theory I. Prerequisite: 3403. Origin and development of accounting and a critical study of modern accounting theory.

5303*
Seminar in Contemporary Accounting Theory II. Prerequisite: 3403. Critical study of contemporary accounting theory.

5400*
Practicum in Professional Accounting. 1-6 credits, maximum 6. Prerequisite: 30 semester credit hours of accounting. An accounting policy course studying auditing, tax, systems, internal and external reporting and international aspects of business cases.

5503*
Advanced Auditing. Prerequisite: 4503. Emphasis on auditing aspects of EDP, use of statistical sampling techniques in connection with audits of financial data, filings with the SEC and other regulatory agencies and other public accounting related topics.

5603*
Accounting-Based Information Systems. Prerequisite: 18 credit hours of accounting including 4203. Concepts underlying the design and use of an effective accounting information system.

5803*
Seminar in Cost-Managerial Accounting. Prerequisite: 18 credit hours of accounting. Intensive study of cost-managerial accounting theory relating to problems of an advanced nature.

5902*
Research Report. Prerequisite: consent of supervising professor and coordinator of graduate programs in accounting. Methods used in research and report writing in accounting. Independent investigation and writing of an acceptable report on a topic approved by the student's supervising professor. Restricted to candidates seeking the M.S. in accounting degree and not available to students who have credit in 5000.

6000*
Research and Thesis. 1-18 credits, maximum 36. Prerequisite: approval of advisory committee. For students working on the doctoral degree.

6110*
Graduate Reading in Accounting. 1-3 credits, maximum 10. Prerequisite: consent of supervising professor and coordinator of graduate programs in accounting. Supervised reading of significant literature not included in regularly scheduled courses.

6703*
Seminar in Accounting Research. Prerequisites: Doctoral student status and consent of coordinator of graduate programs in accounting. The theoretical literature and research methodology in accounting.

AEROSPACE STUDIES-Air Force (AEROS)

1121
The Development of Air Power I. Lab 1. Growth and development of aerospace power through history beginning with first manned flights and continuing through World War II.

1221
The Development of Air Power II. Lab 1. Development and growth of aerospace power from the period following World War II through the Viet Nam conflict; concepts of peaceful deployment of US air power.

2021
The Air Force Today I. Lab 1. Doctrine, mission and organization of the United States Air Force through a study of the total force structure, strategic offensive and defensive forces, general purpose forces, and aerospace support forces.

2121
The Air Force Today II. Lab 1. Continuation of the doctrine, mission and organization of the United States Air Force; review of Army, Navy, and Marine general purpose forces.

3103
Air Force Leadership. Lab 1. The individual as a leader in the Air Force environment; individual motivational and behavioral processes, leadership, communication, and group dynamics.

3203
Air Force Management. Lab 1. The individual as a manager in the Air Force environment; basic managerial processes, organizational and personal values, management of forces in change, organizational power, politics and managerial strategy and tactics discussed.

3504
Summer Training Unit. Prerequisite: consent of PAS. Practical training on an Air Force base. Junior officer training, familiarization training in most functional aspects of a typical Air Force base. Includes career orientation, small arms firing and flight orientation rides.

4103
(S)National Security Forces in Contemporary American Society I. Lab 1. The formulation, organization and context of national security; civil-military interaction and the evolution of strategy. Review of the military profession and officership.

4203
(S)National Security Forces in Contemporary American Society II. Lab 1. Strategy and management of conflict; implementation of national security and regional world issues. Review of societal issues in the military profession and the military justice system.

4402
Applied Officership Practicum. Prerequisite: consent of PAS. Students spend from two to three weeks on an Air Force base working in their intended specialty under supervision of experienced officer. Leadership and management principles applied to day-to-day experiences.

4554
Flight Instruction Program. Lab 3. Prerequisite: consent of PAS. Includes academic and flying phase. Flight characteristics, meteorology, navigation, FAA regulations and radio procedures. Approximately 25 hours flying time.

AGRICULTURAL ECONOMICS (AGEC)

1114
(S)Introduction to Agricultural Economics. Economic theory of production, marketing and consumption of agricultural products. The role and structure of agriculture in the American economy. Policies to achieve efficiency and welfare goals in agriculture.

2103
(S)Principles of Economics Applied to Agriculture. Prerequisite: 1114. Macroeconomic theories: national economic problems including inflation, unemployment, and monetary and fiscal policies and their impacts on agricultural industries and farms.

3010
Internship in Agricultural Economics. 1-6 credits, maximum 6. Prerequisite: approval of internship committee and adviser. Supervised work experience with approved public and private employers in agricultural economics including banks, farm credit services, agriculture chemical firms, Soil Conservation Service, congressional offices and other opportunities. Credit will not substitute for required courses. Graded on pass-fail basis.

3203*
Agricultural Price Analysis. Prerequisites: 1114, 3213 or AG 2112, MATH 1513. Economic theory, statistics and data combined to describe, understand and forecast agricultural price relationships and variation. Quantitative techniques developed to determine the factors causing price variation and to measure trend, cyclical, seasonal and random price variation.

3213
Quantitative Methods in Agricultural Economics. Lab 2. Prerequisites: 1114, MATH 1513. Indices, graphics, budgeting, discounting, basic statistical measures, use of microcomputers, and price analysis. Basic background methods for some courses involving analysis.

3303*
Agricultural Marketing. Prerequisites: 1114, MATH 1513. The agricultural marketing system, its importance to the economy and the role of the individual firm manager. Futures markets, hedging, and the use of decision aids.

3313*
Agricultural Business Management and Finance. Prerequisites: 1114, and ACCTG 2103. Managerial functions and application to agricultural firms. The acquisition, organization and management of personnel, financial assets and physical assets. Procurement and merchandising strategies under different economic conditions. Decision-making, problem-solving and operational strategies stressed.

3403
Agricultural Business Records and Analysis. Lab 2. Prerequisites: 3413 and ACCTG 2103. Financial accounts, production and statistical records and their practical application to the successful management of the farm or ranch and other agricultural businesses.

3413
Farm and Ranch Management I. Lab 2. Prerequisites: 1114, MATH 1513. Production planning with budgeting, financial records and income tax management for the individual farm-ranch business.

3503*
Natural Resource Economics. Prerequisite: 1114. Economic, social, physical, institutional factors in a framework for analyzing problems and policies. Demand and supply of natural resources, externalities, ownership rights, government regulation.

3603*
Agricultural Finance. Prerequisites: 3413, ACCTG 2103. Farm financial management; preparation and analysis of net worth, cash flow and income statements, including microcomputer applications; financial intermediaries; serving agriculture; procedures for evaluating investments; alternative means of acquiring control of farm resources.

3990
Special Problems in Agricultural Economics. 1-3 credits, maximum 3. Directed study of selected agricultural economics topics.

4313*
Agricultural Marketing and Prices. Prerequisites: 3203, 3213 and 3303. Agricultural marketing, with emphasis on system-wide approaches. Economic tools and techniques for making decisions.

4323*
Cooperative Organization and Management. Prerequisite: 3303 or 3313. Principles, objectives, structure and management of cooperative organizations; cooperatives in the modern economy—history, legislation and evaluation.

4333*
Commodity Futures Markets. Prerequisite: 3203. The nature of commodity futures markets and the mechanics of trading. Fundamentals and technical aspects of commodity prices. Basis and basis trading. Hedging and hedging strategies. Regulating commodity trading. Tax aspects. Appreciation of principles via computer game.

4343*
International Agricultural Markets, Trade and Development. Prerequisites: 2103 and 3303. International trade of agricultural products with emphasis on theory of trade and monetary flows, national trade policies and world market structures for agricultural products. Impacts of trade on the domestic agricultural sector and the role of trade in agricultural economics.

4403*
Farm and Ranch Management II. Prerequisites: 3603 and MATH 1513. Production planning with linear programming and other tools and methods of planning under uncertainty; acquisition of resources and the use of information systems in managing the individual farm-ranch business.

4413*
Agricultural Law. Prerequisites: 1114 and junior standing. Survey of law with emphasis on agricultural problems and applications. Contract law, tort law, property law, real estate transactions, oil and gas leases, business organization, estate planning and credit.

4503*
Environmental Economics and Resource Development. Prerequisite: 1114 or ECON 2123. Economic, social and political factors relating to conservation, natural resource development and environmental quality. Legislation and role of governmental agencies in resource conservation and development. Recreational, esthetic and other qualitative considerations relating to natural resources and environment.

4513*
Farm Appraisal. Lab 2. Prerequisite: 3413. Estimating the market value of agricultural real estate using the three approaches to value. Determining the feasibility and profitability of land purchases.

4703*
American Agricultural Policy. Prerequisites: 1114 and upper-division standing. Economic characteristics and problems of agriculture; evolution and significance of programs and policies.

4723*
Rural Economic Development. Prerequisite: 1114. Concepts and theories of regional and community economics, including input-output, economic base, simulation, budget location, and routing. Oklahoma applications.

4902*
Agricultural Economics Seminar. Prerequisite: senior standing in agricultural economics. Contemporary problems in agricultural economics; career exploration; agriculture in the economics of the nation and the world.

4911*
Agricultural Economics Seminar. Prerequisite: senior standing in agricultural economics. Contemporary problems in agricultural economics; agriculture in the economics of the nation and the world. Individual seminar reports and group discussion of reports.

4990*
Problems of Agricultural Economics. 1-6 credits, maximum 6. Open to students with consent of instructor only. Research on special problems in agricultural economics.

5000*
Thesis or Report in Agricultural Economics. 1-6 credits, maximum 6. For students working for a M.S. degree in agricultural economics. Independent research and thesis under the direction and supervision of a major professor.

5010*
Professional Experience in Agricultural Economics. 1-6 credits, maximum 6. Prerequisites: approval of internship committee and adviser. Supervised professional experience with approved public and private employers in agricultural economics including banks, production credit associations, federal land banks, soil conservation service, and other agricultural related firms. Credit will not substitute for required courses. Designed for Master of Agriculture program.

5101*
Research Methodology. The philosophical bases for research methods used in agricultural economics. Alternative research methods compared. Alternative approaches to planning, managing and performing research.

5102*
Teaching Practicum in Agricultural Economics. Lab 4. Prerequisites: two semesters of graduate study in agricultural economics. Philosophies and techniques of teaching, general tasks performed by a teacher, student counseling, test and exercise preparation and grading, and lecture organization, preparation and presentation.

5103*
Mathematical Economics. Prerequisites: differential calculus and ECON 3113. Mathematical tools necessary for formulation and application of economic theory and economic models.

5110*
Applications of Mathematical Programming. 1-3 credits, maximum 3. The application of concepts and principles of existing linear and nonlinear programming techniques to agricultural problems.

5203*
Advanced Agricultural Prices. Prerequisite: 5103, STAT 4043. Demand and price structures, price discovery, time series and agricultural price research methods.

5303*
Agricultural Market Policy and Organization. Marketing firm decisions; structure, conduct and performance of agricultural industries; interregional trade theory; and government policies that influence decisions.

5313*
Food Distribution Systems. Analysis of market structure; operational and pricing efficiency; organizational and operational decision making in food distribution firms.

5403*
Production Economics. Prerequisite: 5103. Analysis of micro static production economics problems; factor-product, factor-factor and product-product relationships; functional forms for technical unit and aggregate production functions; maximizing and minimizing choice rules; firm cost structure; scale relationships.

5503*
Resource Administration and Environmental Policy. Economic analysis, particularly benefit-cost analysis. Development and administration of environmental and economic policies related to the quality of the environment, including land, air, water and related resources, analyzed in an economic framework.

5603*
Advanced Agricultural Finance. Prerequisite: 3603. Financial structure of agriculture, firm financial planning and management, financial intermediation in agriculture and agricultural finance in developing countries.

5703*
Economics of Agriculture and Food Policy. Prerequisites: 4703 and 5103. Application of welfare critera and economic analysis to agricultural, food and rural development problems and policies.

5713*
Rural Regional Development. Prerequisite: 5103. Concepts of rural resource development and delineation of problem areas; theories of regional growth as applied to rural areas; analysis of policies and programs for stimulating rural development.

5723*
Development Planning and Project Appraisal. Economics of development planning; methods of development planning with special emphasis on the analysis of agricultural projects and the economics of agricultural sector planning for developing countries.

5733*
International Agricultural Policy and Development. Review and evaluation of agricultural trade and development policies emphasizing developing countries. Objectives, constraints and instruments of national food and agricultural trade policy in an interdependent world. Efficiency, stability, distribution, equity and market structure in commodity trade.

5990*
Advanced Studies. 1-6 credits, maximum 6. Open to graduate students with consent of instructor only. Investigation in designated areas of agricultural economics.

6000*
Research Problems. 1-15 credits, maximum 24. Open to students pursuing graduate study in agricultural economics beyond the requirements for a master's degree. Independent research and thesis under the direction and supervision of a major professor.

6103*
Advanced Mathematical Economics. Prerequisites: 5103 and MATH 3013. General presentation of static and dynamic optimization theory followed by applications to micro-economic theory.

6113*
Systems Analysis for Agriculture. Prerequisites: 5103, STAT 4043, knowledge of BASIC or FORTRAN. Methodology of systems modeling developed. Problem definition, design of abstract models and the simulation of dynamic agricultural systems with time delays, storage, feedback and stochastic variation. Theory and application of modeling with differential equations and optimal control procedures.

6203*
Econometric Methods. Prerequisites: 5103, and STAT 4203. Application of econometric techniques to agricultural economic problems, theory and estimation of structural economic parameters.

6213*
Advanced Econometrics. Prerequisite: 6203 and MATH 3013. General presentation of large sample theory followed by applications to general linear models, general nonlinear models, simultaneous equation models, time series models, and probability models.

6300*
Agricultural Marketing Seminar. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Current developments in theory, techniques for evaluating marketing behavior, market legislation and market development.

6303*
Advanced Agricultural Marketing. Prerequisite: 5303. Marketing theory, market structure and performance, governmental regulation and policy, and bargaining in agricultural markets.

6400*
Seminar in Farm Management and Production Economics. 1-6 credits, maximum 6. Prerequisite: 5403 or consent of instructor. Scientific research methodology applied to problems of resource efficiency.

6403*
Advanced Production Economics. Prerequisite: 5403. Micro dynamic production economic problems under risky conditions; recent developments in agricultural risk management, measuring utility, stochastic efficiency and decision theory; potential application of inventory, replacement, simulation, game theoretic, Bayesian and nonlinear programming models in production economics research.

6700*
Agricultural Policy and Rural Resource Development Seminar. 1-2 credits, maximum 2. Frontier issues in agricultural policy, natural resources and rural development.

AGRICULTURAL EDUCATION (AGED)

3103
Foundations and Philosophy of Teaching Vocational Agriculture. Lab 2. Prerequisite: 21 semester credit hours of agriculture with a 2.50 GPA. Roles and responsibilities of the vocational agriculture teacher; types of program offerings; steps of the teaching-learning process; place of vocational agriculture in relation to other educational programs in school systems.

3203*
Planning the Community Program in Agricultural Education. Lab 2. Prerequisite: 3103. Determining resources and trends of local communities with respect to agricultural production and agribusiness. Emphasis on vocational agriculture program policies, FFA chapter advisement, planning and managing the instructional program, identification and completion of records and reports required of a teacher of vocational agriculture in Oklahoma.

3302*
Organizing Agricultural Programs for Rural Groups. The nature of adult learning; methods of organizing and implementing educational programs for adult groups and individuals; dynamics of group action; application of the most effective methods and techniques for assisting adults to solve problems in agriculture and community living.

3403
Programs and Personnel of the Cooperative Extension Service. Enabling legislation, program areas, teaching methods used, staffing patterns, funding and program administration. Special emphasis on entry-level positions and responsibilities of each.

3510
Laboratory/Clinical Experiences in Agricultural Education. 1-2 credits, maximum 1. Planned experiences in agricultural education career areas to aquaint students with the diversity of responsibilities and audiences served. Course planning to satisfy requirements for admission to teacher education and student teaching and to develop technical competence.

4103*
Methods of Teaching and Management in Vocational Agriculture. Lab 2. Prerequisites: 3203, junior standing in the College of Agriculture and admission to the University Teacher Education program and concurrent enrollment in 4200. Facets of the teaching-learning process including teaching methods, basic teaching skills, proper classroom management techniques and motivational techniques and ideas. Preparation for student teaching which is to be complete during the same semester.

4200
Student Teaching in Vocational Agriculture. 10 credits. Lab 30. Prerequisites: 3203, junior standing in the College of Agriculture, admission to the University Teacher Education program and concurrent enrollment in 4103. Full-time directed experience in an approved vocational agriculture department. Development of a philosophy and skills in agricultural education. Selecting, adapting, utilizing, evaluating curriculum materials and experiences to meet educational goals and facilitate learning for individual students. Roles, responsibilities, interactions, of school personnel and parents. Study of professional education groups and organization/operation of school systems.

4300
Agricultural Education Internship. 3-10 credits, maximum 10. Prerequisites: professional course sequence and consent of adviser/internship coordinator. Supervised fulltime internships in approved county extension offices, businesses or governmental agencies, for students preparing for agricultural education. Not intended for teacher certification. Maximum credit requires a 12-week internship in addition to a report.

4713
(I)International Programs in Agricultural Education and Extension. World hunger and its root causes. The function of international agencies, organizations, foundation and churches in improving the quality of life for people of the developing nations. Roles of agricultural education and extension at all levels for enhancing the effectiveness of indigenous programs of rural development and adult education.

4990*
Seminar and Problems in Agricultural Education. 1-3 credits, maximum 6. Small group and/or individual study and research in problems relating to programs of occupational education in agriculture.

5000*
Research and Seminar. 1-6 credits, maximum 6. Independent research and thesis under the direction and supervision of a major professor.

5100*
Organizing Curriculum and Programs of Vocational Agriculture. 1-3 credits, maximum 6. Studies of student and community agricultural needs as bases for localizing, personalizing and utilizing a basic core curriculum and other components essential to effective local agricultural education programs.

5122*
Adult Education: Organization and Method. Determining the adult education needs and interest of the community. Securing and organizing the information needed for adult education programs and planning teaching activities.

5300*
Extension Teaching Methods. 1-3 credits, maximum 6. Teaching methods applicable to extension work, their interrelationships and relative effectiveness. Result demonstration, method demonstration, meetings, tours, field days, exhibits, etc.

5402*
Young Farmer Organizations. Purposes and objectives of young farmer groups. Procedures for establishing and operating local chapters with emphasis on the role of the vocational agriculture teacher as adviser. Determining educational needs and interests of members. Securing and organizing information for individual and group instruction, planning training activities. Tours and/or field trips to observe programs in operation.

5500*
Directing Programs of Supervised Training. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Determining the supervised training needs and opportunities of individual students. Planning for supervision of vocational agriculture training programs and 4-H club projects. Analysis of training opportunities in production agriculture, agricultural businesses and individual career development.

5752*
Guidance and Leadership Development of Agricultural Youth. Providing for guidance of youth into farming and agricultural occupations. Sponsoring and advising youth groups; developing leadership through the local FFA chapter, 4-H Club and other youth organizations and groups.

5820*
History, Functions and Objectives of the Extension Service. 1-3 credits, maxium 6. History, legal status, objectives, educational philosophy, aims and objectives and functional responsibilities.

5822*
Advanced Methods of Teaching Agriculture. Developing facility in the use of conferences, demonstration, field trips, individual instruction, laboratory projects, supervised or directed study, surveys, visual aids and forms of programmed learning.

5862*
Curriculum Design and Methodology for Alternative Approaches in Agriculture. The methodology, development and utilization of curriculum for instructional programs focusing upon alternatives in agriculture and agricultural enterprises. Resources and components of curriculum for teaching about new and emerging occupations and careers in agriculture.

5940*
Agricultural Education Workshop. 1-3 credits, maximum 8. For experienced teachers. Curriculum problems, farm practices adapted to different types of farming areas in Oklahoma. Development of units of instruction and methods of teaching or other special concerns in vocational agriculture.

5980*
Research Design in Occupational Education. 1-3 credits, maximum 6. Research tools as aids in decision making. Literature, logic, survey techniques, research design, statistics and the computer are emphasized. Studies in vocational and technical education are reviewed and proposals for graduate research papers prepared.

5990*
Problems in Agricultural and Extension Education. 1-3 credits, maximum 8. Securing and analyzing data related to special problems or investigation in designated areas of agricultural education.

6000*
Research in Agricultural Education. 1-16 credits, maximum 16. Prerequisite: approval of major adviser. Open to students pursuing graduate study beyond the requirements for a master's degree. Independent research and thesis under the direction and supervision of a major professor.

6100*
Developments in Agriculture and Extension Education. 1-3 credits, maximum 6. Developing trends in agricultural and extension education. Pending and anticipated organizational and structural changes and changing emphases in goals and objectives. Functional relationships with other agencies.

6120*
Teaching Agriculture in Higher Education. 1-3 credits, maximum 6. The teaching-learning matrix functioning in both undergraduate and advanced study in the field of agriculture. Discriminate review and assessment of recently developed instructional methods and trends.

6200*
County Extension Program Development. 1-3 credits, maximum 6. A systematic study and use of methods of developing county extension programs, giving attention to sources of essential basic information, determination of problems and needs of people, functions of lay people and the various groups of extension workers. Uses of committees, step-by-step procedures, coordinated county and state plans and characteristics of effective programs.

6220*
Assessment and Evaluation of Educational Programs in Agriculture. 1-3 credits, maximum 6. Application of the accountability concept to educational programs. Instructional, extension and other educational programs are assessed and the systems approach used to revise current programs and re-direct effort.

AGRICULTURAL ENGINEERING (AGEN)

1011
Introduction to Surveying. Lab 3. Prerequisite: trigonometry. Fundamentals of surveying including leveling, topographic surveying, boundary surveys and the layout of engineering facilities.

1302
Agricultural Engineering Principles. Lab 4. Prerequisite: MATH 1613. Engineering measurements and design procedure. Analysis of test data. Orderly presentation of calculations and results. Design of a simple system. Introduction to engineering standards.

2012
Agricultural Energy Conversion. Prerequisite: PHYSC 2114. Energy use patterns in the U.S. food and fiber system, supply and demand for energy from various sources, thermodynamic constraints on energy sources, use and limitation of alternate energy sources.

3013*
Intermediate Fluid Mechanics. Prerequisite: ENGSC 3233. Closed-conduit fluid flow, flow in open channels, non-Newtonian fluid flow and fluid power.

3023*
Instruments and Controls. Lab 2. Prerequisites: ENGR 1412, ENGSC 2613. Transducers, signal conditioning, read-out instruments, and electrical controllers. Assembly language programming, interfacing and applications of micro-computers in agriculture.

3113*
Environmental Engineering. Prerequisites: 3013, PHYSC 2114. Physiologic mechanisms by which plants and animals adjust to their environment, environmental control for animal and plant structures, equipment and facilities used for environmental control of animal and plant structures.

3212*
Agricultural Machinery. Prerequisites: 2012 and ENGSC 2122.Function and operation of agricultural machinery, soil dynamics and tillage machinery, selection and management of agricultural machinery.

3323
Hydraulic Applications in Soil and Water. Prerequisite: 3013. Design of irrigation systems, open channel flow systems, and conservation structures. At least one-half devoted to design methodology for hydraulic systems used in soil and water conservation.

3413*
Agricultural Process Engineering. Lab 2. Prerequisite: 3113. Physical properties of agricultural materials. Grain storage, drying and handling. Special emphasis on design of systems for grain storage, grain drying, and materials handling.

4001*
Seminar. Prerequisite: senior standing. Technical and professional literature including preparation and presentation of papers.

4023*
Agricultural Equipment Design. Lab 3. Prerequisites: 3023, 4212. Senior design course. Project selection, patent search, market evaluation, and design of machine elements. Students will participate as design team members through prototype construction and evaluation.

4113*
Design of Agricultural Structures. Prerequisite: ENGSC 2114. Design of simple beams and indeterminate frames for agricultural structures. Determination of design loads. Design of functional agricultural structures using wood, steel and reinforced concrete.

4212*
Agricultural Power. Prerequisites: 3013, 3212, ENGSC 2213. Tractors in agricultural power units; fuels; accessories and their relationship to tractor performance; tractor stability and traction. Design of power systems for agriculture applications.

4222*
Agricultural Power and Machinery Applications. Lab 6. Prerequisites: 3023 and 4212. Planning, organizing and conducting experiments. Engineering report writing. Classroom knowledge applied to laboratory studies in power and machinery.

4313*
Introduction to Hydrology. Prerequisites: CHEM 1515, PHYSC 2014, CIVEN 3833 or AGEN 3013. Surface and groundwater hydrology and their application in engineering problems. The hydrologic cycle, weather and hydrology, precipitation, evaporation, transpiration, subsurface waters, stream flow hydrographs, hydrologic and hydraulic stream routing, probability of hydrologic events, application of hydrologic models. Same as CIVEN 3843.

4400*
Special Problems. 1-4 credits, maximum 4. Investigations in specialized areas of agricultural engineering.

4423*
Food Engineering. Lab 2. Prerequisites: 3413, ENGSC 2213. Mechanics, heat and mass transfer in analysis of unit operations and systems processing biological agricultural materials. Process measurement and control.

5000*
Thesis and Research. 1-6 credits, maximum 6. Prerequisite: approval of major professor.

5030*
Engineering Practice. 1-12 credits, maximum 12. Prerequisite: B.S. degree in agricultural engineering. The identification, analysis and synthesis of an authentic problem in agricultural and biological engineering. Solution of the problem will involve making engineering decisions tempered by real-time restraints, economic realities, and limited data with due consideration for environmental and social implications.

5413*
Instrumentation in Biological Process Control System. Prerequisite: 3023 or equivalent. Analysis of transducers for on-line measurement and control of biological processes. Emphasis on selection of measurement techniques and transducers to sense physical properties of biological materials. Application to agricultural and food processing industries.

5501*
Seminar. Discussion of current literature with special emphasis on research and experimental techniques.

5513*
Experimental Engineering Analysis. Prerequisite: STAT 4023. Design and analysis of engineering experiments, error sources and prediction equations using statistical theory.

6000*
Research and Thesis. 1-10 credits, maximum 30. Prerequisite: approval by the student's advisory committee. Independent research and doctoral thesis preparation under the cognizance of a graduate faculty member in the student's field of specialization.

6313*
Stochastic Methods in Hydrology. Prerequisites: 4313 or CIVEN 5843 and STAT 4053 or equivalent. Stochastic and statistical hydrologic analyses of surface water and groundwater systems. Analysis of urban and rural drainage and detention systems. Same as CIVEN 6843.

6323*
Advanced Irrigation Engineering. Prerequisite: 3323 or equivalent. Hydraulic theory and design and operation of surface, sprinkler, and trickle irrigation systems. Management of water and energy in irrigated agriculture.

6333*
Fluvial Hydraulics. Prerequisites: 3013 or equivalent. Principles of sediment detachment and transport in fluvial systems. Design of stable channels and flow resistance relationships for sediment-laden flows.

6503*
Similitude in Research. Prerequisite: MATH 2613. Theory of similitude and its use in planning, conducting and analyzing experiments in engineering and biological sciences.

6520*
Problems in Soil and Water Engineering. 2-6 credits, maximum 6. Prerequisite: consent of instructor. Problems associated with erosion control, drainage, flood protection and irrigation.

6540*
Problems in Farm Power and Machinery. 2-6 credits, maximum 6. Prerequisite: consent of instructor. Literature review and analytical studies of selected farm power and machinery problems. Written report required.

6580*
Problems in Transport Processes. 2-6 credits, maximum 6. Prerequisite: consent of instructor. Literature review and analysis of heat and mass transport and interval diffusion in biological materials. Transport phenomena at interfaces, thermal and cryogenic processing, drying, packed and fluidized bed systems. Thermal and moisture control processing affecting quality of food products. Written report required.

6610*
Advanced Research and Study. 1-10 credits, maximum 20. Prerequisite: approval by the student's advisory committee. Research and study at the doctoral level on the topic related to the student's doctoral program and field of interest.

AGRICULTURE (AG)

1011
Orientation. Required of all freshman in the College of Agriculture. Methods of study, advisement system, organization of curriculum and discussion of requirements and career opportunities in various fields of agriculture. Graded on pass-fail basis.

2112
Microcomputer Techniques in Agriculture. Lab 2. Operation and capabilities of microcomputers in agricultural applications. Simple programming, data analysis, graphical display, spread sheets, word processing.

3010
Internships in Agriculture. 1-3 credits, maximum 12. Supervised internships with business, industry or governmental agencies including cooperating veterinarians. Graded on pass-fail basis.

4010
Honors Seminar. 1-6 credits, maximum 6. Role of agriculture in society and adjustments to change in the economy.

4453
Communications in Agriculture. Fundamentals of newswriting and other communication methods; the role of the news media in agriculture and related fields. Same course as JB 4453.

AGRONOMY (AGRON)

1213
Crop Production. Soils and cropping practices necessary for future crop production systems. Production of modern crops and their management, as well as the adaptation of major agronomic crops to varying edaphic and climatic conditions. Importance of crop production to the producer and the consumer.

2012
(N)Crop Production Laboratory. Lab 2. Prerequisite: 1213. Hands-on experiences with crop plants. Identification of crops in seed, seedling, mature stages; crop morphology, seed quality, grain grading, growth stages of crops.

2041
Agronomic Orientation. Prerequisite: sophomore standing in agronomy. Development and improvement of written and oral communicative skills; orientation to agronomic research and extension activities; academic requirements and procedures. Graded on pass-fail basis.

2124
(L,N)Fundamentals of Soil Science. Lab 2. Prerequisite: CHEM 1215. Principal physical, chemical and biological properties of the soil related to plant growth; soil testing and fertilizer usage; formation and classification of soils, rural and urban land use.

3111
Weed Control Laboratory. Lab 2. Prerequisite: 1213 and 3112 (or concurrent enrollment). Identification of common weeds, principles and and practices of herbicide application, and application equipment, handling and proper use of herbicides.

3112
Principles of Weed Control. Prerequisite: 1213. Weed control principles and practices included in cultural and chemical weed control. Current weed control practices in crops, rangeland and crop situations.

3213*
Pasture Management and Forage Production. Prerequisites: 1213, 2124, and MATH 1213. Pasture systems, livestock management and forage crop production for maximum economical production of introduced forage species.

3433*
Soil Genesis, Morphology, and Classification. Lab 3. Prerequisite: 2124. Basic principles dealing with how and why soils differ, their descriptions, geographic distributions and modern classification of soils. Soil genesis and classification a prerequisite to sound land use planning and land management.

3554*
(N)Plant Genetics. Lab 2. Prerequisites: BISC 1304. Basic principles of heredity. Interrelationship between classical genetics and molecular genetics emphasized. Mendelian genetics, cytogenetics, mutations, gene regulation and genetic engineering.

3781
Market Grain Technology. Lab 2. Prerequisite: 1213. Quality characteristics of grain for commercial use; identification of different market classes of grain, quality factors, and admixtures affecting the commercial grade; practice in grading grain using the federal grain standards.

3792
Seed Technology. Lab 6. Prerequisite: 1214. Techniques, factors and practices in determining seed purity and germination; principles of seed testing; laws and regulations governing the production, processing, handling and marketing of seed.

3893*
Soil Chemistry. Prerequisite: 2124. The chemical and mineralogical properties of soils, weathering and synthesis of minerals in soils, cation exchange and plant nutrition, mechanisms of ion uptake by plants and the role of the soil-borne elements in plant nutrition.

3914*
Principles of Range Management. Lab 2. Prerequisites: 1213 or BISC 1304, and AGRON 2124. Range management; livestock and vegetation response to grazing pressure, seasonal effects, drought, and fire; range plant identification; range sites and condition.

4080
Agronomy Internship. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Internship must be at an approved agribusiness unit or other agency serving agronomic agriculture. Requires a final conference with on-campus adviser and a written report. Graded on a pass-fail basis.

4112*
Advanced Weed Science. Prerequisites: 3112 and 3111. Integrated approach for weed management. Weed life cycles and biology, weed crop interferences, herbicide families and their characteristics, and finally a systematic and integrated weed management system. Methods of conducting and interpreting research results in appropriate topics.

4123*
Crop Physiology. Prerequisites: 1213 and BOT 3463. Application of basic physiological concepts of growth and cultural management and underlying crop production; environmental and genetic effects on growth of crop plants. Plant ecosystems at the community level relative to optimum yields and quality.

4210*
Describing and Interpreting Soils. 1 credit, maximum 3. Lab 3. Prerequisite: 2124. Describe and classify soil properties in the field and interpret for suitable agriculture, urban, and other land uses.

4234*
Soil Fertility and Management. Lab 2. Prerequisite: 2124. Soil fertility and use of fertilizer materials for conservation, maintenance, and improvement of soil productivity and to minimize environmental concerns.

4263*
(I)International Agriculture and Food Production. Improving the world food supply. Institutional structures needed to promote rural development, and to increase agricultural production in the developing countries.

4293*
Plant Response to Environmental Stress. Prerequisites: BOT 3463 or concurrent enrollment. Effects of environmental factors on plants including mechanisms of environmental stress resistance. Specific stresses include drought, flooding, freezing, heat, salinity and radiation. Environmental effects on whole plants and cells in relation to crop development and production.

4353*
Plant Breeding. Prerequisite: 3554 or equivalent. Basic principles dealing with the improvement of plants through application of genetic principles.

4360*
Soils of Oklahoma and Their Utilization. 1-3 credits, maximum 3. Open to anyone interested in using soil information. Discussion of Oklahoma soils and their interpretation for agricultural and non-agricultural users for increased food production and for environmental improvement. Preparations of interpretive maps, soil judging in the field, evaluations of work-and-do reports.

4463*
Soil and Water Conservation. Prerequisite: 2124. Conservation and management of soils for the prevention of losses by wind and water erosion.

4470*
Problems and Special Study. 1-3 credits, maximum 12. Prerequisite: consent of the instructor. Problems in agronomic crops which include range and turf, plant breeding and genetics, weed control, soil chemistry and fertility, soil physics, soil biology, soil conservation and soil morphology; spring travel course.

4483*
Soil Biology. Prerequisite: 2124. Soil ecology of microorganisms, biological transformations, humus complex, pesticide decomposition, plant nutrient cycles, microflora of rhizosphere.

4571
Senior Seminar. Prerequisite: senior standing in agronomy. Career opportunities (talks and field trips); preparation of resumes and interviews. Graded on a pass-fail basis.

4673*
Grain Crops. Lab 2. Prerequisite: 1213. Production, distribution, classification, utilization and improvement of the major cereal crops.

4683*
(N)Physical Properties of Soils. Prerequisites: 2124 and PHYSC 1114. Soil physical properties and processes, and their influence on plant growth.

4772*
Oilseed, Pulse and Mucilage Crops. Prerequisite: 1213. Production, utilization and improvement of oilseed, pulse and mucilage crops with special emphasis on peanuts and soybeans.

4783*
Cotton Production. Prerequisite: 1213. Production, utilization and improvement of cotton. Several other agronomic fiber crops briefly discussed.

4913*
Pesticides in the Environment. Prerequisites: BISC 1403, CHEM 1255. A discussion of pesticides (chiefly fungicides, insecticides, herbicides and nematocides), including potential movement, degradation, fate and significance in the environment. Same course as ENTO 4913 and PLP 4913.

4934*
Range Ecology. Prerequisite: 3914. Ecological principles pertaining to rangelands with emphasis on soil, plant and animal relationships. Characteristics of major range ecosystems and range plants.

4953*
Soils of the World. The major soils of the world discussed with regard to factors responsible for their formation, developmental causes of soil differences and resulting effects on utilization for food production. International soil maps used to correlate soil characteristics with potential use.

4954*
Range Improvement. Lab 3. Prerequisites: 3914, AG 2112. Methods of improving or maintaining range conditions and production. Grazing management; chemical, mechanical, and burning treatments; and physical developments. Field trips and reports in laboratory.

4973*
Range and Ranch Planning. Lab 4. Prerequisite: 4954, ANSI 3612. Range resource survey, inventory and monitoring. Inventory of ranch resources, survey and evaluation of ranch practices, and economic analysis. Development of a comprehensive ranch management plan. Field trips and reports in laboratory. Same course as ANSI 4973.

4990*
Special Topics in Range Management. 1-3 credits, maximum 3. Prerequisite: 15 hours of range management. Advanced topics and new developments in range management.

5000*
Master's Thesis. 1-6 credits, 6 maximum total credits under Plan I, and 2 maximum total credits under Plan II. Prerequisite: consent of adviser in agronomy. Research planned, conducted and reported in consultation with a major professor.

5020*
Graduate Seminar. 1 credit, maximum per semester 1 credit on M.S. program and 2 credits on a Ph.D. program required. Prerequisite: graduate standing. Philosophy of research, methods of research, or interpretation of research in agronomy.

5112*
Herbicide Fate in the Environment. Prerequisites: 4112. Processes involved in the behavior and fate of herbicides in air, soil, and water. Reaction, movement and dissipation of herbicides in soil.

5114*
Advanced Crop Physiology. Lab 4. Prerequisites: 4123, BIOCH 3653. Physiological concepts underlying culture and growth of crop plants. Plant competition and physiological processes.

5193*
Data Acquisition and Analysis in Agronomic Systems. Prerequisites: one course in statistics, computer programming experience, and consent of the head of the agronomy department. Use of microcomputers for data acquisition and control of field and laboratory instruments in agronomic applications. Management and analysis of data on microcomputer and main-frame systems. Practical experience in the use of graphics, data management, statistics, and inter-computer communication programs and simulation models with an analysis of the numerical methods involved.

5230*
Research. 1-6 credits, maximum 8 (not to exceed 4 credit hours of either crops or soils). Prerequisite: consent of a faculty member who will supervise the research.

5353*
Advanced Soil Genesis and Classification. Lab 2. Prerequisite: 3433. Processes and factors of soil formation. Comparison of world soil morphology and classification systems.

5411*
Plant Breeding Techniques. Lab 2. Prerequisites: 3554, 4353 and STAT 5013, concurrent enrollment in 5413. Selfing, crossing and selection techniques used in breeding crop plants; managing breeding and yield nurseries; managing greenhouse, winter, and other special nurseries; data management and other breeding problems including cytogenetics, biochemical and statistical techniques.

5413*
Principles and Methods of Plant Breeding. Prerequisites: 3554, 4353 and STAT 5013, concurrent enrollment in 5411. Theory and techniques of breeding and selection methods applicable to self- and cross-pollinated crops. Application of genetic and cytogenetic principles to selection theory and breeding methodology.

5421*
Plant Breeding Techniques II. Prerequisites: 3553, 4353 and STAT 5013. Selfing and crossing spring crop plants, managing breeding and yield nurseries, managing greenhouse, winter, and other special nurseries, accumulating data, developing crop pest resistance and/or tolerance, and other breeding problems including cytogenetics, biochemical and statistical techniques.

5432*
Application of Biotechnology to Crop Improvement. Prerequisites: 3553, 4353, and BISC 3014. Emerging techniques in cell biology and molecular genetics to study and manipulate crop plants. Emphasis on genetic systems which influence productivity and end-product utilization. Integration of biotechnology into plant breeding programs.

5443*
Advanced Genetics. Prerequisites: 3554 or equivalent; BIOCH 3543 or 3653. Concepts of eukaryotic genetics with emphasis on classical, molecular and quantitative genetics.

5452*
Cytogenetics. Prerequisite: 5443 or concurrent enrollment in BOT 5232. Behavior of chromosomes, cellular organelles and cytoplasm in relation to genetic behavior.

5473*
Advanced Soil Fertility. Prerequisite: 4234 or equivalent. Fundamental concepts, theories, approximations and techniques used in soil fertility investigations.

5523*
Principles of Breeding Cross-Pollinated Crops. Prerequisites: 3553, 4353 and STAT 5013. Selection procedures and breeding systems applicable to cross-pollinated crops emphasizing the application of genetic principles to plant breeding.

5583*
Soil Physics. Prerequisites: MATH 2265 or 2365, PHYSC 1214. Fluid flow through saturated and unsaturated soils; temperature change and heat flow in soil; soil strength and deformation as it applies to plant response.

5614*
Advanced Soil Chemistry. Lab 3. Prequisites: CHEM 2113 and 2122, or 3324. Introduction to thermodynamics and kinetics, solubility relationships which control ion activities in soils, geochemical modeling of chemical equilibria, mechanisms of absorption and ion exchange, clay mineralogy, and weathering processes. Common soil analyses and conceptual experiments.

5703*
Evapotranspiration. Prerequisites: knowledge of calculus and basic physics. Evaporative demands by radiant and advective energy; transport by wind and turbulent mixing. Water movement from soil through plant to air to region. Water budget in bare and vegetated fields including phreatophytes and in regions. Methods of water budget and energy budget measurement and instrumentation.

5760*
Special Topics in Range Science. 2-4 credits, maximum 4. Prerequisite: consent of instructor. Selected topics in range research methods, range ecophysiology, grazing management, and range analysis.

5813*
Soil-Plant Relationships. Prerequisite: 4234 or equivalent. Essential nutrient reactions in soil theories, concepts, and approximations used to describe the relationship between soil nutrient supply and plant responses that miminize the potential for groundwater pollution.

5863*
Management of Agricultural Research Systems. Organization, management and budgeting agricultural research systems with emphasis on developing countries. Analysis of research and training priorities, budgeting, staffing and management of projects.

5990*
Soil Physical Analyses. Lab 1 or 2. 1-2 credits, maximum 2. Prerequisite: 4683. Principles and techniques.

6000*
Doctoral Thesis. 1-6 credits, maximum 20. Independent research to be conducted and reported with the supervision of a major professor as partial requirement for the Ph.D. degree.

6010*
Advanced Topics and Conference in Agronomy. 1-6 credits, maximum 12. Prerequisite: M.S. degree. Supervised study of advanced topics in areas of agronomic interest. A reading and conference course designed to acquaint the advanced student with fields not covered in other courses in agronomy.

6222*
Soil Physical Chemistry. Prerequisite: CHEM 3553 or consent of instructor. Thermodynamics of soil solutions, kinetics, surface chemistry of solid phases important in soil or aquatic systems, techniques in X-ray diffraction and electron microscopy, and examples in geochemical equilibrium modeling.

6264*
Classical Evolution. Prerequisite: 3553 or equivalent. Development of evolutionary concepts from the various scientific disciplines up to and including the present time; historical development of faunas and floras including adaptation and speciation; evolution of the primates, man's physical and cultural evolution (including religion), and the origin and subsequent development of domesticated plants and animals.

6332*
Soil Mineralogy and Crystallography. Prerequisite: 5613. Crystalline properties of soil materials and their determination by X-ray diffraction and X-ray fluorescence. Principles of crystallographic indexing of soil minerals, absorption of organic and inorganic chemicals from the environment and soil engineering applications.

6463*
Quantitative Genetics. Prerequisites: 5413, ANSI 5303, STAT 5023, or consent of instructor. Advanced study in the statistical and experimental analysis of quantitative inheritance pertinent to plant improvement; inbreeding effects on genetic mean and variances, genetic interpretation of covariance of relatives produced by outcrossing and/or self-fertilization, estimation of genetic effects from various generation means, prediction of selection gain in outcrossed and self-fed progenies.

6683*
Advanced Soil Physics. Prerequisites: 5583, MATH 4013. Movement of water in soils.

ANIMAL SCIENCE (ANSI)

1124
Introduction to the Animal Sciences. Lab 2. Species adaptability, product standards and requirements, areas and types of production, processing and distribution of products, includes meat animals, dairy and poultry.

1133
Fundamentals of Food Science. Food industry from producer to consumer and the current U.S. and world food situations.

2112
Live Animal Evaluation. Lab 4. Prerequisite: 1124. Using tools for selection including performance records, pedigree information and visual appraisal, in the evaluation of cattle, swine, sheep, horses and poultry.

2123
(N)Livestock Feeding. Lab 2. Nutrients and their functions, nutrient requirements of the various classes of livestock; composition and classification of feed stuffs and ration formulation. Not required of animal science majors.

2253
Meat Animal and Carcass Evaluation. Lab 2. Prerequisite: 1124. Evaluation of carcasses and wholesale cuts of beef, pork and lamb. Factors influencing grades, yields and values in cattle, swine and sheep.

2422
Horse Production. Lab 2. Management, care and handling of horses for work and pleasure.

3002
Dairy Production. Lab 2. Prerequisites: 1124 and 2123. Basic requisites of nutrition as related to composition of milk produced: requirements of replacement animals; herd health problems peculiar to stresses of production; milking management and mammary health; and dairy breed programs related to herd management.

3012
Beef Production. Lab 2. Prerequisites: 1124 and 2123. Modern production and management practices for beef cattle operations. No credit for animal science students with credit in 4612, 4621, 4631 or 4641.

3021
Sheep Production. Lab 2. Prerequisites: 1124 and 2123. Modern production and management practices for sheep operations. No credit for animal science students with credit in 4542.

3023
Poultry Science. Lab 2. Prerequisites: 1124, and 2123 or 3543. The relationship of the biological concepts and functions of poultry to management practices, incubation procedures, and economic factors utilized by poultrymen in the commercial production of table and hatching eggs, broilers, turkeys and other poultry meat.

3031
Swine Production. Lab 2. Prerequisites: 1124 and 2123. Modern production and management practices for swine operations. No credit for animal science students with credit in 4643.

3033
Meat Technology. Lab 3. Prerequisite: organic chemistry. The basic characteristics of meat and meat products as they relate to quality. Product identification, economy, nutritive value, preservation and utilization. No credit for students with credit in ANSI 2253 or 3333.

3101
Undergraduate Seminar. Prerequisites: 60 credit hours and animal science major status. An in-depth consideration of the various areas of specialization in the field of animal science and their associated career opportunities and obligations.

3113*
Quality Control. Lab 2. Prerequisites: organic chemistry and BISC 1502 or equivalent. Application of the principles of quality control in food processing operations to maintain the desired level of quality.

3182
Meat Grading and Selection. Lab 4. Prerequisite: 2253. Classifying and grading carcasses and wholesale cuts of beef, pork and lamb; factors influencing quality and value.

3210
Animal and Product Evaluation. 1-2 credits, maximum 4. Prerequisite: consent of instructor. Advanced instruction in evaluating slaughter and breeding animals, and grading and evaluating meat, poultry and dairy products.

3223
Food Plant Systems. Lab 2. Prerequisite: MATH 1513. Food plant design and the application of machines to food processing, packaging and storage.

3242
Advanced Live Animal Evaluation. Lab 4. Prerequisite: 2112. Visual and objective appraisal of beef cattle, sheep, swine and horses.

3301
Food Sanitation Laboratory. Lab 2. Prerequisites: 3302 or concurrent enrollment, and BISC 1502. Exercises to illustrate qualitative or quantitative methods for monitoring foods, food ingredients or processing procedures and equipment for proper attainment of sanitation.

3302
Food Sanitation. Prerequisite: organic chemistry. Principles of sanitation in food processing, distribution, preparation and service. Emphasis on control of food spoilage and food-borne illnesses.

3333*
Meat Science. Lab 3. Prerequisites: 2253, CHEM 1215 or equivalent. Anatomical and basic chemical and physical characteristics of meat animals studied. The application of scientific principles to the processing and economical utilization of meat animals, as well as in the manufacture of meat products, emphasized in the laboratory.

3373
Food Chemistry. Lab 2. Prerequisites: BIOCH 3543, CHEM 2344. Basic composition, structure and properties of foods and the chemical changes or interactions that occur during processing and handling.

3423*
(N)Animal Genetics. Prerequisite: BISC 1303. The basic principles of heredity including: kinds of gene action, random segregation, independent assortment, physical and chemical basis of heredity, mutations, sex-linkage, chromosome mapping, multiple alleles and chromosomal abnormalities. Also a brief introduction to quantitative inheritance and population genetics.

3433*
Animal Breeding. Lab 2. Prerequisite: 3423. The application of genetic principles to livestock improvement; study of the genetic basis of selection and systems of mating; and the development of breeding programs based on principles of population genetics.

3443*
Animal Reproduction. Lab 2. Prerequisite: PHSI 3034 or equivalent. Physiological processes of reproduction in farm animals, gonadal function, endocrine relationships, fertility and factors affecting reproduction efficiency. Emphasis on principles of artificial insemination in the laboratory.

3493*
Marketing and Utilization of Milk. Lab 2. Prerequisites: 1124 and AGEC 1114. Marketing and utilization of milk, pricing, quality controls, procurement, processing and utilization, product distribution and factors affecting consumption.

3543*
(N)Principles of Animal Nutrition. Prerequisite: CHEM 1215 or equivalent. Basic principles of animal nutrition including digestion, absorption and metabolism of the various food nutrients; characteristics of the nutrients; measure of body needs.

3603*
Processing Dairy Foods. Lab 3. Prerequisites: BISC 1502 and organic chemistry. Theory and practice in formulation and processing: butter and margarine, cottage cheese, blue and processed cheeses; evaporated and sweetened condensed milk; ice cream; ice milk and other frozen desserts.

3612*
Range and Pasture Utilization. Lab 2. Prerequisite: AGRON 2974 or 3213. Integration of livestock production with range and pasture management practices.

3653*
Applied Animal Nutrition. Lab 2. Prerequisite: 3543. Composition, characteristics and nutritive value of feeds and ration additives; qualitative and quantitative nutrient requirements of each of the classes of livestock; formulation of rations for each of the classes of livestock.

3763*
Analysis of Food Products. Lab 2. Prerequisite: organic chemistry. Application of quantitative chemical and physical methods of analysis to the examination of foods.

3903
(I)Agricultural Animals of the World. The production and utilization of agricultural animals by human societies.

4333*
Processed Meat. Lab 4. Prerequisite: 3333 or 4033. Meat and meat product composition. Techniques in the molding and forming of meat; sausage formulation; curing; quality control; and cost analysis.

4343*
Avian Nutrition. Prerequisite: 3543. Nutritive requirements, feed ingredients, ration formulation and feeding practices for various classes of domestic fowl.

4423
Horse Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Current concepts and production principles related to the horse industry including nutrition, reproduction, herd health, functional anatomy and implications, social behavior, and applying principles of psychology in horse management and training.

4441
Advanced Cattle Reproductive Management. Lab 2. Prerequisite: 3443. Advanced concepts in cattle reproductive management with emphasis on artificial insemination techniques in cattle.

4542*
Sheep Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Breeding, feeding, management and marketing of commercial and purebred sheep.

4543*
Dairy Cattle Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Organization and managerial efficiency in dairy farm businesses. Principles related to current and future systems of milk production, feeding and waste disposal and other involved systems.

4612*
Beef Cow-Calf Management. Lab 2. Prerequisites: 3433, 3443, 3612 and 3653. Application of scientific knowledge, management principles and research advances to modern commercial cow-calf production.

4621*
Stocker Cattle Management. Lab 2. Prerequisites: 3612, 3653. Application of scientific knowledge, management principles and research advances to modern stocker cattle operations.

4631*
Feedlot Cattle Management. Lab 2. Prerequisite: 3653. Application of scientific knowledge, management principles and research advances to modern feedlot cattle operations.

4641*
Purebred Beef Cattle Management. Lab 2. Prerequisite: 4612 or concurrent enrollment. Production, selection, management and merchandising considerations in purebred beef cattle operations.

4643*
Swine Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Application of genetic, physiological, microbiological, nutritional and engineering principles to the efficient production of swine.

4712
Livestock Sales Management. Lab 2. Prerequisite: 3433. Advertising of purebred livestock; performance data and breeding values in the merchandising of purebred livestock; photography and ad copy layout; conduct of an actual livestock auction, including animal selection, advertising, catalog and animal preparation, clerking, receipt of payments, sales budgets and transfer of registration papers.

4803*
Animal Growth and Performance. Prerequisite: PHSI 3034 or equivalent. Physiological and endocrine factors affecting growth and performance of domestic animals.

4863*
(L)Interpretation of Research. Lab 2. Prerequisite: senior standing or consent of instructor. Introduction to the methods of science, descriptive statistics and literature organization. Students review the literature and make oral and written reports.

4900
Special Problems. 1-6 credits, maximum 6. Prerequisite: consent of instructor. A detailed study of an assigned problem by a student wishing additional information on a special topic.

4910*
Animal or Food Industry Internship. 3-12 credits, maximum 12. Prerequisite: consent of instructor. Full-time internship at an approved production, processing or agribusiness unit or other agency serving animal agriculture. Maximum credit requires a six-months internship in addition to a report and final examination.

4973*
Range and Ranch Planning. Lab 4. Prerequisites: 3612 and AGRON 4954. Range resource survey, inventory and monitoring. Inventory of ranch resources, survey and evaluation of ranch practices, and economic analysis. Development of a comprehensive ranch management plan. Field trips and reports in laboratory. Same course as AGRON 4973.

5000*
Research and Thesis. 1-6 credits, maximum 6. Independent research planned, conducted and reported in consultation with a major professor.

5010*
Special Problems. 1-3 credits, maximum 6. Special problems in areas of animal science other than those covered by the individual graduate student as a part of his research and thesis program.

5110*
Seminar. 1 credit, maximum 3. A critical review and study of the literature; written and oral reports and discussion on select subjects.

5113*
Basic Reproductive Physiology. Prerequisites: ZOOL 3204. Female and male reproductive processes, the influences of environmental factors upon these processes and the application of reproductive physiology to animal production. Same course as PHSI 5113.

5213*
Advances in Meat Science. Prerequisites: BIOCH 4113 and ZOOL 3204 or equivalent. Development of muscle and its transformation to meat. Properties of meat and their influence on water-binding, pigment formation, texture and fiber characteristics.

5120*
Special Topics in Food Science. 1-4 credits, maximum 4. Prerequisites: graduate standing and/or consent of instructor. Advanced topics and new developments in food science especially with reference to foods of animal origin.

5303*
Advanced Animal Breeding. Prerequisites: 3433 or equivalent and STAT 4013. Basic concepts of population genetics as related to theoretical animal breeding including heritability, genetic correlations, selection methods, inbreeding and heterosis.

5623*
Experimental Methods in Animal Research. Lab 2. Prerequisite: STAT 4023. Methods used in large animal research including the selection of experimental material, record keeping, interpretation of results and a critical review of existing investigations.

5733*
Advanced Animal Nutrition. Lab 2. Prerequisite: 3653. Physiological aspects of digestion and absorption; nutrient content of livestock feeds and methods of analysis; methods of determining nutrient value of feeds, nutritional energetics; nutrient requirements of different animals; and the application of current concepts in nutrition to formulation of rations and feeding program.

5742*
Rumenology. Prerequisite: 3653 or equivalent. Physiology of development of the ruminant digestive tract; the nature of, and factors controlling, digestion and absorption from the tract to include the relative nature and roles of the rumen bacteria and protozoa. Same course as PHSI 5742.

5751*
Rumenology Laboratory. Lab 3. Prerequisite: 5742 or concurrent enrollment. Demonstrations and practice of basic techniques used in nutritional and physiological research investigations with the ruminant animal including cannulations, passage measurements, microbiology and in vitro rumen fermentation.

5762*
Carbohydrate and Lipid Nutrition. Prerequisite: BIOCH 5753. An in-depth study of the digestion, absorption and metabolism of carbohydrates and lipids as related to energy requirements, productive function, health and disease.

5772*
Protein Nutrition. Prerequisite: BIOCH 5753. Nutritional, biochemical and clinical aspects of protein metabolism as it relates to nutritional status.

5782*
Vitamin and Mineral Nutrition. Prerequisite: BIOCH 5753. Development of the concept of dietary essential minerals and vitamins. Individual minerals and vitamins discussed for animal species from the standpoint of chemical form, availability, requirements, biochemical systems, deficiencies and excesses, and estimation in foods and feed.

5923*
Livestock Systems. Lab 2. Prerequisites: AG 2112 or consent of instructor. Application of computer, linear programming and simulation techniques in animal research and livestock production.

6000*
Research and Thesis. 1-10 credits, maximum 30. Prerequisite: M.S. degree. Open only to students continuing beyond the level of the M.S. degree. Independent research, planned, conducted and reported in consultation with and under the direction of a major professor.

6003*
Population Genetics. Prerequisites: 5303 or equivalent and STAT 4023. Population concept of genetics with emphasis on qualitatively inherited traits and statistical techniques utilized in population genetics. Gene and genotypic frequencies, estimation of genetic parameters within a population and the forces which can alter the magnitude of these genetic parameters and inbreeding.

6010*
Special Topics in Animal Breeding. 1-3 credits. Prerequisite: consent of instructor. Advanced topics and new developments in animal breeding and population genetics.

6110*
Seminar. 1 credit, maximum 3. A critical analysis of the objectives and methods of research in the area of animal science. Review of the literature, written and oral reports and discussion on select topics.

ANTHROPOLOGY (ANTH)

2353
(S)General Anthropology. Anthropology, emphasizing the study of human physical evolution (physical anthropology) and cultural evolution (archaeology).

3353*
(H,I,S)Cultural Anthropology. Introduction to culture, various subdisciplines of cultural anthropology, anthropological concepts and capsule ethnographies of assorted ethnic groups.

3823
North American Indian Cultures. Precontact and traditional subsistence patterns, social organization and ideology with emphasis on specific groups in each culture area.

4123*
Archaeology of North America. Factors influencing the initial peopling of North America, the spread and diversification of hunting and gathering economies, the rise of agricultural systems and emergence of extensive and complex political units.

4633*
(S)Racial and Cultural Minorities. Ethnic and racial groups in contemporary pluralistic society, including a cultural-historical perspective on their origins. social relations, value systems and goals.

4643*
(I)Women: A Cross-Cultural Perspective. Compares the roles of women in different types of societies (hunting and gathering, horticultural, peasant and agricultural). Social, familial, economic and legal status of women in American society. Same course as SOC 4643.

4823*
Contemporary Native Americans. Cultural adaptations of North American Indians within both contemporary 'traditional' communities and urban settings. Federal programs and current problems as they relate to the adaptational processes.

4883*
(I,S)Comparative Cultures. Compares environments, economies, social and political organizations and other aspects of culture among selected literate and preliterate societies.

4953*
Anthropological Theory. Significant theoretical formulations in cultural anthropology. Relationship between theoretical developments and research emphasis.

4990*
Special Topics in Anthropology. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Directed readings or research on significant topics in anthropology.

4993*
Anthropology of Aging. Study of aging using anthropological theory and method; includes aging in different societies, effect of culture change on aging and role culture plays in aging process.

APPLIED BEHAVIORAL STUDIES IN EDUCATION (ABSED)

1112
World of Work. Assists students in exploring career options through increased understanding of self and expanded knowledge of occupational information. Includes a study of the decision-making process and a look at the present and future changing world of work.

3013
(S)Leadership Concepts. Prerequisite: 12 hours completed course work. Increases undergraduate student competence through the study of leadership concepts. Stresses communications, decision-making, leadership styles and theories and group dynamics. Attempts integration of theoretical concept with reality of application within the university community.

3092
Counseling and Guidance for Dormitory Personnel. Principles and practices involved in counseling and supervising students.

3113*
Psychological Foundations of Childhood. Prerequisite: PSYCH 1113. The child from conception to puberty with focus on educational implications of development in cognitive, affective and psychomotor domains.

3202
Education of Exceptional Learners. Learning characteristics, needs and problems of educating the exceptional learner in the public schools. Implications of the learning, environmental and cultural characteristics; planning and program assistance available for accommodating the exceptional learner in regular and special education programs; observation of exceptional learners.

3213*
Psychology of Adolescence. Prerequisite: PSYCH 1113. The adolescent from pubescence to adulthood with focus on educational implications of development in cognitive, affective and psychomotor domain.

3240*
Observation and Participation in Special Education. 1-3 credits, maximum 6. Lab 1-3. Supervised activities with various types of exceptional learners and the educational provisions for them.

3413
Child and Adolescent Development. Prerequisite: PSYCH 1113. The person from conception through adolescence with focus on education implications of development in cognitive, affective, social, and physical domains.

3633*
Assessment and Intervention for Exceptional Infants and Children—Birth to Age 6. Prerequisite: 3202. Assessment techniques and intervention strategies appropriate for exceptional infants and young children. Basic theories of development and research supportive of various intervention strategies and assessment techniques.

4052*
Measurement and Evaluation in the School. Prerequisite: junior standing. Construction and selection of classroom tests. Criterion-referenced and norm-referenced measurement strategies are contrasted. Grading techniques, rudiments of standardized test selection and score interpretation and the basic statistics used to summarize and analyze test results.

4063*
Exploration of the Creative Experience. Prerequisite: senior standing. The creative experience in art (visual to performing), articulation (oratory to literature), thought (philosophy to psychology), business (practices to products), leisure (procreation to recreation). Western and Eastern viewpoints. Personal creative development fostered by modeling and by investigation of proven techniques. A wide range of creative endeavor with an experiential approach. Future-oriented applications.

4223*
Human Learning in Educational Psychology. Prerequisites: 3113 or 3213 and an approved observation or field experience course. Instructional psychology focusing on the study of teaching and learning theory as part of an instructional program to deal with individual, cultural, and environmental differences. Case studies and group discussion emphasizing motivation, planning, evaluation, classroom problems and management.

4453*
Educational Diagnosis and Remediation. Prerequisites: 4052, MATH 2413 and CIED 3283. Provides skills in the application of standardized and informal assessment information for educational planning. Includes analysis of commonly used achievement, perceptual, motor and language tests and behavioral analysis techniques.

4513*
Introduction to Emotionally Disturbed. Prerequisite: 3202 or 5633. Characteristics, identification and teaching of the emotionally disturbed/behavior–disordered student; a variety of theoretical approaches to the subject.

4613*
Mental Retardation and Physical Handicaps. Prerequisite: 3633. Nature, causes, and social consequences of mental retardation and physical handicaps.

4640
Student Teaching in Special Education. 1-12 credits, maximum 12. Prerequisites: admission to teacher education and 3202. Supervised teaching experience in the area of special education in which the student is preparing to qualify for a teaching certificate.

4643
Student Teaching Methods. Prerequisites: 4453, 4713, and concurrent enrollment in 4640. Competencies of classroom instruction, scope and sequence of activities, individualization of programs, appropriate teaching materials and communication skills in the education of handicapped individuals.

4653*
Education of the Mentally Retarded. Prerequisites: 3202 and PSYCH 4613. Education program needs and social-cultural environment of mentally retarded children, adolescents and adults.

4713*
Individualizing Education Programs for Exceptional Individuals. Prerequisite:3202. Techniques for teaching individuals with handicapping conditions.

4723*
Curriculum and Methods for Teaching Mentally Retarded Adolescents and Adults. Prerequisite: 3202. Techniques for teaching the mentally retarded individual from adolescence through adulthood.

4743*
Student Evaluation and Guidance Services. For secondary school majors with emphasis on test design, use and grading practices and on the teacher role in testing, evaluation and guidance services.

4753*
Techniques of Behavior Management and Counseling with Exceptional Individuals. Prerequisite: 3202. Techniques to develop and evaluate programs of behavior change for exceptional students including counseling with the exceptional individual and conferencing with professionals and parents.

5000*
Master's Thesis. 1-6 credits, maximum 6. Prerequisite: consent of instructor.

5013*
Introduction to Graduate Study and Research in Education. Required of all graduate students in education. An introduction to the concepts of research design, methodology, sampling techniques, internal and external validity and the scientific method in educational problem solving. Critical analysis of educational research studies and the writing of proposals. No credit for student with credit in 5015.

5015*
Foundations of Educational Research. Introductory concepts in methodology, statistics and measurement necessary to research in education. Calculation and interpretation of descriptive statistics, introduction to inferential statistics, rudiments of educational research design and appropriate uses and characteristics of tests and measurements. Emphasizes the scientific method in educational problem solving. No credit for students with credit in 5013 and 5952.

5023*
Introduction to School Psychological Service. History, role and function, and issues and problems of the school psychological service worker.

5042*
Interviewing Techniques. Prerequisite: graduate standing or consent of instructor. Basic principles underlying effective interviewing and interpersonal communication skills. Overview of various types of interviews. Application and analysis of interviews through video and audio tapes.

5063*
Introduction to Gifted and Talented Education. Concepts, techniques and strategies for providing differentiated educational programs and experiences for the gifted and talented. State and Federal legislation; development of gifts and talents; program types; identification systems; program development; materials development; teaching techniques and methodologies.

5103*
Human Development in Psychology. Introduction to basic research and theories of cognitive, emotional and social development. Applications to educational and family settings.

5123*
Medical Information in Counseling. Prerequisite: graduate standing or consent of instructor. Orientation to medical information and medical aspects of disability. Application to clinical problems in human service professions such as rehabilitation counseling, counseling psychology, and related disciplines.

5173*
Gerontological Counseling. Prerequisites: graduate standing or consent of instructor. An examination of mental health treatment modalities and approaches to counseling with older adults. An experiential component is included.

5183*
Introduction to Rehabilitation Counseling. Background, legal aspects and philosophy of rehabilitation. Overview of current practices in rehabilitation and related areas.

5213*
Advanced Educational Psychology. Learning and its effect upon coping and adjustment. How learning, environmental and personality factors interact to change human behavior.

5223*
Psychology of Disability. Psychological and sociological implications of physical disability and illness. Dynamics involved in adjusting to disabling conditions including issues in rehabilitation psychology, counseling, and somatopsychology.

5320*
Seminar in Applied Behavioral Studies. 3-6 credits, maximum 6. Prerequisite: consent of instructor. In-depth exploration of contemporary problems of applied behavioral studies.

5363*
Differentiated Curriculum Techniques and Materials for Gifted and Talented. Prerequisite: 5063. Development of curriculum content for horizontal and vertical enrichment and acceleration. Commercial and teacher-prepared materials in imagination; imagery; analogy; metaphor; inductive, deductive and abductive thinking; science; philosophy; psychology; logic systems; problem solving; concept learning; creativity; creative dramatics, etc. Conceptual approaches to the use of the preceding in various interest-based and non-interest-based formats.

5373*
Educational Measurements. Appropriate applications of tests in the schools. Development of teacher-made tests, selection of standardized tests, interpretation of test results, understanding of the statistics reported in testing literature, uses of test results and recent developments in educational measurement.

5382*
Family—School Involvement Processes. For teachers, administrators, counselors, school psychologists and other school personnel concerned with improving communication between the home and school in an attempt to better meet the needs of children and youth.

5443*
Theories and Problems in Educational Psychology. Theoretical foundations and nature of the problems studied in educational psychology; current issues and historical overview.

5453*
Vocational and Career Information. Prerequisites: 5553 or 5572. Local, state and national sources of occupational information about jobs and sociological factors related to career planning and worker effectiveness.

5463*
Psychology of Learning. Application to education of the principles and theories of the psychology of learning.

5473*
Introduction to Counseling Practice. Prerequisite: consent of instructor. Orientation to counseling practice through observation and participation. The supervised experiences permit the student and the counselor education staff to evaluate the student's strengths and weaknesses as a potential counselor or student personnel administrator.

5483*
Community Counseling and Resource Development. Prerequisite: 5562. Application of educational, preventive, and crisis interventions in a variety of human service settings, including the development and evaluation of community helping resources.

5503*
Multicultural Counseling. Prerequisite: 5562. Emphasis on effective communication skills in cross-cultural counseling or helping relationships and the integration of theoretical knowledge with experimental learning. Psycho-social factors, life styles, etc. of various cultural and ethnic groups and their influence on the helping relationship.

5510*
Practicum in Educational Psychology. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Supervised application of the principles and procedures of educational psychology in institutional settings appropriate for the preparation of students in the areas of their specialization.

5512*
Secondary School Counseling and Development. Cooperation of the school counselor, teachers, principals, and parents emphasized in organizing, developing, implementing, and evaluating a counseling and development program in secondary schools.

5520*
Individual Appraisal. 3 credits, maximum 6. Methods of developing a framework for understanding individuals and techniques for data collection, assessment, and interpretation such as interviews, testing, and case study. The study of individual differences including ethnic, cultural, and gender factors.

5533*
Developmental Interventions. Lab 2. Counseling theories and techniques for working with children, adolescents, and their parents in individual and group counseling and consulting. Laboratory portion translates theory to practice.

5543*
Career Development Theories. Historical and contemporary viewpoints advanced by Ginsberg, Super, Holland, Roe, etc. Counselors are assisted in developing the theoretical and applied basis for developing school-based career education programs and for assisting individuals in career planning.

5553*
Principles of Counseling. Provides a comprehensive foundation for counseling practice and emphasizes the application of contemporary theories to further knowledge of counseling as a communication process.

5563*
Program Development in Special Education. Physical, social and psychological factors in communities such as power structure, economics, prejudice, religion, as well as national activities that are influential in establishing programs for the exceptional.

5572*
Elementary School Counseling and Development. Cooperation of the school counselor, teachers, principals, and parents emphasized in organizing, developing, implementing, and evaluating a counseling and development program in elementary schools.

5583*
Group Process. Lab 2. Group dynamics, theory and techniques applicable to working with people of all ages in various school and non-school settings. Group member competencies are stressed during the laboratory period.

5590*
Counseling Practicum. 3-12 credits, maximum 12. Prerequisites: 5523, 5553, 5562 or 5572 or 5512 or equivalent and admission to the counseling or student personnel program. Supervised experience in human interaction processes of counseling and consulting with the major goal of facilitating positive growth processes through individual supervision. May be conducted in a variety of settings with a wide range of developmental levels.

5612*
Methods of Teaching Students with Learning Disabilities. Prerequisites: 3202 or equivalent, 5623. Methods of preparing teachers in prescriptive techniques and individualized instruction. Procedures dealing with students who have specific learning problems; teacher/pupil-made materials; setting up learning centers or a resource room; pupil motivation; cultural differences, and effective communication with other teachers, parents and administrators.

5613*
Instructional Systems Design. A practically-oriented coverage of analyzing, defining, sequencing and validating instructional systems. Developing educational objectives, course development, matching instruction to individual differences and evaluation of systems. Techniques of developing and validating instructional components.

5620*
Practicum with Exceptional Learners. 1-8 credits, maximum 8. Lab 1-8. Prerequisites: 5612 and consent of instructor. Supervised individual and group experience with exceptional learners. The particular experience (learning disability, mental retardation, gifted, etc.) is determined by the student's field of specialization.

5623*
Introduction to Learning Disabilities. Prerequisite: survey course in special education. Problems that students experience during their preschool, school and adult years; historical and contemporary perspectives; the cultural, environmental and psychophysiological contributions to learning style differences; and issues related to individualized educational planning and instruction. Practical experience with individuals having learning problems.

5633*
Behavior Characteristics of Exceptional Individuals. Individual differences and problems that exceptional individuals experience. Educational programs and resources available to assist administrators, teachers and parents in dealing with unique individual needs.

5643*
Counseling Parents of Exceptional Children. Aiding the classroom teacher and other professional personnel in the understanding of unique activities and interpersonal relations involved in counseling with parents of exceptional children.

5653*
Play Therapy in Special Education. Theories and practices of the principles of play therapy. The application of play therapy for special education children. Supervised clinical experience with children with emotional, social and psychological problems.

5663*
Creativity for Teachers. Theoretical origins of creativity and their concomitant applications in the learning environment. Blocks to creative thinking, imagination, imagery, creativity testing, developing ideas and innovations, creative problem solving and teaching techniques and methods to maximize creative potential in all kinds and types of students.

5670*
Rehabilitation Counseling Practicum. 1-12 credits, maximum 12. Prerequisites: graduate standing and consent of instructor. Applied experience for graduate students in counseling.

5673*
Developmental Language for the Exceptional Individual. Prerequisites: 3202 or 5633; and SPATH 3213. Normal language development and variations from norms demonstrated by handicapped learners. Theoretical approaches to language training, formal and informal assessment techniques, and instructional methods.

5680*
Internship in Counseling. 1-12 credits, maximum 12. Prerequisites: 5590 and admission to the counseling and student personnel program. Supervised experience working and studying in a counseling agency or setting.

5713*
Transpersonal Human Development. Human development in terms of individual consciousness, focusing on the implications of such extraordinary states of consciousness as those associated with hallucinogenic drugs and mystical religious experience. Integration of psychological and religious interpretations of development. Applications to practical problems in education and psychology.

5720*
Workshop. 1-8 credits, maximum 15. Professional workshops of various topics and lengths. Each workshop designed to meet unique or special needs of individuals concerned with education, helping professions, and behavioral studies.

5732*
Seminar in Education. Prerequisite: consent of instructor. Preparation of seminar study.

5733*
Teaching Strategies for the Physically Handicapped. Prerequisite: 4613. Types of physical handicaps, their educational implications and various adjustments for optimal functioning.

5743*
Curriculum Modifications for Exceptional Individuals. Materials and resources designed for use by teachers and other professionals, paraprofessionals and parents in working with exceptional individuals. Includes commercial and teacher-student-made materials.

5763*
Teaching Methods and Techniques for the Gifted and Talented. Prerequisite: 5363. Subject and skill-related learning facilitation that is process-oriented and doing-centered. The role of the teacher as facilitator, counselor and non-directive change agent. Individualized educational plans, involving independent study, tutoring, correspondence, clustering, mentors, learning centers, resource centers.

5783*
Psycho-educational Testing of Exceptional Individuals. Prerequisite: consent of instructor. Intensive practice in the selection, administration and interpretation of individual tests, appropriate for exceptional individuals.

5823*
Characteristics and Identification of Emotionally Disturbed Learner. Prerequisites: 4513 and PSYCH 3443. Characteristics and identification of the emotionally disturbed/behavior-disordered learner. Trains the teacher to identify the emotionally disturbed/behavior-disordered learner.

5853*
Advanced Methods for Teaching the Mentally Retarded. Prerequisite: 4653. A review of research and methodological developments related to the instruction of mentally retarded children, adolescents, and adults.

5863*
Developing Programs for the Gifted and Talented. Prequisites: 5063 and 5563. Programs based on various philosophies and structural concepts of gifted and talented education, e.g., mainstreaming, self-contained, pullouts, magnet schools, timeblocking, acceleration and enrichment. Programs designed for general and specific academic ability; however, exposure will be provided to creative and productive thinking programs, leadership programs, and visual and performing arts programs. Specific models included.

5873*
Instructional Strategies and Resources for the Emotionally Disturbed Learner. Prerequisite: 5823. Instructional procedures and resources available for working with the emotionally disturbed/behavior-disordered learner. A wide range of theoretical approaches explored.

5883*
Behavior Management and Affective Education. Prerequisite: 4753. The utilization of various approaches to the management of individual and group behavior; affective education in a wide range of instructional settings.

5933*
Altered States of Consciousness in Human Development. Theory and research concerning the role of altered states of consciousness in human development. Practical techniques for facilitating healthy human development which might be of use to counselors, teachers, and other human services workers. Techniques include guided imagery, progressive relaxation and, especially, meditation.

5953*
Elementary Statistical Methods in Education. Elementary statistical methods needed by consumers of educational research. Descriptive and inferential statistics. No credit for students with credit in 5015.

5962*
Developing Support Resources for Gifted and Talented Programs. Prerequisite: 5863. Development, management, and evaluation of volunteer programs in intra- and extra-class settings. Program types include parent-aid, volunteer-aid, mentors, tutors, group sponsors. Developing community interest, finding external resources, external funding and resource information sources.

5983*
Intermediate Research Techniques in Education. Prerequisites: 5015 or 5013 and 5952. Selected techniques needed for effective research in education. Research design, data collection and analysis, and interpretation of results stressed. Appropriate utilization of nonparametric and factorial analysis of variance techniques.

5993*
Identification and Behavior Characteristics of the Gifted and Talented. Prerequisites: 5373 and 5863. Cognitive, affective, and behavioral characteristics of the gifted and talented. Selection of tests and interest inventories. Selection and/or developing of nomination/recommendation forms/models, inventories, checklists, rating scales, sociograms as well as data abstraction from cumulative and anecdotal records. Functions of gifted/ talented identification committees.

6000*
Doctoral Thesis. 1-25 credits, maximum 25. Prerequisite: permission of advisory committee chairman. Required of all candidates for doctorate in Applied Behavioral Sciences. Credit given upon completion and acceptance of thesis.

6013*
Advanced Research Techniques in Education. Prerequisite: 5983. Research design, data collection and analysis, and interpretation of results stressed. Appropriate utilization of complex analysis of variance, mutiple regression analysis, and related multivariate analysis techniques.

6043*
Adult Development. Theory and research concerning human development during the adult years. Practical applications for serving adult populations in education and education-related settings.

6053*
Professionalism and Ethics in Counseling Psychology. Principles and issues of professionalism and ethics. Legal and ethical implications derived from statutes and case law for the practice of counseling psychology in case studies.

6083*
Principles of Counseling Psychology. Prerequisite: 5553 or equivalent. Development, theoretical foundations and applications of therapeutic models of counseling and psychology.

6110*
Seminar in School Psychology. 1-3 credits, maximum 6. Prerequisite: concurrent enrollment in 6210. An assessment of psychological techniques applied to problems encountered in the internship.

6173*
Higher Education Student Personnel Administration. Develops an understanding of the history, philosophy, student life, critical issues and administration of student personnel work in higher education.

6210*
Internship in School Psychology. 3-6 credits, maximum 12. Prerequisite: enrollment in school psychology program. Supervised field experience in the duties of a school psychologist consisting of one semester participation under the direction of a certified school psychologist or other qualified field personnel approved by the supervising faculty member.

6213*
Higher Education Student Personnel Services. Prerequisite: 6173. Higher education student personnel services such as: admissions, orientation, student activities, financial aids, housing and counseling.

6220*
Internship in Higher Education Student Personnel. 2-6 credits, maximum 6. Prerequisites: 6173 or 6213 and admission to the student personnel and guidance program and consent of supervisor. Provides work and study opportunities under supervision in areas of student housing, student activities, financial aid, foreign student advisement, student personnel administration, student union, group facilitation and other appropriate work situations.

6310*
Advanced Practicum and Supervision. 3-12 credits, maximum 12. Prerequisites: 5593 and master's degree. For prospective counseling psychologists, counselor educators and supervisors, and practicing counselors. Supervised assistance in development of counseling, consulting and supervising competencies.

6373*
Program Evaluation. Prerequisite: 5013 or 5015. Contexts, purposes and techniques of evaluating educational programs. Evaluation design, information collection, analysis, reporting and uses of results for programs ranging from individual lessons to nation-wide multi-year projects. Special emphasis on evaluation requirements of federally funded programs.

6460*
Internship in Educational Psychology. 1-9 credits, maximum 9. Prerequisite: consent of instructor. Supervision and guidance of teaching and service in educational psychology. May be repeated for credit when work assignment varies. Required of all teaching assistants in educational psychology during the first semester of each new teaching assignment. Includes cooperative planning and evaluation.

6533*
Human Motivation. A theoretically-oriented approach to the concept of motivation; essential precursors to human behavior and applications to the solution of real and hypothetical problems.

6553*
Advanced Practice in Marital and Family Treatment. Prerequisites: 6523, concurrent enrollment in counseling or clinical practicum or consent of instructor. Advanced methods in assessment, diagnosis and treatment of marital and family problems. Skill development, professionalism, ethics and case management. Dynamics of co-therapy and conjoint treatment. Case consulatation format. Same as PSYCH 6553.

6560*
Advanced Internship in Counseling. 1-3 credits, maximum 6. Prerequisite: admission to the doctoral program in counseling and student personnel or applied behavioral studies emphasizing counseling and development, and consent of instructor. Designed to facilitate counseling effectiveness and to set the stage for a productive life of professional practice.

6603*
Current Trends and Issues in Special Education. Current research and literature regarding the education of exceptional children.

6663*
Applied Behavioral Studies Research Seminar. Prerequisite: admission to advanced graduate program. Critical analysis of current research.

6850*
Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing.

6880*
Internship in Education. 1-8 credits, maximum 8. Lab 3-24. Prerequisites: admission to advanced graduate program and consent of department head. Directed off-campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

ARCHITECTURE (ARCH)

1216
Architectural Design Studio I. Lab 16. Architectural graphics and design fundamentals.

2003
(H,I)Architecture and Society. Design, planning and building considered in their social and aesthetic contexts.

2100
Architectural Studies. 2-4 credits, maximum 4. Lab 6-12. Beginning studies in graphics and design in architecture.

2114
Statics and Strength of Materials. Lab 2. Prerequisites: PHYSC 2014 and MATH 2265. Resultants of force systems, static equilibrium of rigid bodies and statics of structures. Shear and bending moments, deformation and displacements in deformable bodies.

2116
Architectural Design Studio II. Lab 16. Prerequisite: grade of "C" or better in 1216. Problems in architectural design.

2183
(H)History and Theory of Architecture I. Prerequisite: 2003. History and theory of the Pre-Enlightenment era of architecture in the Western world.

2216
Architectural Design Studio III. Lab 16.Prerequisite: grade of "C" or better in 2116. Problems in architectural design.

2263
Building Systems and Materials. Prerequisite: grade of "C" or better in 2116. Architectural, structural, environmental control systems and materials in architecture.

3100
Special Topics. 2-6 credits, maximum 6. Subjects to be selected by the faculty in architecture from advances in state-of-the-art areas.

3117
Architectural Design Studio IV. Lab 16. Prerequisite: grade of "C" or better in 2216 and admission to third year. Problems in architectural design.

3123
Structures: Elementary Analysis. Lab 2. Prerequisite: grade of "C" or better in 2114. Structural theory for applications in architecture.

3133*
Environmental Control: Thermal Systems. Prerequisite: PHYSC 1114 or 2014. A survey of the fundamentals of thermal comfort, energy concerns, and mechanical systems for buildings.

3233*
Environmental Control: Electricity and Lighting. Prerequisite: PHYSC 1214 or 2114. A survey of electrical and lighting systems for buildings.

3246
Structures: Elementary Steel and Timbers. Prerequisite: grade of "C" or better in 3123. Analysis and design of steel and timber structures used in architecture.

3253*
Environmental Control: Acoustics and Life Safety. Prerequisite: PHYSC 1114 or 2014. A survey of architectural acoustics and life safety techniques for building design.

3283
(H)History and Theory of Architecture II. Prerequisite: 2003. Specific course content varies from year to year; exploration of some aspect of Renaissance and Baroque architecture in the Western world.

4083
English Renaissance and Early American Architecture. Prerequisite: 2003. Renaissance Britain from 1558 to c. 1880 surveying Elizabethan, Jacobean Carolinian, Palladian and English Baroque architecture demonstrating its importance to the development of Early American architecture.

4117
Architectural Design Studio V. Lab 20. Prerequisite: grade of "C" or better in 3117. Problems in architectural design.

4123*
Structures: Elementary Concrete. Lab 2. Prerequisite: grade of "C" or better in 3123. Analysis and design applications in architectural problems using concrete structures.

4143*
Structures: Foundations for Buildings. Prerequisite: 4123 or concurrent enrollment. Interaction of frames and supports for structures used in architecture. Subsurface conditions and design of foundation systems and retaining walls for buildings.

4183*
(H)History and Theory of Architecture III. Prerequisite: 2003. History of cities.

4193
Marketing Professional Services. Prerequisite: 3117. Business development aspects of design firm management, including: marketing plan development; marketing organization; strategies and tools; selling techniques and contract negotiating.

4217*
Architectural Design Studio VI. Lab 20. Prerequisite: grade of "C" or better in 4117. Problems in architectural design.

4244*
Structures: Intermediate Steel. Lab 3. Prerequisite: grade of "C" or better in 3246. Design and analysis of multi-story steel frames, trusses, arches and other architectural structure components.

4273*
(H)History and Theory of Architecture IV. Prerequisite: 2003. Specific course content varies from year to year; exploration of some aspect of 19th and 20th century architecture in the Western world.

4370
Field Study in Europe I. 1-4 credits, maximum 8. Prerequisite: senior standing in architecture or consent of instructor. On-site analysis and study of European architecture, culture and urban design.

5000*
Special Problems. 1-6 credits, maximum 6. Lab 3-18. Prerequisite: consent of instructor and head of the School. Theory, research or design in related disciplines. Plan of study to be determined jointly by student and graduate faculty.

5083*
Japanese Architecture. Prerequisite: admission to the professional School of Architecture or consent of instructor. Historical Japanese architecture from 200 BC to 1980; Shinto, Buddhist, Zen Sukiya, Zukuri, Minka and contemporary subjects.

5100*
Special Topics. 3-6 credits, maximum 15. Subjects to be selected by the graduate faculty in Architecture to cover advances in the state-of-the-art.

5119*
Architectural Design and Development. Lab 24. Prerequisites: for architectural engineering structures majors: 3117, 3233, 3246, 3253; for architecture majors: 3233, 3246, 3253, 4217. Design and detailed development of a major architectural project integrating all aspects of architecture and related disciplines in a professional manner and milieu.

5133*
Passive Design. Prerequisite: fourth-year standing. The principles of passive design strategies in architecture and application of these concepts in architectural design.

5144*
Structures: Intermediate Concrete. Lab 3. Prerequisite: grade of "C" or better in 4123. Design and analysis of multi-story reinforced concrete frames and prestressed and post-stressed concrete structural components used in architecture applications.

5153*
Advanced Architectural Acoustics Design. Prerequisite: fourth-year standing. Analysis and design of acoustically-critical spaces, including open-plan offices, music facilities, studios, theaters, etc. and a design project of the student's choice.

5193*
Management of Architectural Practice. Prerequisite: fifth-year standing in architecture or architectural engineering or consent of instructor. Principles of management as applied to the private practice of architecture and architectural engineering.

5217*
Architectural Design Studio VII. Lab 20. Prerequisite: grade of "C" or better in 5119. Problems in architectural design.

5223*
Structures: Intermediate Analysis. Prerequisite: grade of "C" or better in 3123. Mathematical formulation of architectural structural behavior. Matrix applications, finite element, finite differences, stability considerations and three-dimensional structuring modeling.

5233*
Advanced Architectural Lighting Design. Prerequisite: fourth-year standing. Lighting applications in contemporary architectural design, including offices, schools, churches, health care facilities, etc. Principles applied to a design of student's choice.

5243*
Structures: Special Loadings. Prerequisite: grade of "C" or better in 3246 and 4123. Mathematical formulations and modeling in architectural structures. Human response to vibrations. Seismic design in building. Design for extreme winds on buildings. Approximate methods for preliminary design of architectural structures.

5293*
Architectural Project Management. Prerequisite: fifth-year standing in architecture or consent of instructor. Principles of management as applied to architectural and architectural engineering projects.

5370*
Field Study in Europe II. 1-4 credits, maximum 8. Prerequisite: senior standing in architecture or consent of instructor. On-site analysis and study of European architecture, culture and urban design.

6000*
Special Problems. 1-15 credits, maximum 15. Lab 3-18. Prerequisite: consent of instructor and head of School. Theory, research or design investigation in specific areas of study in the field of architecture and its related disciplines. Plan of study determined jointly by student and graduate faculty.

6073*
Survey of Non-Western Architecture. Prerequisite: graduate standing or consent of instructor. Architecture in the non-Western and pre-Columbian World.

6083*
Survey of Contemporary Architecture. Prerequisite: graduate standing or consent of instructor. American architecture beginning in the 16th Century through the 20th Century.

6100*
Special Topics. 3-6 credits, maximum 15. Subjects selected by the graduate faculty in Architecture to cover advances in the state-of-the-art.

6113*
Professional Project Research. Prerequisite: 5217. Data gathering, analysis and program formulation related to professional project.

6117*
Architectural Design Studio VIII. Lab 20. Prerequisite: 5217. Problems in architectural design.

6123*
Structures: Advanced Steel. Prerequisite: grade of "C" or better in 4244. Plastic analysis and design of structural steel frames utilizing load and resistance factor design.

6143*
Computer Applications in Architecture. Lab 3. Prerequisite: consent of instructor. State of the art applications of computers to the practice of architecture and architectural engineering.

6183*
Architecture Seminar I. Seminar for graduate students only. Must be taken concurrently with 6117.

6193*
Financial Management for Architects and Engineers. Prerequisite: 3117. Financial aspects of design firm management, including: fundamentals of finance; profit planning and control; cash management and analysis of financial statements.

6206*
Creative Component. Lab 18. Prerequisite: 6117. A design project based on a program previously developed by the student, to include a written report and supporting documents when appropriate. Must be approved by the project adviser and completed in the final semester of the graduate program.

6214*
Graduate Design Studio. Lab 12. Prerequisite: 6117. Independent projects or competitions. May be combined with 6206 with approval of adviser.

6223*
Structures: Advanced Concrete. Prerequisite: grade of "C" or better in 5144. Design of prestressed concrete structures, including pre- and post-tensioning.

6224*
Structures: Advanced Analysis. Prerequisite: grade of "C" or better in 5223. Analysis techniques for architectural structures including stability, space frames, computer applications, guyed towers and project research.

6283*
Architecture Seminar II. Seminar for graduate students only. Architectural criticism.

6500*
Architectural Engineering Problems. 1-6 credits, maximum 6. Lab 3-18. Engineering problems in architecture involving structures, mechanical systems, acoustics, illumination, etc.

ART (ART)

1103
Drawing I. Lab 6. A freehand drawing experience designed to build basic skills and awareness of visual relationships. A sequence of problems dealing with composition, shape, volume, value, line, gesture, texture and perspective. A variety of media explored.

1113
Drawing II. Lab 6. Prerequisite: 1103. Objective and subjective approaches to visual problem solving in a variety of black and white and color media. The analysis and manipulation of form, light, space, volume, and the formal aspects of perspective.

1203
Design I. Lab 6. An introduction to visual problem solving. Organization of the two-dimensional plane using the elements and principles of design: line, shape, value, texture and color. Use of black and white and color media.

1803
Introduction to Art. An introduction to the analysis and interpretation of visual arts. Visual, emotional and intellectual aspects of art in painting, sculpture, printmaking and architecture.

2103
Drawing III. Lab 6. Prerequisite: 1113. The development of formal and expressive aspects of drawing by direct observation of the figure and its environment. Emphasis on media experimentation, aesthetic considerations, personal concepts, and anatomy.

2203
Three-dimensional Design. Lab 6. Prerequisites: 1103 and 1203. Exploration of three-dimensional form and space stressing organization of design elements, development of concepts and manipulation of materials. Investigation of linear space, modular ordering, mass/volume and color through projects of a conceptual and applied nature.

2213
Design II. Lab 6. Prerequisites: 1103, 1203. Color theories and their application to visual problem solving, distinctions between pigment and light and between additive and subtractive color mixing. The nature and properties of color, its expressive qualities, symbolic potential, and psychological impact.

3100
Advanced Drawing. 3 credits, maximum 9. Lab 6. Prerequisite: 2103. Investigation of drawing stressing thematic development, abstract ideas, and individual imagery.

3123
Oil Painting. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613 or permission of instructor. The development of skills in oil painting stressing form and content, visual perception and individual expression. Technical instruction applicable to individual problems and needs.

3133
Watercolor Painting. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613 or permission of instructor. The development of skills in watercolor painting stressing form and content, visual perception and individual expression. Structured assignments in color mixing, wet-on-dry techniques, wet-into-wet techniques, brush handling, paper supports and surface manipulation.

3323
Sculpture I. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613. Studies in clay and plaster. Subtractive and additive processes. Emphasis on sculptural ideas, methods and materials.

3330
Sculpture. 3 credits, maximum 9. Lab 6. Prerequisites: 1333 and 3303. Sculpture in any material.

3333
Sculpture II. Lab 6. Prerequisite: 3323. Non-ferrous metal casting. Basic welding techniques using oxy-acetylene, electric arc and T.I.G. methods. Emphasis on concepts, form, methods, and materials.

3343
Jewelry and Metals. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613 or consent of instructor. Fabrication and forming techniques for non-ferrous metals. Cold joinery, silver soldering, surface treatment and elementary stone setting. Applications toward either wearable or small scale sculptural format.

3403
Illustration. Lab 6. Prerequisite: 3413. Exploration of conceptual to technical picture-making utilizing a wide range of media and techniques. Emphasis on the proper use of reference material to complete sample problems in editorial, advertising, and technical illustration.

3413
Lettering and Typography. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613. The study of symbolic communication including the practice of calligraphy, reproduction lettering, typography and experimental typographic design. Emphasis on innovative typography and the use of pictorial symbols as forms of communication.

3423
Graphic Design. Lab 6. Prerequisite: 3413. Aspects of graphic communication: ideation, production skills, selection and use of materials and reproduction processes. Sequential course work includes grid and proportional systems, information organization, layout, comprehensives, mock-ups, and mechanical preparation.

3433
Applied Graphic Design. Lab 6. Prerequisite: 3423. Design problems with special attention to signage, exhibition design, packaging, display, and point of purchase. Use of model-building tools and study of structure and form to introduce the student to problem-solving and finishing techniques. Development of concepts into models.

3503
Ceramics. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613, or consent of instructor. Methods of clay preparation, hand building, wheel forming methods, methods of decoration and glazing, firing and kiln construction. Involvement with ceramic materials and processes.

3603
History of Classical Art. Stylistic, philosophical and formal qualities of art in the Classical world. The creation of the Greek ideal and its dissemination in the Roman world through architecture, sculpture, and painting.

3613
History of Medieval Art. A survey of European art and architecture from the fall of Rome to the end of the Gothic period, approximately 400-1400. Includes a study of the late Middle Ages as emerging from the blending of earlier traditions: classic, Byzantine, barbaric, Christian, and Moslem.

3623
History of Renaissance Art. A survey of Italian painting, sculpture and architecture from the thirteenth through the sixteenth century. Includes painting in northern Renaissance Europe, Jan van Eyck to Pieter Brugel.

3633
History of Baroque Art. Painting, sculpture, and architecture in Counter-reformation Italy, Spain, and Flanders. The second half of the course focuses on seventeenth-century Protestant Holland, analyzing the popularization of non-religious themes in painting including portraits, landscape, still life, and genre.

3653
History of Nineteenth Century Art. Art of 19th century Europe—ideals, conflicts, escapes and triumphs, beginning with the French Revolution and ending in 1900.

3663
(H)History of American Art. Prerequisite: 2603 or 2613. Visual arts in America from the Colonial period to the present. Major styles, ideas and uses of material in architecture, painting, sculpture and design.

3683
(H,I)History of 20th-century Art. Prerequisite: 2613. Beginning with the birth of "modernism" in the late 18th century, exploration of the fast-changing artistic styles of the 20th century: abstraction, expressionism, fantasy, realism, surrealism, and social protest. Emphasis on the relationship of art and 20th-century society.

3703
Printmaking. Lab 6. Prerequisite: 1103, 1203. Projects in printmaking processes and techniques, including linocut, woodblock, etching, aquatint, and lithography.

3710
Printmaking: Screenprinting. 3 credits, maximum 9. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613, or permission of instructor. Understanding and control of stencil-making techniques and the printing of editions. Development of concepts and images through the medium of screenprinting.

3720
Printmaking: Intaglio. 3 credits, maximum 9. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613 or permission of instructor. Understanding and control of intaglio techniques; preparation, processing, and editioning of images from metal plates. Development of concepts and images through traditional and contemporary approaches to the intaglio process.

3730
Printmaking: Lithography. 3 credits, maximum 9. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613 or permission of instructor. Understanding and control of the procedures of drawing, processing and printing editions from stones and metal plates. Development of concepts and images through the medium of lithography.

4120
Oil Painting Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3123. Oil painting with emphasis on personal development of visual ideas and technique.

4130
Watercolor Studio. 3 credits, maximum 6. Lab 6. Prerequisite: 3133. Structured assignments with exploration of individual concepts, ideas and imagery to reinforce growth of technical skills and personal painting style in watercolor.

4330
Sculpture Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3333. A broad-based course which allows students to pursue individual interests using a variety of materials and processes. Emphasis on further development of concepts, skills and techniques.

4340
Jewelry and Metals Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3343 or 4343. Metalworking processes including casting, rubber modeling, and advanced stone setting. Consideration of non-metal media. Emphasis on development of materials and ideas through conceptual problems.

4343
Metalsmithing. Lab 6. Prerequisites: 1103, 1113, 1203, 2203, 2213, 2603, 2613. Metalsmithing processes: forging, raising, holloware construction and die forming. Emphasis on plastic properties of metal. Problems relating to cutlery, flatware, containers, and vessels.

4420
Graphic Design Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3423. Design problems suited to the professional portfolio. Discussion of practical issues including career options, resume and portfolio preparation, and interview techniques. Investigation of historic precedent in graphic design.

4430
Illustration Studio. 3 credits, maximum 9. Lab 6. Prerequisites: 3403, 4420. Developing and finishing illustrations for advertising, editorial, reportorial, and technical use. Emphasis on visual control of a two-dimensional composition to relate the intent of the client/artist. Line, black and white, limited and full color. All media.

4500
Ceramics Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3503. Continued explorations of ceramic arts: glazes, clay bodies, methods of forming, decorating and firing. Continued emphasis on the relation between visual unity and individual expressive concepts as these apply to both utilitarian and conceptual forms.

4613
Art Since 1945. Art and art theory from 1945 to the present. Major trends of abstract expressionism, pop art, minimalism, photorealism and conceptual art. Theories and intellectual bases of each movement as well as major critical responses.

4633
(H,I) Survey of African Art. Art products of traditional sub-Saharan African societies as they have evolved in relation to human needs, religion, philosophy, history, geography and anthropology. The contribution of African art to world art and approaches toward esthetic evaluation.

4643
(H,I)Survey of East Asian Art. Arts of China, Korea and Japan in their historical and cultural settings. Major emphasis on painting, sculpture, and architecture, but other arts including porcelain, furniture and prints.

4800
Special Studies in Art. 1-3 credits, maximum 9. Prerequisites: junior standing and consent of instructor. Courses in media exploration, special subjects and current issues. Offered on campus or through extension workshops.

4900*
Directed Study. 1-3 credits, maximum 9. Lab 1-6. Prerequisites: junior standing and written permission of department head. Self-designed special topics in studio art or art history. By contract only.

ARTS AND SCIENCES (A&S)

1103
(H,SpD) An Introduction to the Arts: Literature, Music and Painting. Formal relationships among painting, music and literature. An introduction to the several arts.

1111
Freshman Orientation. Orientation for freshmen. Study techniques, evaluation of one's abilities and the making of proper educational and vocational choices.

2000
Arts and Sciences Lower-division Honors Seminar. 1-3 credits, maximum 5. Prerequisite: participation in the Honors program.

2123
(H,SpD)Language of Art Appreciation. Appreciation of art, music; use of specific art offerings available on campus.

3603
Colloquium in Area Studies. Interdisciplinary studies in one area: African, Asian, Latin American, Russian and East European, Native American, Ancient and Medieval, or Women's studies. Individual undergraduate research projects.

3710
A&S Internship. 1-6 credits, maximum 6. Prerequisite: junior standing. For students in the College of Arts & Sciences. Cooperative education experiences not included in departmental offerings. Before enrolling, students must have an individual contract approved by the sponsoring professor and the Dean of Arts and Sciences (or administrative officer).

3903
(H,I,S,SpD)Integrative Honors Studies: World Community. Prerequisite: participation in Arts and Sciences Honors Program. World history (cultural, political, and economic) since 1650; and seminar study of a selected global problem. Restricted to Honors students.

4000
Arts and Sciences Upper-division Honors Seminar. 1-3 credits, maximum 5. Prerequisite: participation in the Arts and Sciences Honors Program.

4110
Arts and Sciences Upper-division Honors Independent Study. 1-3 credit, maximum 3. Prerequisite: participation in the Arts and Sciences Honors program. Independent study by individual contract only. Before enrolling, student must have contract approved by the sponsoring professor and the director of Arts and Sciences Honors Program.

4910*
Research Problems in the Arts and Sciences. 1-3 credits, maximum 9. Prerequisites: consent of instructor. Directed readings and study for students wishing to pursue interdisciplinary topics of special interest in the arts and sciences.

4990
Honors Senior Thesis or Creative Activity. 1-3 credits, maximum 6. Undergraduate honors thesis, research and report, or other creative activity undertaken to satisfy the requirements for Departmental Honors in the College of Arts and Sciences. Restricted to Arts and Sciences Honors students.

5710*
Developmental Workshop in Selected Academic Fields. 1-3 credits, maximum 9. Arts and Sciences discipline-based material. Study groups, lectures and seminars.

6000*
Research for Ed.D. Dissertation. 1-15 credits, maximum 15. Prerequisite: candidacy for Ed.D. degree. Ed.D dissertation.

ASTRONOMY (ASTRO)

1104
(N)Elementary Astronomy. Methods of observation and analysis. Current interpretations of observational data in regard to the solar systems, Milky Way galaxy and the universe.

2023
(N)General Astronomy. Prerequisite: PHYSC 1214 or equivalent. More rigorous treatment of material in 1104 for majors in physical sciences and other areas.

2153
Advanced Astronomy. Prerequisite: 1104 or 2023. Topics such as pulsars, quasars, neutron stars, black holes and interplanetary space probes.

3023
Astrophysics. Prerequisite: PHYSC 2114 or consent of instructor; ASTRO 1104 recommended. Analysis and interpretation of astronomical phenomena in terms of the laws of physics; e.g. stellar structure, the interstellar medium, galaxies and cosmology.

3053*
Celestial Mechanics. Prerequisite: MATH 2613. Motion of a particle under various laws of force, potential and attraction of massive bodies, theory of orbit determination and problems of two, three and *N* bodies.

ATHLETICS (ATHL)

1101
Intercollegiate Baseball and Softball. Lab 5. Development of knowledge and skills through participation in varsity competition.

1111
Intercollegiate Basketball. Lab 5. Development of knowledge and skills through participation in varsity competition.

1121
Intercollegiate Volleyball. Lab 5. Development of knowledge and skills through participation in varsity competition.

1131
Intercollegiate Football. Lab 5. Development of knowledge and skills through participation in varsity competition.

1141
Intercollegiate Swimming. Lab 5. Development of knowledge and skills through participation in varsity competition.

1151
Intercollegiate Golf. Lab 5. Development of knowledge and skills through participation in varsity competition.

1161
Intercollegiate Track and Field. Lab 5. Development of knowledge and skills through participation in varsity cross country, track and field competition.

1171
Intercollegiate Gymnastics. Lab 5. Development of knowledge and skills through participation in varsity competition.

1181
Intercollegiate Wrestling. Lab 5. Development of knowledge and skills through participation in varsity competition.

1191
Intercollegiate Tennis. Lab 5. Development of knowledge and skills through participation in varsity competition.

1201
Intercollegiate Field Hockey. Lab 5. Development of knowledge and skill through participation in varsity competition.

AVIATION AND SPACE EDUCATION (AVSED)

1113
Theory of Flight. A ground school course covering Federal Aviation Regulations, theory of flight, power plant operation, service of aircraft, principles of navigation and meteorology. Fulfills the ground school training needed for a Private Pilot Certificate.

1222
Flight Training. Lab 4. Meets the flying requirements for a Private Pilot Certificate. Includes all maneuvers and cross-country flying required by the Federal Aviation Administration for the issuance of a Private Pilot Certificate. Requires a minimum of 20 flight hours with an instructor and 15 hours of solo flight. Training conducted at the Stillwater Airport under the direction of Federal Aviation Administration certificated instructors. Special fee required.

2122
Secondary Flight. Lab 4. Prerequisite: 1222 or Private Pilot Certificate. First of three courses, 2122, 2332, and 3442, which terminate in the issuance of a Commercial Pilot Certificate or benefit the pilot who wants to improve flying skills. Includes maneuvers and cross-country flying. Requires 10 flight hours with an instructor and 30 flight hours solo. Special fee required.

2332
Intermediate Flight. Lab 4. Prerequisite: 2122. Special flight instruction in night flying, instrument flying, and cross-country flying. Includes training in use of radio navigation and the flight computer. Requires 20 flight hours with an instructor 15 flight hours of solo maneuvers and 20 flight hours of solo cross-country. Special fee is required.

3223
Advanced Theory of Flight. Advanced aircraft systems and performance problems, maintenance, operation and inspection of airplanes, and aircraft power plants. Review of aerodynamics, theory of flight, and Federal Aviation Regulations. Prepares the student for the Commercial Pilot Written Examination.

3234
Theory of Instrument Flight. Prerequisite: 1113 or passage of FAA Private Pilot Written Examination. Instrument flight rules, the air traffic system and procedures, and elements of forecasting weather trends.

3331
Theory of Multiengine Flight. Prerequisite: Private Pilot Certificate. Aeronautical theory and information required for operating the multiengine airplane safely, efficiently and within its specified limitations. Emphasis on aerodynamics and multiengine emergencies.

3441
Aerobatic Flight Laboratory. Prerequisites: 1113 and 1222. A minimum of ten hours dual flight training. Basic, intermediate and advanced aerobatic flight maneuvers including sequencing and dimensional box spacing. Special fee required.

3442
Advanced Flight. Lab 4. Prerequisite: 2332. The final phase of flight training in preparation for the Commercial Pilot Certificate. Requires 20 flight hours with an instructor and 10 flight hours of solo on precision maneuvers. Special fee required.

3551
Multiengine Flight Laboratory. Lab 2. Prerequisite: Private Pilot Certificate. Dual flight training in preparation for the Multiengine Flight Examination. The student will obtain the experience and skill necessary to add an Airplane, Multiengine Land Class Rating to his/her private or commercial pilot certificate. Study of airplane systems, emergencies, single-engine flight and performance characteristics. Special fee required.

3552
Instrument Flight Laboratory. Lab 4. Prerequisite: Private Pilot Certificate. Dual flight training in preparation for the Federal Aviation Administration Instrument Flight Examination. Unusual attitudes, emergencies, instrument approaches, and IFR cross-country flight. Special fee required.

3562
Flight Instructor: Airplanes. Prerequisites: Commercial Pilot Certificate with Instrument Rating and at least 18 years of age. Dual flight training to meet the requirements of a Flight Instructor Certificate with an Airplane Category Rating and a Single Engine Class Rating. Requires 20 dual flight hours which includes maneuvers practice and giving maneuvers instruction.

3661
Flight Instructor: Instruments. Prerequisites: valid Flight Instructor Certificate and valid FAA first class or second class medical certification. Dual flight training to meet the requirement of adding an Instrument Flight Instructor Rating to the Flight Instructor Certificate. Special fee required.

3663
Air Transportation: The Industry. Prerequisite: 50 credit hours. Broad understanding of the air transportation industry and an in-depth knowledge of the organizational structures, managerial functions and operational aspects of today's major, national, and regional air carriers. Historical perspectives, regulators and associations, economic characteristics, labor relations and marketing of modern air carriers.

4113
Aviation Safety. Prerequisites: 1113 and 50 credit hours. Overview of flight safety including studies in human factors, weather, aircraft crashworthiness, accident investigation, and aviation safety programs. Students will be introduced to elements of aviation safety in ground and flight operations.

BIOCHEMISTRY (BIOCH)

3543
(N)General Biochemistry. Prerequisite: CHEM 2344 or 2463. Descriptive survey of the chemistry of living systems. A terminal course for students in applied biological sciences. Not recommended for preprofessional students or for students planning graduate work in biological science. No credit for students with credit in 3653.

3653*
Survey of Biochemistry. Prerequisite: CHEM 3015 or 3053. An introduction to the chemistry of living systems. Chemical properties of the constituents of living organisms. Mode of formation, reactions and function of these compounds in microorganisms, plants and animals. No credit for students with credit in 3543.

3721
(L,N)Biochemical Laboratory. Lab 3. Prerequisite: 3653 or 3543 or concurrent enrollment in either. Qualitative and quantitative examination of biochemical materials and reactions.

4113*
Biochemistry. Prerequisite: 3653. An extension and expansion of 3653.

4990*
Special Problems. 1-5 credits, maximum 5. Lab 3-15. Training in independent work, study of relevant literature and experimental investigation of an assigned problem.

5000*
Research. 1-6 credits, maximum 6. For M.S. thesis.

5753*
Biochemical Principles. Prerequisite: CHEM 3153 or equivalent. Chemistry of cellular constituents; introduction to the chemical processes in living systems. The first in a series of courses for graduate students in biochemistry and related fields.

5823*
Biochemical Laboratory Methods. Lab 8. Prerequisites: 4113 or 5753, or concurrent enrollment in either, and CHEM 2113 and 2122, or 3324. Quantitative experiments illustrating biochemical principles and basic laboratory methods. No credit for students with credit in 5930.

5853*
Metabolism. Prerequisite: 5753 or 4113. Reaction sequences and cycles in the enzymatic transformations of fats, proteins and carbohydrates; energy transfer, biosynthesis and integration in the metabolic pathways.

5930*
Advanced Biochemical Techniques. 1-5 credits, maximum 5. Prerequisites: 5753 or concurrent registration, and consent of head of Department. Comprehensive lecture and laboratory course in advanced research techniques covering photometry, chromatography, isotopes, enzymes, macromolecules and metabolism. Offered in 5 consecutive parts in a semester. Any or all parts may be taken separately, each for one hour credit. Reduced credit for students with credit in 5823.

6000*
Research. 1-15 credits, maximum 60. For Ph.D dissertation.

6110*
Seminar. 1-2 credits, maximum 2 for Ph.D. candidates or 1 for M.S. candidates. Prerequisite: 5853. Graded on pass-fail basis.

6732*
Biochemical Regulation. Prerequisite: 5853 or 4113. Mechanisms by which biochemical reactions, pathways and processes are controlled. Qualitative and quantitative behavior of various biochemical systems analyzed.

6742*
Physical Biochemistry. Prerequisites: one semester of biochemistry, calculus and physical chemistry Physical principles underlying molecular phenomena of biology and methods for their study. Besides core of topics, additional items may be chosen for individual or group study.

6752*
Enzymes: Kinetics and Mechanism. Prerequisite: 5753 or 4113. Theory of and methods for study of enzyme catalysis, including kinetics, chemical modification and model studies, illustrated with examples from the current literature.

6762*
Nucleic Acids and Protein Synthesis. Prerequisite: 5753 or 4113. The encoding of information into base sequences of nucleic acids and the expression of this information by means of protein synthesis. Structures, mechanisms, enzymatic synthesis and modification, reaction sequences, and control emphasized.

6772*
Protein Structure. Prerequisite: 5733 or 4113. Protein structure (sequence, conformation, quaternary structure) illustrated by examples of selected proteins.

6782*
Membranes and Transport. Prerequisite: 5853 or 4113. Components, organization and biosynthesis of cellular membranes, emphasizing structure/function relationships of plasma membranes. Mechanisms and energetics of transport of substances across various membranes including plasma membranes and organelles.

6792*
Plant Biochemistry. Prerequisites: 4113 or 5753. Biochemistry of processes and structures of special importance to plants, such as photosynthesis, cell walls, nitrogen fixation, secondary metabolites and storage proteins.

6820*
Selected Topics in Biochemistry. 1-2 credits, maximum 6. Prerequisite: 5853. Subject matter will vary from year to year; students should inquire at the Department office before enrolling.

BIOLOGICAL SCIENCE (BISC)

1114
(L,N,SpD)Introductory Biology: Populations and Ecosystems. Lab 2. Ecological principles, populations, man and environment; genetics, reproduction and development; concepts of evolution, selection, adaptation, speciation and taxonomy. For the nonmajor.

1214
(L,N,SpD)Introductory Biology: Organisms. Lab 2. Cellular organization and function, energy relations, maintenance of living systems, coordination and behavior. For the nonmajor.

1220
Current Topics in Biology. 2 credits, maximum 8. Topics of current interest especially designed for nonbiology majors.

1222
(N,SpD)Man and Disease. Types of diseases, such as infectious or genetic, and diseases of major organ systems. How diseases are diagnosed and treated; biological processes involved in disease. For the nonbiology major.

1232
(N)Human Reproduction. Human reproduction is dealt with in terms of anatomy, physiology, embryology, genetics and evolution. Birth control, and teratogenic substances as well as pregnancy and childbirth. For the nonbiology major.

1252
(N)Man and Environment. The impact of man's activities on the natural world and an analysis of the potential of technological and societal changes on the environment. For the nonbiology major.

1262
(N,SpD)Plants and Man. Types of plants, form and function, uses of plants by man, and impact of plants on society. For the nonbiology major.

1272
(N,SpD)Human Origins. The scientific evidence for the evolution of human morphology, technology, behavior and ecology. For the nonbiology major.

1283
(L,N)Microbes and Man. Lab 2. Characteristics of bacteria and techniques used in their isolation, cultivation and identification. Food sanitation, disease transmission and immunity. Water treatment and chemical and physical control of bacteria. For the nonbiology major.

1304
(L,N)Principles of Biology. Lab 2. High school chemistry or one semester of college chemistry recommended. Unifying principles of cellular, organismal, population and ecosystem biology. Genetics, evolution, classification, development, energy transformations, integration and control in biological systems. The nature of biological investigation receives attention.

1403
(N)Plant Biology. Lab 3. Prerequisite: 1304. Survey of the plant phyla, structure and function of plant organs, water relations, translocation, reproduction, growth and development. Emphasis on the importance of plants to mankind.

1603
(N)Animal Biology. Lab 2. Prerequisite: 1304. Morphology, physiology, ecology, embryological development behavior, life histories and importance to man of representatives of major groups. Evolution of systems and mechanisms which have allowed animals to survive and adapt to diverse habitats.

3014*
Cell and Molecular Biology. Lab 3. Prerequisites: 1403, or 1603, or equivalent; and organic chemistry. The cell concept and cell morphology, cell macromolecules, organelles, enzymes, energetics, movement of water and materials across membranes, influence of external environment, cellular synthesis, growth and maintenance, control and integration of function, replication, differentiation, origin and evolution of cells.

3024*
General Genetics. Prerequisite: 1403, or 1603, or equivalent. Inheritance in plants, animals and microorganisms; molecular and classical aspects.

3034*
(L)General Ecology. Lab 3. Prerequisite: 1403, 1603 or equivalent. Physical and biotic environment, responses of organisms to the environment, community ecology, natural ecosystems, and man's interaction with ecosystems.

4100
Problems and Special Study. 1-4 credits, maximum 4. Prerequisite: approval of instructor. Participation in research problems involving library, laboratory or field studies.

4313*
Biophysics. Prerequisites: 1403, or 1603; PHYSC 1214 or 2114; CHEM 3015. The application of physical concepts to biological structures and processes. Interaction of light with biological materials, effects of radiation on living systems, electrical processes of biological systems, thermodynamics, nature of biological materials and the application of physical concepts in biological instrumentation. Same course as PHYSC 4313.

5100*
Current Topics in Biology for Teachers. 1-4 credits, maximum 4. Prerequisite: approval of instructor. Acquaints the primary or secondary teacher with recent advances in biology. May include lecture, laboratory or field work.

5413*
Developmental Biology. Prerequisites: 3014 or equivalent. The molecular basis of developmental events. Cell division, interaction, differentiation, migration and death as developmental mechanisms. Developmental aspects of carcinogenesis and teratology.

BOTANY (BOT)

3005
(N)Field Botany. Lab 6. Prerequisite: BISC 1114 or 1304 or equivalent. Collecting and identifying vascular plants including use of keys and terminology. Field recognition of native dominant Oklahoma plant and plant communities on sight, and discussion of the ecologic factors that control them. For students in range management, wildlife ecology, animal science, forestry, and agronomy, and for non-scientists interested in learning the plants of Oklahoma. Three or four weekend field trips required.

3013*
Biological Microtechnique. Lab 3. Prerequisite: BISC 1403 or 1603. Techniques for preparation of biological materials for microscopic examination. Same course as ZOOL 3013.

3024*
Plant Diversity. Lab 4. Prerequisite: BISC 1403. Forms and life histories of selected plants with emphasis on some of the less familiar forms. The diversity of plant forms as well as basic similarities in life histories; importance of each form to man and his environment. Field trips required.

3114*
Plant Taxonomy. Lab 4. Prerequisite: BISC 1403 or equivalent. Vocabulary and concepts of plant taxonomy: terminology, keys, nomenclature, documentation, classification and biosystematics. Emphasis on angiosperm flora of Oklahoma. Field trips required.

3233*
Plant Anatomy. Lab 3. Prerequisite: BISC 1403. Structure of cells, tissues and organs of plants. Consideration of structure as related to ontogeny, phylogeny and function.

3460*
Plant Physiology Laboratory. 1-2 credits, maximum 2. Lab 2-4. Prerequisite: 3463 or concurrent enrollment. Skills in techniques for working with plants, experiments involving nutrition, respiration, photosynthesis, water relations, translocation, hormones, growth and development. Students having credit in BISC 3014 should enroll for one hour; all others enroll for 2 hours credit.

3463*
Plant Physiology. Prerequisite: BISC 1403. Plant subcellular structure, water relations, water absorption and ascent of sap, translocation, gaseous exchange, nutrition, enzymes, respiration, photosynthesis, growth, development, reproduction, tropisms, hormones, dormancy and seed germination.

3693*
Plant Geography. Prerequisite: BISC 1403. Discussion of the natural geography of the world's plants and the factors controlling it, especially environmental and biological, with emphasis on evolutionary trends and events.

4023*
Plant Ecology. Prerequisite: BISC 3034 or equivalent. Autecological principles applicable to higher plants including effects of specific environmental variants on plant processes and distributions.

4033*
Freshwater Algae. Lab 3. Prerequisite: BISC 1403. The taxonomy, ecology, and physiology of algae in lakes and streams with special reference to their role in overall aquatic productivity. Field trips required.

4374*
Agrostology. Lab 4. Prerequisite: BISC 1403. Grasses and the principles involved in their classification. Field trips required.

4400
Undergraduate Research. 1-2 credits, maximum 5. Prerequisite: consent of instructor. Undergraduate research problems in botany.

4553*
Plants of the Southern Rocky Mountains. Lab 6. Prerequisite: BISC 1403. Skills and concepts needed to describe, identify and preserve plants. Sight recognition of a number of dominant plant species and plant communities from the Southern Rocky Mountains. Offered only as a summer session course. Two-week field trip to Colorado required.

5000*
Research. 1-6 credits, maximum 6. Research for the M.S. degree.

5104*
Mycology. Lab 6. Prerequisite: graduate standing. Study of the fungi. Same as PLP 5104.

5110*
Problems in Botany. 1-5 credits, maximum 8. Prerequisite: consent of instructor. Special studies in any area of botany.

5213*
Botanical Limnology. Lab 3. Prerequisite: BISC 1403. Taxonomy, ecology, and physiology of freshwater algae and vascular aquatic plants, with special reference to their role in overall limnological dynamics. Field trips required.

5223*
Vegetation Sampling and Measurement. Lab 3. Prerequisites: 3005 or 3114; 4023 and introductory statistics; or consent of instructor. Theory and application of quantitative sampling of vegetation in terrestrial habitats with emphasis on density, frequency and mass. Local field trips and special project required.

5232*
Cytogenetics Laboratory. Lab 4. Prerequisite: AGRON 5342 or concurrent enrollment. Cytogenetic research techniques, especially karyotyping; observation and interpretation of cytogenetic phenomena including mitosis, meiosis and chromosomal aberrations.

5263*
Plant Physiological Laboratory Techniques. Prerequisites: 3463 and 3460 or equivalent. Research techniques applicable to plant physiological problems.

5314*
Phylogeny and Classification of Flowering Plants. Lab 6. Prerequisite: 3114. Plant taxonomy and the relationship of various groups of vascular plants.

5403*
Physiological Action of Herbicides and Plant Growth Regulators. Prerequisite: 3463. The mode of action, breakdown and movement of herbicides and plant growth regulators in plants and soils.

5423*
Physiology of Ion Metabolism. Prerequisite: 3463 or equivalent. Physiology of ion absorption, translocation, metabolism and functions in higher plants.

5533*
Advanced Ecology. Lab 3. Prerequisite: 4023 or BISC 3034. Physiological and evolutionary aspects of plant ecology as revealed by recent research. Spring recess field trip required.

5543*
Plant Ecological Genetics. Prerequisites: BISC 3024 and 3034, or equivalents. Variation below the species level in natural plant populations: genetic basis (including quantitative genetics), ecological implications, and microevolutionary outcomes. Emphasis on morphological, biochemical, and life-history variation and their adaptive significance, with some consideration of the larger processes of coevolution, divergence, and speciation.

5753*
Physiology of Growth and Development. Prerequisite: 3463 or equivalent. Consideration of plant subcellular organization and function, gene and enzyme regulation, cell life cycles, plant hormones, cell growth and growth control mechanism, tropisms and phloem transport.

5763*
Plant Tissue Culture. Lab 3. Prerequisite: 3463 or BISC 3014. Skills in sterile technique, media preparation, embryogenesis and organogenesis. Survey of the major types of tissue culture and their application to crop and horticultural species. Introduction to general principles of genetic engineering of plant cells.

5813*
Plant Developmental Genetics. Prerequisites: 3463 and BISC 3024 or equivalent. Discussion of morphogenesis, embryogenesis, gametogenesis, and the regulation of gene expression during plant development. Emphasis on recent genetic, experimental, and molecular studies of development in higher plants.

5823*
Plant Morphology. Lab 3. Prerequisite: 3024. Comparative study of the form and life cycle of representative genera of the major taxa of vascular plants. Field trips required.

5850*
Botany Seminar. 1 credit, maximum 6. Required of senior and graduate majors.

5923*
Environmental Plant Physiology. Prerequisite: 3463 or equivalent. Effects of light, temperature, water, soil and other environmental factors on physiological responses of plants; photosynthesis, water relations, water and temperature stress, flowering, dormancy and germination.

6000*
Research. 1-15 credits, maximum 36. Independent research for the doctoral dissertation.

BUSINESS ADMINISTRATION (BUSAD)

2010
Special Topics. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special topics and independent study in business.

4010
Business Projects. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special advanced topics, projects and independent study in business.

4050*
Honors Colloquium. 3-9 credits, maximum 9. Prerequisites: junior standing and consent of the instructor and the Dean. Study of an interdepartmental and interdisciplinary nature of various important issues and aspects of our business and economic environment. Provides an intellectual challenge for the able student with a strong interest in scholarship.

4113*
Small Business Management. Prerequisite: Business core courses or consent of instructor. Problems faced in the creation and early growth periods of business enterprises. Accounting, finance, opportunity recognition, legal constraints, management, marketing, taxation and procedural problems. To solidify the concepts covered, students are asked to create a plan for implementation and operation of a new business venture.

4513*
Strategic Management and Business Policy. Prerequisites: senior standing and completion of common body core of the CBA. A terminal integrating course in formulating and implementing basic policy for business. Planning models, policy models and strategy development. Strategic decisions applied to practical examples of problems firms now face and of problems that they will face given current trends in the external environment.

5013*
Research Methods for Business. Prerequisite: STAT 2023, admission to MBA program or approval from MBA director. Role of Bayesian and inferential statistics in business research and management decision making. Measurement, scaling, survey methods, and forecasting. These tools will be presented and reviewed in their applications to marketing; managerial, human resource, financial and, production planning; and other related business topics. Use of computers in statistical analysis.

5110*
Computer Applications in Business. 3 credits, maximum 3. Prerequisite: admission to MBA program or approval from MBA director. Introduction to management information systems, statistical and optimization packages, financial modeling languages and microcomputers. Algorithmic programming in FORTRAN/BASIC/COBOL.

5113*
Entrepreneurship and Venture Management. Enterprise creation and problems faced by entrepreneurs in early growth stages of business ventures. An interdisciplinary problem-solving approach with emphasis on 'live' case studies and plans for new business ventures. Emphasis is on entrepreneurship rather than problems faced by going concerns.

5613*
The External Environment of Business. Prerequisite: admission to MBA program or approval from MBA director. Social, ethical, regulatory and political forces as they impact on the organization. Attention to organizational response to these forces through management policies and strategies.

5713*
Analysis of the Multinational Firm. Identification and analysis of the managerial, financial and market problems facing the multinational firm. Focus is empirical, and stressing application of ecological and quantitative tools to the study of the multidimensional nature of the international business environment.

5990*
Graduate Research Projects. 3 credits, maximum 6. Prerequisites: graduate standing and consent of supervising professor. Graduate research projects to partially meet the requirements of the MBA program.

6000*
Research and Thesis. 3-9 credits, maximum 30. Prerequisite: approval of advisory committee.

6100*
Seminar in Business Administration. 3-6 credits, maximum 6. Prerequisite: doctoral student status and consent of instructor. Interdisciplinary in nature; focused on research methodology.

BUSINESS COMMUNICATIONS (BCOMM)

3113
Written Communication. Prerequisite: 50 semester credit hours. Analysis of business communication problems in terms of generally accepted communication principles. Practice in written messages; specifically, special goodwill letters, neutral and good-news, disappointing, persuasive and employment messages.

3223
Organizational Communication. Prerequisite: 50 credit hours. Communication theory and process; common and special problems associated with interpersonal and organizational communication affecting business decisions and operations. Principles and methods of basic and applied research in business and communication; practice in administrative report writing. Analysis of selected business cases.

4523*
Real Estate Law, Management and Practice. Prerequisite: 3213. Real property law and practice. Nature of real property; land descriptions; title information; conveyancing; listing and sales contracts; loans and mortgages; brokers and salesmen; landlord-tenant relations; condominiums, shopping centers. Successful completion qualifies persons to sit for Sales Associate State Licensing examination. Trusts and estates: matters involving estate planning, wills; law of descent and distribution; probate administration; gift and estate taxes; and fiduciary management of property.

5113*
Seminar in Administrative Communication. Understanding and application of valid and relevant communication principles and theories. Designed to develop management-level personnel who can effectively and efficiently use oral and written communications as administrative tools to organizational functioning.

5210*
Business Communication Applications. 1-3 credits, maximum 3. Application of communication techniques to the business setting. Interpersonal communication skills necessary for the manager in a business organization. Problems and applications within the modern business setting.

BUSINESS EDUCATION (BUSED)

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: consent of department head.

5110*
Problems in Business Education. 1-3 credits,maximum 6. Current problems in business education, based upon the interests and needs of the students.

5330*
Field Study. 1-6 credits, maximum 6. Prerequisite: consent of department head. Individual investigations conducted in absentia and internships; periodic conferences and reports during the progress of the study.

6000*
Doctoral Thesis. 1-10 credits, maximum 10. Prerequisites: advanced graduate standing and approval of department head. Independent research for the doctoral thesis. Credit is given upon completion of the thesis.

6110*
Graduate Reading in Business Education. 1-3 credits, maximum 6. Prerequisites: graduate standing and consent of department head and supervising professor. Supervised reading of significant literature not included in regularly scheduled courses.

BUSINESS LAW (BUSL)

1113
Law in Society. Forms and types of law and their evolution, including antitrust, ecology, consumerism and civil rights. Political, social and economic forces affecting legal developments. Legal needs of society and the probable future direction of the law.

3213
Law of Contracts and Property. General concepts of jurisprudence; judicial systems; substantive law of torts, contracts, and property as they relate to the business environment.

3323
Law of Commercial Transactions and Debtor-Creditor Relationships. Prerequisite: 3213. Concentrated study of law relating to certain commercial transactions and debtor/creditor relationships. Includes law of sales, negotiable instruments, secured transactions, suretyship and bankruptcy.

3422
Business Law. Prerequisite: 50 semester credit hours. Legal background, contracts, bailments, agency, sales, and negotiable instruments. Not open to students who have credit in 3213.

4413*
Law of Business Organizations. Prerequisite: 3213. General principles of law relating to the formation, operation and termination of various forms of business organizations. Includes a study of the law of agency, partnerships and corporations.

4633*
Legal Aspects of International Business Transactions. Prerequisites: 3213 or equivalent. Legal aspects of operating a business entity engaged in international commerce. Topics may include: foreign business organizations, U.S. taxation of foreign investors, common clauses in transnational contracts, problems of technology transfer on the international market, anti-trust aspects of international business, and jurisdictional problems in resolving disputes.

5163*
Legal Environment of Business. Legal environment within which business must operate. Nature and source of law, the operation of the judicial system, the operation of administrative agencies, selected Constitutional provisions frequently involved in litigation of business problems, and selected substantive legal areas having a direct relationship with business operation and decision making.

BUSINESS PROFESSIONS (BUSPR)

2313
Production Typewriting. Lab 2. Prerequisite: 1100 or equivalent. Continued skill development in correct techniques, speed and accuracy with major emphasis on the application of skill.

2630
Automated Office Applications. 1-3 credits, maximum 3. Lab 4. Prerequisites: 2313 or equivalent and 24 semester credit hours. Application of automated office equipment to work processes in the office. Operation and use of word-processing equipment for text editing, operation and use of the microcomputer in text editing and other office information systems, and transcription of office communications.

3523
Office Problems in Typewriting. Lab 2. Prerequisite: 2313 or equivalent. Problems in office situations requiring application of typewriting knowledge and skills. Emphasis on quality work at high speeds.

4363
Teaching Bookkeeping and Accounting. Prerequisites: ACCTG 2203, ABSED 3213, CIED 2113, and skill in secretarial business subjects. Teaching bookkeeping and accounting including development of objectives; organization, assessment and preparation of instructional resources and materials. Administration and interpretation of assessment techniques; design and use of diagnostic and achievement examinations; interaction patterns and instructional modifications.

4653*
Data Processing Instructional Methods and Procedures. Prerequisite: GENAD 2103 or COMSC 2113. Instructional methods in the teaching of data-processing courses including the development of an understanding of computer hardware and software concepts and terminology. Problems, methods, and techniques in using and teaching concepts about the computer and computer programming languages are included. 'Hands-on' programming experience is an integral part of the course. Lab required.

5770*
Seminar in Vocational Business and Office Education. 1-3 credits, maximum 6. Prerequisite: consent of department head. Problems, materials, methods, history and current theory and philosophy of vocational business and office education programs.

CHEMICAL ENGINEERING (CHENG)

2033
Introduction to Chemical Process Engineering. Lab 3. Prerequisite: CHEM 1515. Application of mathematics and scientific principles to solving chemical engineering problems. Simple material and energy balances applied to process design. The nature and application of unit operations and unit processes to the development of chemical processes.

3013*
Rate Operations I. Lab 3. Prerequisites: 2033 and ENGSC 3233. Basic rate equations for heat, mass and momentum transport; the transport analogies, solutions and correlations for predicting transport rates for practical applications; utilization in design and analysis of process equipment.

3113
Rate Operations II. Prerequisites: 3013, 3473. Continuation of CHENG 3013.

3243*
Elements of Petroleum Refining. Lab 3. Prerequisite: CHEM 3015. Survey of refining methods and processes. Physical properties of petroleum and its products and their relation to the refining process. Principles of petroleum testing and interpretation of the results.

3473*
Chemical Engineering Thermodynamics. Lab 3. Prerequisites: ENGSC 2213; concurrent enrollment in 2033 and CHEM 3434. Application of thermodynamics to chemical process calculations. Behavior of fluids, including estimation of properties by generalized methods. Study of chemical thermodynamics, including heats of reaction, chemical reaction and phase equilibria.

4002*
(L)Chemical Engineering Laboratory I. Lab 6. Prerequisites: 3013 and 3473. Applications of heat, mass, and momentum transfer, unit processes, and unit operations principles to the analysis of bench and pilot-scale equipment. Interpretation of experimental data and the presentation of results are emphasized.

4112*
(L)Chemical Engineering Laboratory II. Lab 6. Prerequisite: 4002. A continuation of 4002.

4123*
Chemical Engineering Design I. Prerequisites: 3113, concurrent enrollment in 4002. Economic analysis of process plants and systems of equipment; methods for estimating plant investment requirements and operating costs; economic evaluation and optimal design of chemical process systems; basic equipment and process design calculations.

4223*
Chemical Engineering Design II. Prerequisite: 4123. A continuation of CHENG 4123. Economic analysis of process plants and equipment. Design of chemical processing equipment and chemical plants. Application of computer techniques to chemical engineering design.

4333
Transport Phenomena. Prerequisite: 3013. Physical and mathematical similarities and differences of momentum, heat and mass transfer. Molecular theories of viscosity, thermal conductivity and diffusion. Shell balance techniques, Navier-Stokes equations, differential equations of energy and continuity in multi-component, reactive and nonreactive systems used to solve simple transport phenomena problems. Transport phenomena in turbulent flow systems with convective heat and mass transfer complemented with unsteady state transport.

4363*
Chemical Processes. Prerequisite: senior standing. Chemical process industries are studied from the standpoint of technology, raw materials, products and processing equipment. Thermodynamics and kinetics of industrial processes.

4473*
Chemical Reaction Engineering. Lab 3. Prerequisite: senior standing. Principles of chemical kinetics rate concepts and data treatment. Elements of reactor design principles for homogeneous systems; introduction to heterogeneous systems.

4581*
Seminar. Prerequisite: senior standing. Recent developments in chemical engineering and the process industries.

4613*
Fundamentals of Reservoir Engineering. Prerequisites: MATH 2613 and 3473 or MAE 3613. Properties of porous media, properties and phase behavior of reservoir fluids. Computational schemes, including numerical methods, for predicting and optimizing production rates and establishing reserves.

4683*
Petroleum Processes. Prerequisite: 3473. Analysis of the unit processes of petroleum refining.

4840*
Process Control Laboratory. 2-5 credits, maximum 5. Lab 4-8. Prerequisites: 3013 and MATH 2613. Experimental study of control loop performance including: process dynamics, sensors, feedback controllers, and control valves. Analog and digital techniques including: pneumatic and electronic components, programmable controllers, and computer simulation with colorgraphics.

4843*
Chemical Process Instrumentation and Control. Prerequisites: 3013 and MATH 2613. Instruments for measuring temperature, pressure, composition and other process variables; different modes of control and their influence on process stability. System analysis and design through linearization technique.

4990
Special Problems. 1-5 credits, maximum 5. Lab 3-15. Prerequisite: senior standing. Training in independent work, study of relevant literature and experimental investigation of an assigned problem.

5000*
Master's Thesis. 1-6 credits, maximum 6. Prerequisite: approval of major professor. Methods used in research and thesis writing.

5030*
Professional Practice. 2-6 credits, maximum 8. Prerequisites: senior standing and consent of instructor. Application of chemical engineering principles to the solution of real-life engineering problems in an actual or simulated industrial environment. Includes application of design and testing procedures, economic evaluation and reporting on one or more assigned projects.

5110*
Special Topics In Chemical Engineering. Lab 2-6. 2-3 credits, maximum 6. Prerequisite: consent of instructor. Small group and individual projects in unit operations, unit processes, chemical kinetics, computer applications, process modeling or any of a wide range of chemical engineering topics. May be repeated for credit if subject matter varies.

5123*
Advanced Chemical Reaction Engineering. Prerequisite: 4473. Advanced principles and applications of chemical kinetics in catalysis, heterogeneous systems, non-ideal reactions, polymerization and biological reactions.

5213*
Selected Diffusional Unit Operations. Mass transfer in fluids. Diffusion in liquids and gases. Equilibrium stage and transfer unit concepts. Mass transfer concepts of diffusional unit operations such as absorption, adsorption, crystallization, drying, humidification and liquid extraction.

5283*
Biochemical Engineering. Prerequisite: consent of instructor. Application of fundamental chemical engineering principles to challenges posed by biotechnology. Fermentation technology, biological mass transfer and kinetics, and bioprocessing design and scale-up.

5320*
Introduction to Nuclear Engineering. 3-4 credits, maximum 4. Principles and application of nuclear energy. The fission reaction, the behavior of neutrons, nuclear reactor theory and nuclear reactors.

5423*
Process Heat Transfer. Application of fundamental principles of single- and two-phase fluid dynamics and heat transfer to the design and analysis of process heat transfer equipment.

5463*
Two Phase Flow and Heat Transfer. Prerequisite: 3013 or MAE 4233. Thermodynamic relationships in gas/vapor-liquid systems. Flow regimes. Conservation equations for two-phase flows. Pressure effects. Pipeline design. Heat transfer in condensing and vaporizing systems.

5553*
Metallurgical Failure Analysis. Prerequisite: ENGSC 3313 or equivalent. Mechanisms which cause materials failure. Instrumentation used for failure analysis. Case history study of representative failures. Laboratory analysis of failed samples.

5583*
Corrosion Engineering. Prerequisite: ENGSC 3313. Modern theory of corrosion and its applications in preventing or controlling corrosion damage economically and safely in service.

5633*
Stagewise Operations. Stagewise separation in binary and multicomponent systems. Development of theoretical techniques with application to typical situations in vapor-liquid, liquid-liquid and solid-liquid systems. Use of digital and analog techniques.

5743*
Chemical Engineering Process Modeling. 3 credits, maximum 6. Chemical engineering systems and process models. Analytical and numerical methods of solution of resulting equations or systems of equations, with computer methods in a chemical engineering context.

5793*
Advance-Process Design and Economics. Prerequisites: 4123, 4223. Application of chemical engineering principles to the design and analysis of process equipment and plants; prediction and extrapolation of thermal and physical properties; methods for design and synthesis of process units and equipment.

5843*
Principles of Chemical Engineering Thermodynamics. Principles of thermodynamics. Properties of fluids and prediction of thermodynamic properties. Phase and chemical equilibrium. Thermodynamics in unit operations.

5853*
Advanced Chemical Process Control. Prerequisite: 4843 or equivalent. Computer-based process control techniques. Discrete equivalent to the PID analog controller. Z-transform analysis of sampled-data control systems. Digital control algorithms for feed-back, feed forward, and multivariable control. Application of advanced concepts to distillation control and other chemical process units.

5873*
Air Pollution Control Engineering. Causes, effects and control of atmosphere pollution. Same course as CIVEN 5873.

5953*
Petroleum Technology. Polymerization, catalytic cracking, reforming and other unit processes. Unit operations as applied to petroleum refining. Economics of refining operations.

5990*
Special Problems. 2-4 credits, maximum 9. Prerequisite: consent of instructor. Individual report topics in chemical engineering involving operations, processes, equipment, experiments, literature search, theory, computer use or combinations of these.

6000*
Doctoral Thesis. 2-15 credits, maximum 30. Prerequisite: approval of major professor. The doctoral candidate will register for a minimum of 3 semester credit hours to a maximum of 15 semester credit hours in each semester during which laboratory work is in progress. Methods used in research and thesis writing. An original investigation of a problem in chemical engineering and its report in a dissertation.

6010*
Chemical Engineering Seminar. 1-3 credits, maximum 3. Advanced research and development topics.

6023*
Chemical Engineering Science I. Prerequisites: 5213 and 5423. Theoretical aspects of fluid dynamics, heat transfer and mass transfer. Boundary layer theory, multiphase flow theory of diffusion and interphase mass transfer. Analogies between heat, mass and momentum transfer.

6113*
Chemical Engineering Science II. Prerequisite: 6023. Continuation of 6023. Theoretical aspects of fluid dynamics, heat transfer and mass transfer. Boundary layer theory, multiphase flow. Theory of diffusion and interphase mass transfer. Analogies between heat, mass and momentum transfer.

6223*
Advanced Chemical Engineering Thermodynamics. Prerequisite: 5843. Phase equilibrium in multicomponent systems. Irreversible processes. Properties of fluids and the prediction of properties by statistical methods. Application of thermodynamics to unit operations.

6440*
Advanced Topics in Chemical Engineering. 3-6 credits, maximum 9. Topics in chemical engineering unit operations in design. Advanced mathematical techniques in chemical engineering problems. May be repeated for credit if subject matter varies.

6543*
Chemical Engineering Kinetics. Prerequisite: 6223. Kinetics of chemical reaction. Reaction rates in homogeneous systems. Design of batch and fluid reactors. Catalysis and the design of gas-solid catalytic reactors.

CHEMISTRY (CHEM)

1014
(L,N)Chemistry in Civilization. Lab 2. Symbols, methods and contributions to society of the chemical sciences. Includes polymers, pollution, energy, consumer chemicals, drugs, nuclear science and other topics. No credit for students with credit in 1025, 1215, 1314.

1215
(L,N)General Chemistry. Lab 2. The beginning chemistry course recommended for students in the applied biological sciences. No credit for students with credit in 1014, 1025, 1314.

1225
(L,N)General Chemistry. Lab 2. Prerequisite: 1215 or advanced placement. A continuation of general chemistry, recommended for students in the applied biological sciences. No credit for students with credit in 1415 or 1515.

1314
(L,N)General Chemistry. Lab 2. Prerequisite: MATH 1213 or one and one-half units of high school algebra. The beginning chemistry course recommended for students in basic biological sciences (including premedical science and pre-veterinary science), physical sciences and engineering. No credit for students with credit in 1014, 1025, 1215.

1515
(L,N)General Chemistry. Lab 2. Prerequisite: 1314 or advanced placement. A continuation of general chemistry. No credit for students with credit in 1225.

2113
Principles of Analytical Chemistry. Prerequisites: 1515 or 1415, and MATH 1513 or 1715. Modern theories of solutions, separation techniques and methods of analysis. No credit for students with credit in 3324.

2122
Quantitative Analysis Laboratory. Lab 6. Prerequisite: 2113 or concurrent enrollment. Laboratory work related to material covered in CHEM 2113. No credit for students with credit in 3324.

2344
(N)Organic Chemistry. Prerequisite: 1025 or 1225 or equivalent. For students in agriculture taking 3-semester sequence 1025-2344-BIOCH 3543. Fundamentals of organic chemistry with an introduction to biologically important molecules. No credit for students with credit in 2463, 3015 or 3053.

3015*
(N)Introductory Organic Chemistry. Lab 4. Prerequisite: 1415 or equivalent. Terminal course in organic chemistry covering general principles, methods of preparation, reactions and uses of both acyclic and cyclic compounds. No credit for students with credit in 2344, 2463, 3053 or 3112.

3053*
Organic Chemistry. Prerequisite: 1515 or equivalent. Hydrocarbons and their derivatives, including specific compounds of theoretical, biological or industrial importance. No credit for students with credit in 2344, 2463 or 3015.

3112
Organic Chemistry Laboratory. Lab 6. Prerequisite: 3153 or concurrent enrollment. Laboratory exercises related to theoretical principles covered in CHEM 3053 and 3153. No credit for students with credit in 3015.

3153*
Organic Chemistry. Prerequisite: 3053. A continuation of 3053.

3324*
Introductory Quantitative Analysis. Prerequisite: 1225 or equivalent. Volumetric, gravimetric and instrumental methods of analysis. A terminal course in analytical chemistry. No credit for students with credit in 2113 or 2122.

3353
Descriptive Inorganic Chemistry. Prerequisite: 1225 or 1515. Structures and properties of the elements and their many compounds in the broadest sense which includes the modern technologically important materials, organometallics, and inorganic substances of biological significance.

3434*
Physical Chemistry I. Prerequisites: 2113, MATH 2365. Introductory theoretical analysis of molecular structure, chemical bonding and macroscopic chemical systems using quantum theory, classical and statistical thermodynamics and kinetics. Students who are not chemistry majors may receive graduate credit. No credit for students with credit in 3354.

3532*
Physico-Chemical Measurements. Lab 6. Prerequisites: 2122, 3434. Apparatus, experimental methods and calculations employed in physico-chemical investigations.

3553*
Physical Chemistry II. Prerequisite: 3434. A continuation of 3434. Students who are not chemistry majors may receive graduate credit.

4024*
Modern Methods of Chemical Analysis. Lab 6. Prerequisites: 2122, 3434. Theoretical and laboratory study of modern techniques, reagents and instruments employed in analytical chemistry.

4320*
Chemical and Spectrometric Identification of Organic Compounds. Lab 1-2. 1-3 credits, maximum 3. Prerequisites: 3112 and 3153. Theory and practice in separating mixtures of organic compounds and some theory and practice in identifying organic compounds by spectroscopic methods.

4333*
Inorganic Chemistry. Prerequisite: 3 hours of physical chemistry. Valence, periodic system, complex ions and the more important classes of inorganic compounds.

4482*
Chemical Literature and Reference Work. Prerequisites: 2113, and 3015 or 3053. Use of the chemical library; journals, reference works and other sources of information on chemical subjects.

4990*
Special Problems. 1-5 credits, maximum 6. Lab 3-15. Prerequisite: senior standing. Training in independent work, study of relevant literature and experimental investigation of an assigned problem.

5000*
Thesis. 1-6 credits, maximum 6. Investigations, chiefly experimental, with necessary conferences. Familiarizes the student with methods used in research in chemistry.

5011*
Graduate Seminar. Preparation and presentation of seminars, usually on subjects of current interest taken from the literature. Completion of 1 credit hour required for M.S. degree.

5103*
Physical and Chemical Separations. Prerequisite: one year of physical chemistry. Principles of bulk and multistage separation methods: chromatography, liquid-liquid extraction, zone melting, etc.

5113*
Equilibrium and Kinetics in Analytical Chemistry. Prerequisite: one year of physical chemistry. Physical and chemical principles of equilibrium and kinetics as applied to analytical problems.

5220*
Modern Topics for Teachers. 1-6 credits, maximum 6. Prerequisite: teaching experience. Designed to help elementary and secondary science teachers improve their subject matter competence in chemistry. Content varies, depending on the needs of specific groups of teachers.

5223*
Chemistry of High Polymers. Prerequisites: 3153 and 3434 or equivalent. Preparation and polymerization of organic monomers; properties and uses of resulting high polymers; theories of polymerization; inorganic and natural organic polymers.

5282*
Radiochemistry. Prerequisites: 1515 and PHYSC 4213. Chemical aspects of nuclear reactions and reactors. Separation techniques: chemical effects of nuclear energy; isotope exchange and tracer applications.

5323*
Reactions of Organic Compounds. Prerequisite: 3153. Products and mechanisms of reactions of importance in organic synthesis.

5362*
Organic Reactions. Prerequisite: 5323. A continuation of 5323, covering more advanced material.

5372*
Spectrometric Identification of Organic Compounds. Lab 3. Prerequisite: 4320. Obtaining and interpreting spectra of organic compounds. Ultraviolet, infrared, nuclear magnetic resonance, circular dichroism, mass spectrometry.

5443*
Mechanism and Structure in Organic Chemistry. Prerequisites: 3153 and 3553. Relationship of properties of organic compounds to their structure; mechanisms of organic reactions.

5563*
Chemical Thermodynamics I. Prerequisite: 3553. Statistical and classical thermodynamics applied to chemical systems.

5623*
Quantum Chemistry I. Prerequisite: 3553. Fundamentals of quantum mechanics, including classical mechanics, wave representation of matter, the Schroedinger equation and atomic structure.

5723*
Solutions of Electrolytes. Prerequisite: 3553. Thermodynamics of solutions of electrolytes; cell potentials; transference conductance, diffusion, dielectric constants and their theoretical interpretation.

5963*
Inorganic Chemistry II. Prerequisite: 4333. Application of molecular orbital theory to inorganic molecules. Transition and nonrepresentative metal chemistry. Kinetics, mechanisms, electronic spectra and magnetism. Topics in the chemistry of nonmetals. Investigative methods.

6000*
Research. 1-12 credits, maximum 55. Prerequisite: M.S. degree in chemistry or permission of instructor. Independent investigation under the direction and supervision of a major professor.

6011*
Advanced Seminar. Prerequisite: 5011 or M.S. degree. Preparation and oral presentation of critical reviews on chemical subjects. Usually related to the student's research area. Completion of 1 credit hour required for the Ph.D. degree.

6050*
Special Topics in Analytical Chemistry. 1-6 credits, maximum 6. Supervised study of topics and fields not otherwise covered.

6103*
Electroanalytical Chemistry. Prerequisite: 4024. The theory, practice and instrumentation in various areas of modern electroanalytical chemistry.

6113*
Analytical Spectroscopy. Prerequisite: 4024. Survey of selected topics in analytical applications of spectroscopic techniques. Fundamental concepts as well as current trends in research, including instrumentation.

6153*
Mechanism of Organic Reactions. Prerequisite: 5443. Theories of organic reactions; prediction of their course.

6323*
Heterocyclic Compounds and Medicinal Chemistry. Prerequisite: 5362. Preparations and reactions of cyclic organic compounds containing atoms other than carbon in the ring. Modern synthetic techniques as well as industrial methods for the preparation of heterocycles, especially those with medicinal properties and uses as related to structural characteristics of the compounds.

6353*
Chemistry of Natural Products. Prerequisite: 5323. Complex naturally occurring organic compounds such as alkaloids, terpenes and steroids.

6420*
Special Topics in Organic Chemistry. 1-9 credits, maximum 9. Prerequisite: 3153. Deals with topics not covered in other courses.

6453*
Chemical Kinetics. Prerequisite: 3553. The kinetics of chemical reactions and their theoretical interpretation.

6523*
Quantum Chemistry II. Prerequisite: 5623 or PHYSC 5613. Molecular quantum mechanics and chemical bonding.

6553*
Molecular Spectroscopy. Prerequisite: 5623. Spectra and structure of molecules.

6623*
Chemical Thermodynamics II. Prerequisite: 5563. A continuation of 5563.

6650*
Selected Topics in Advanced Physical and Inorganic Chemistry. 1-6 credits, maximum 12. Prerequisite: consent of instructor. Supervised study of selected topics and fields not otherwise covered.

CHINESE (CHIN)

1115
(I)Elementary Chinese. Prounciation, conversation, grammar and reading.

2115
(H,I)Intermediate Chinese I. Prerequisite: 1115 or equivalent proficiency. Reading, the writing system, culture, grammar, conversation.

2123
(H,I)Intermediate Chinese II. Prerequisites: 1115 and 2115 or equivalent proficiency. A continuation of 2115.

2223
(H,I)Intermediate Chinese III. Prerequisites: 1115, 2115 and 2113 or equivalent proficiency. A continuation of 2115 and 2123.

CIVIL ENGINEERING (CIVEN)

2613
Surveying I. Lab 3. Prerequisite: MATH 1613 or 1715. First course in a measurement science. Introduction and application of plane surveying procedures. Field problems related to linear and angular measurements, differential leveling, traverses and topographic surveys. Computer applications to surveying calculations.

3114
Intermediate Strength of Materials. Lab 3. Prerequisite: ENGSC 2114. Stress-strain behavior of engineering materials. Transformation to stresses and strains in 3 dimensions. Shear and moment diagrams for beams. Stresses in beams. Buckling of columns. Truss analysis. Experimental investigation of the properties of structural materials and behavior of structural members subjected to load.

3413
Structural Analysis. Prerequisite: 3114. Analysis of internal forces and deflections of structures subjected to static loading. Beams, trusses, and framed structures are analyzed by appropriate classical methods. Classical methods and modern computer procedures for the analysis of statically indeterminate structures.

3513
Structural Steel Design. Lab 3. Prerequisite: 3114. Introduction to the design of structural steel members and connections in accordance with AISC specifications.

3523
Reinforced Concrete Design. Lab 3. Prerequisite: 3114. Introduction to the design of reinforced concrete elements in accordance with the strength design requirements of the ACI Building Code.

3603
Surveying. Lab 3. Prerequisite: MATH 1613 or 1715. For students not majoring in civil engineering. Basic course in plane surveying techniques. Linear and angular measurements, traverses, differential leveling, horizontal and vertical curves and earthwork calculations.

3613
Surveying II. Lab 3. Prerequisite: 2613. Second course in measurement science. Advanced surveying problems in precise leveling, triangulation and field astronomy. Principles of route surveying; simple compound and transition curves, vertical curves, earthwork and haul quantities. Basic photogrammetry. Computer application for triangulation, curves and profile computations. Introduction to electronic distance measurement equipment.

3633
Transportation Engineering. Lab 3. Prerequisite: 3613 or consent of instructor. Planning, design and operations of transportation facilities. Vehicle characteristics and human factors in design. Traffic stream variables and their measurement techniques. Basic traffic flow models. Highway and street intersection capacity and level of service. Traffic control concepts. Transportation systems management.

3713
Introduction to Geotechnical Engineering. Prerequisite: ENGSC 2114. Physical and mechanical properties of soils, including; specific gravity, grain size distribution, plasticity, permeability, consolidation, and shear strength. Use of physical and mechanical properties to calculate stresses in a soil mass, lateral earth pressures, bearing capacity, and slope stability.

3813
Environmental Engineering Science. Prerequisite: CHEM 1515. Engineering aspects of the life support system; the carbon-oxygen cycle; cycling of nitrogen, sulfur and phosphorus; the hydrologic cycle; the nature of organic matter; composition of organic matter; hydrocarbons, carbohydrates, lipids; proteins, nucleic acids. Oxidizability and energy content of organic matter. Introduction to Biochemical Oxygen Demand (BOD); living organic matter as an engineering material.

3823
Water and Society. How engineered water systems have influenced societies, from ancient civilization to present times. The effect of engineered water systems on developing countries also studied. The relationship between water development and the character of future societies.

3833
Hydraulics. Prerequisites: CHEM 1515, PHYSC 2014. Basic hydraulic principles and their applications in civil engineering problems. Fundamental properties of water, water pressure and pressure forces, water flow in pipes and networks, water pumps, water flow in open channels, hydraulics of wells, hydraulic similitude and model studies, and water measurements. Basic principles and concepts will be highlighted by laboratory demonstrations and computer solution techniques.

3843
Introduction to Hydrology I. Prerequisites: CHEM 1515, PHYSC 2014, CIVEN 3833 or AGEN 3013. Basic principles of surface and groundwater hydrology and their application in engineering problems. Topics include the hydrologic cycle, weather and hydrology, precipitation, evaporation, transpiration, subsurface waters, stream flow hydrographs, hydrologic and hydraulic stream routing, probability of hydrologic events, application of hydrologic models. Same course as AGEN 4313.

4010*
Civil Engineering Research. 1-4 credits, maximum 12. Prerequisite: senior standing or consent of instructor. Research and investigation of civil engineering problems.

4042
Engineering Practice. Prerequisite: senior standing or consent of instructor. Topics of management and administration of civil engineering projects. Specific areas include project management, verbal and written communications, bidding documents, bidding procedures, professional ethics, and professional liability. Also advantages of professional registration and membership in professional organizations.

4273*
Construction Planning and Scheduling. Lab 3. Prerequisites: senior standing and consent of instructor. Critical-path methods of planning, scheduling and controlling construction projects. Includes both computer and noncomputer techniques.

4711*
Basic Soils Testing Laboratory. Lab 3. Prerequisite: 3713. Laboratory measurement of the physical and mechanical properties of soils; specific gravity, grain size distribution, plasticity, compaction, compressibility, and shear strength.

4763*
Construction Estimating. Lab 2. Prerequisite: senior standing. The construction industry, its makeup, operation, estimating and bidding procedures. Theory and practice of estimating materials, labor, equipment and overhead costs for various types of construction. Emphasis on preliminary cost estimates during the conceptual design phase of a construction project.

4833*
Unit Operations in Environmental Engineering. Prerequisites: 3813 and 3833. Basic theory of water and wastewater treatment unit operation.

5000*
Master's Thesis or Report. 1-6 credits, maximum 6. Prerequisite: graduate standing. A student studying for a master's degree will enroll in this course for 2 credit hours if a report is to be written; 6 credits if a thesis is to be written.

5003*
Computer-aided Design and Analysis. Prerequisite: senior or graduate standing. The simulation of civil engineering design and analysis processes for the application of digital computing methods.

5010*
Civil Engineering Seminar. 1-3 credits, maximum 6. Prerequisites: graduate standing and approval of major professor. Review of literature of major fields of civil engineering.

5020*
Civil Engineering Research. 1-6 credits, maximum 6. Prerequisites: graduate standing and approval of major professor. Research and investigations other than thesis studies.

5030*
Engineering Practice. 1-6 credits, maximum 9. Prerequisite: approval of adviser. Professional supervised civil engineering practice involving authentic projects for which the student assumes a degree of professional responsibility. Activities must be approved in advance by the student's adviser and may consist of engineering experience on-campus or off-campus, or both. Periodic reports both oral and written are required as specified by the adviser.

5080*
Engineering Problems. 1-3 credits, maximum 6. Prerequisite: graduate standing. Problems of particular interest to graduate students in the field of applied science.

5113*
Advanced Strength of Materials. One- and two-dimensional problems in stress, deformation and instability by analytical methods.

5123*
Theory of Elastic Stability. Prerequisite: 5113. General theory of elastic stability. Buckling of columns. Analysis of beam-columns. Stability analysis of structural frames, thin-walled beams of open cross-section, and plate structures.

5223*
Systems Analysis for Civil Engineers. Prerequisite: senior or graduate standing. Synthesis of systems modeling and simulation techniques, mathematical optimization procedures, and evaluation tools of multi-attributed systems including utility theory and decision analysis. Mathematical optimization techniques in the areas of resource allocation, transportation and water resources systems planning, structural design, construction management, and environmental and ecological problems.

5414*
Classical Methods of Structural Analysis. Prerequisite: 3413. Advanced analysis of indeterminate frames, trusses and arches by classical, numerical, and energy methods with emphasis on methods for hand computations.

5423*
Matrix Analysis of Structures. Prerequisites: consent of instructor. Matrix analysis of two- and three-dimensional trusses and frames. Development of member stiffness matrices. Assemblage of structure matrices by direct stiffness method. Computer programs for structural analysis.

5513*
Advanced Reinforced Concrete Design. Prerequisite: 3523. Advanced topics in reinforced concrete design with emphasis on frames, slabs, and earthquake-resistant structures.

5523*
Advanced Steel Structure Design. Prerequisite: 3513. Advanced topics in steel design such as plastic design, plate girders, composite design, fatigue and fracture, stability, and bracing design.

5533*
Prestressed Concrete. Prerequisite: 3523. Design of simple and continuous prestressed concrete beams. Behavior under overload. Calculation of prestress losses and deflections.

5543*
Bridge Design. Prerequisites: 3513 and 3523. Structural design of steel and concrete highway bridges, including bridge types, parts of a bridge, loads and load distribution, analysis, design, and bridge rating. Emphasis on topics of special interest to students.

5603*
Design and Planning of Airports. Prerequisite: 3633. Nature of civil aviation. Aircraft characteristics and performance related to airport planning and design. Air traffic control and navigation systems. Basics of airport planning and airport demand forecasting. Analysis of airport capacity and delays. Runway length requirements. Configuration and geometric design of runways, taxiways, holding aprons, and landing areas. Airport lighting, marking, and signing. Drainage and noise control.

5613*
Traffic Control Systems Design. Prerequisite: 3633. Traffic control systems design, available technological options and range of agency needs. Design of vehicle detectors, controllers, communications links, signal display hardware and wiring. Development of timing plans using computer simulation models. Freeway surveillance and control: ramp metering, incident detection and motorist information systems. Preparation of contractual documents and construction supervision.

5623*
Terrain Interpretation and Evaluation. Lab 3. Prerequisites: 3713 and GEOL 1114 or GEOL 3024. Engineering and related properties of terrains and their reflection in topography, vegetation and man's use of surfaces. Characteristics of aerial photography and remote sensing imagery. Training and practice in the use of these media in applications and problems.

5633*
Construction Law, Contracts and Specificiations. Introduction to the U.S. legal system. Laws applicable to the construction industry. Contract documents. Principles of specification writing. Disputes, claims, and dispute resolution. Public and private contracting and bidding procedures.

5643*
Asphalt Materials. Lab 3. Prerequisite: graduate or senior standing. Composition, characteristics and uses of asphalt as a contruction material. Introduction to the physical, chemical and rheological properties of asphalt that affect its durability under service conditions.

5653*
Asphalt Mix Design. Lab 3. Prerequisite: 3633. Theory and design procedures of hot-mix asphalt concrete, including production and control of the mixture. Asphalt concrete pavement specifications and construction methods. Design and construction of asphalt pavements and bases; soil-asphalt stabilization, asphalt surface treatments and seal coats.

5663*
Transportation Systems Analysis. Prerequisite: 3633. Determinants of demand for transportation and models for demand forecasting. Performance characteristics of transportation systems and models for performance. Quantitative analysis of multimodal transportation networks including prediction of flow patterns and service quality. Evaluation of social, environmental, and political impacts of transportation decisions. Application of systems analysis techniques to the generation, evaluation, and selection of alternative transportation systems.

5673*
Concrete Materials. Lab 3. Methods of concrete mix design. Cement, aggregate and admixtures and their effect on concrete strength and durability. Experimental investigation of physical properties.

5683*
Geometric Design of Highways. Prerequisite: 3633. Geometric, functional and aesthetic aspects of roadway design. Alignment, sight distance, at-grade intersections, interchanges and freeway systems. Design tools and techniques.

5693*
Pavement Design. Prerequisite: 3633. Basic principles and current methods of pavement design. Soils and paving materials and their behavior under vehicle loads. Design of a pavement to support and spread vehicle loads to the supporting soils under all climatic conditions.

5703*
Laboratory Testing of Soils. Lab 9. Prerequisites: 3713 and 4711. Testing soils for engineering purposes. Laboratory exercises in physical and mechanical properties of soils including: specific gravity, grain size distribution, permeability, plasticity, compaction, and stabilization. Consolidation and shear strength testing of soils.

5713*
Soil Mechanics. Prerequisite: 3713 and 4711. Application of soil mechanics principles and concepts in geotechnical areas of permeability and seepage, settlement analysis, bearing capacity, lateral earth pressures and retaining walls, slope stability, and metastable soils.

5723*
Foundation Engineering. Prerequisite: 3713 and 4711. Types of structural foundations including footings, mats, rafts, piles and piers. Site characteristics, exploration programs, field data, test results and construction materials and methods as basis for selection of type of foundation and design. Design procedures and methods.

5733*
Rock Mechanics in Engineering Design and Construction. Prerequisite: adequate background in civil or architectural engineering or geology. Stresses, strength variations and deformational behavior of rocks. Engineering classification of rock. Methods of field and laboratory measurement of the engineering properties of rock. Rock mechanics consideration in the design and construction of engineering works.

5743*
Soil-Structure Interaction. Prerequisite: senior or graduate standing in civil engineering. A study of theory and applications in finite-difference and discrete-element methods for analysis of soil-supported structural elements. Procedures for analysis of beams, beam-columns and grid systems considering linearly elastic and nonlinear flexural stiffness and soil support. Methods of predicting nonlinear soil response and organization of equations for computer analysis.

5753*
Engineering Soil Stabilization. Prerequisite: 3713 and 4711. Theoretical and practical aspects of engineering soil stabilization as a method for improving and upgrading low quality and/or unstable soils for engineering purposes. Use of lime, portland cement, asphalt, sodium chloride and other physical/chemical admixtures. Conduct and evaluation of laboratory test methods and interpretation of test data. Necessary construction methods and procedures.

5763*
Construction Equipment Management. Prerequisite: INDEN 3503. Concepts and theories of equipment operation and ownership costs and their relationship to production systems. Analysis of depreciation and other fixed costs for equipment pricing on construction projects. Application of engineering fundamentals to construction methods.

5773*
Concrete Construction. Prerequisite: 4763. Design and analysis of formwork for concrete structures; economics of formwork designs. Concepts of slab construction such as for parking areas, streets and highways; cost of mixing concrete, subgrade preparation, forms, finishing, sawing and curing.

5793*
Soil Dynamics. Prerequisite: 3713. Behavior of soils under dynamic loads and its modeling. Liquefaction. Analysis of dynamically-loaded foundations and dynamic soil-structure interaction. Response of soil deposits and embankment dams to earthquakes.

5813*
Environmental Laboratory Analysis. Lab 1. Prerequisite: 4833. Analytical procedures for water and waste water contaminants. Emphasis on the chemical theory of procedures, analytical work and an understanding of the significance or need for such laboratory data for surface and groundwater management and water and wastewater treatment processes and design.

5823*
City Planning and City Organization. Lab 3. Prerequisite: senior or graduate standing. Orderly development and extension in city growth, civic, legal and engineering aspects: subdivisions, zoning, park system, water fronts, street systems, airports and transportation terminals, and traffic control. Functional organization of a city and city engineering organization.

5833*
Water Quality Management. Physical, chemical and biological factors in pollution and natural purification of rivers and lakes in relation to water supply, sewage disposal and disposal of industrial wastes. Principles of sanitary limnology. Identification and control of plankton.

5843*
Hydrology II. Prerequisite: 3843. Study of the rate of exchange of water between phases of the hydrologic cycle and in particular of the variations in this rate with time and place.

5853*
Fundamentals of Biochemistry and Microbiology for Environmental Engineering. Prerequisites: adequate background in chemistry and microbiology. Advanced treatment of microbiological and biochemical principles applied to environmental engineering analysis and design.

5863*
Advanced Unit Operations in Environmental Engineering. Prerequisite: 4833. Theory and design of advanced physical-chemical water and wastewater treatment processes.

5873*
Air Pollution Control Engineering. Causes, effects and control of atmospheric pollution.

5883*
Solid Waste Management. Theory, design and operation of solid waste collection, disposal and reclamation systems.

5893*
Hazardous Waste Management. Past and current hazardous waste management practices. Areas of concern and alternative approaches. An overview of important requirements and regulations.

5913*
Groundwater Hydrology. Theory of groundwater movement, storage, exploration and pumping tests. Design of groundwater recovery and recharge systems.

5923*
Water Resources Planning and Management. Application of engineering economics and microeconomic theory to the planning and management of water resources projects including flood control, hydroelectric, water supply, and urban stormwater. Systems analysis approaches, primarily linear and dynamic programming, and their application in water resources.

5933*
Water Treatment. Prerequisite: 4833. Theory, design and operation of water treatment plants. Water treatment plant control procedures.

5943*
Wastewater Treatment and Design. Lab 3. Prerequisite: 4833. Design of water and wastewater treatment systems.

5953*
Biological Waste Treatment Design. Lab 3. Prerequisite: 4833 or graduate standing. The use of laboratory and pilot plant studies in the design of biological waste treatment plants. Various methods of scaling-up pilot plant studies to full-scale plants presented.

5963*
Open Channel Flow. Prerequisite: 3833. Open channel hydraulics, energy and momentum concepts, resistance, channel controls and transitions, flow routing, and sediment transport.

5973*
Ground Water Quality. Prerequisite: graduate standing or consent of instructor. Ground water protection legislation. Fate and transport of nutrients, metals, other anions and cations, organics, bacteria and viruses in the subsurface environment. Pollution containment, abatement techniques. Aquifer restoration.

5983*
Groundwater Pollution Control. Theory, design and operation of groundwater pollution control systems. Includes examples from site specific applications as well as regional or national focus.

6000*
Ph.D. Research and Thesis. 1-16 credits, maximum 30. Independent research under the direction of a member of the graduate faculty by students working beyond the level of Master of Science degree.

6010*
Seminar. 1-6 credits, maximum 12. Prerequisites: consent of instructor and approval of the student's advisory committee. Analytical studies with suitable reports on problems in one or more of the subfields in civil engineering by students working beyond the level of Master of Science degree.

6113*
Theory of Elasticity. Stress, strain and deformation analysis of two- and three-dimensional elastic continua. Propagation of stress waves through elastic continua.

6413*
Introduction to Plate and Shell Structures. Prerequisite: 5113. Bending of thin plate structures to include rectangular and circular plates. Analysis of orthotropic plates by classical and numerical methods. Analysis of singly and doubly curved shells of membrane theory. Introduction to shell bending theory.

6433*
Dynamics of Structures I. Prerequisites: 5113 and 5414. Analysis of bars, frames, towers, multistory building and truss structures subjected to dynamic disturbances; investigation of lumped and distributed mass systems; natural frequencies, response spectra, applications to blast loading and earthquake analysis.

6434*
Finite Element Analysis in Engineering. Lab 2. Prerequisite: consent of instructor. Finite element methods from an advanced viewpoint. Matrix mechanics; approximation theory; weighted residual and variational statements; shape functions and element types; parametric mappings; convergence criteria and error analyses; nonlinear and transient methods; eigenanalysis; programming techniques; applications to solid mechanics, structures, fluids mechanics, and thermal problems.

6444*
Boundary Element Methods in Engineering. Lab 2. Prerequisite: consent of instructor. Matrix formulation and solution of complex two- and three-dimensional problems cast as boundary integral equations. Synthesis of integral relationships; elementary and advanced applications in solid mechanics, structures, fluids, and thermal problems; coupling with finite element analysis.

6533*
Behavior of Reinforced Concrete Structures. Prerequisite: 5514. Influences of creep, shrinkage, repeated and dynamic loads, high temperatures and complex states of stress on the performance of reinforced concrete structures.

6543*
Plastic Steel Design. Plastic steel design in accordance with AISC specifications. Design of single and multistory frames. Limit analysis using energy methods of analysis.

6553*
Earthquake-Resistant Design. Review of characteristics of earthquakes. Consideration of site and structural parameters on response of building. Building code specifications. Structural analysis and design procedures necessary to achieve earthquake-resistant structures.

6713*
Seepage and Groundwater Flow. Prerequisite: 3713. Seepage through dams and subsoils. Construction and utilization of flow nets. Properties of line of seepage. Seepage pressures, piping and boiling. Groundwater lowering for construction purposes. Steady state and transient pumping problems. Subdrainage analysis.

6723*
Advanced Geotechnical Engineering. Prerequisites: 3713 and GEOL 3024. Problems associated with soil or rock support of engineering projects. Application to projects such as tunnels, dams, transportation facilities and river and coastal improvement works. Other topics include use of earth or rock as a construction material, natural slope stability, frost effects and earthquake design.

6733*
Selected Topics in Geotechnical Engineering. Prerequisite: graduate standing in major area of geotechnical engineering, or consent of instructor. Recent developments in geotechnical engineering and selected geotechnical areas only briefly dealt with in prior courses.

6763*
Construction Management. Prerequisites: 4273 and 4763. Management of the design and construction of civil engineering projects. Early project development and formation, design coordination, preliminary and final estimates, project scheduling and cost analysis, packaging work, bid evaluations, bonds, insurance, and legal considerations.

6823*
Environmental Concepts and Analysis II. Prerequisite: 5853. Advanced application of physical, chemical and biological principles in establishing quantitative relationships in control of the aqueous environment and in sanitary engineering analysis and design.

6833*
Advanced Biological Waste Treatment Design. Prerequisite: 5953. Use of kinetic models in the design of biological wastewater treatment plants.

6843*
Stochastic Methods in Hydrology. Prerequisites: 5843, or AGEN 4313 and STAT 4053 or equivalent. Stochastic and statistical hydrologic analyses of surface water and ground water systems. Analyses of urban and rural drainage, and detention systems. Same as AGEN 6313.

6853*
Modeling of Water Resources Systems. Prerequisites: 5843 and 5913. Application of finite-difference and finite-element methods to predict water flow and chemical and biological water quality in saturated-unsaturated ground waters, streams, lakes, urban areas, and watersheds.

6913*
Advanced Sanitary Science. Lab 3. Prerequisite: 5813. Effect and control of water pollutants.

6923*
Industrial Wastes Engineering. Theory and methods of treating and reducing industrial wastes.

6933*
Operational Control of Wastewater Treatment Plants. Prerequisites: 5853 and 5953 or consent of instructor. The use of scientific and engineering principles for the management of wastewater treatment facilities.

CLOTHING, TEXTILES AND MERCHANDISING (CTM)

1100
Clothing Construction: Processes and Products. 1-3 credits, maximum 6. Lab 1-4. A modular class including units on basic construction techniques, pattern selection and garment construction, selecting quality ready-to-wear, pattern alteration and fitting, couture techniques and problem fabrics, construction of designer garment, and managing a sewing laboratory mass production techniques.

2110
Fashion Showmanship. 1 credit, maximum 8. Preparation, production and evaluation of special fashion-related events. Professional learning experiences will include modeling techniques, organization and directing procedures.

2113
Applied Design in the Clothing Industry. Lab 4. Appreciation of art elements and design principles; development of skill in application of design within various segments of the clothing industry.

2433
Fashion Innovation and Marketing Processes. The process of fashion innovation; variables of fashion affecting production and distribution of consumer goods; development of present structure in the fashion industry.

2573
(L)Textiles for Consumers. Lab 2. Consumer-oriented study of textiles emphasizing fibers, care and serviceability of apparel and household fabrics.

3002
(S)Professional Image and Dress. Role of appearance and dress in creating a professional image for men and women. Figure and wardrobe analysis, professional clothing needs, individualized clothing decisions. Not open to CTM majors.

3013
Flat Pattern Design. Lab 4. Prerequisite: 6 credit hours of 1100. Interpretation of dress design developed through the medium of flat pattern; introduction to pattern drafting.

3102
Fashion Sketching. Lab 4. Prerequisites: 2113 or 3 credit hours of art and completion of 60 credit hours. Principles and techniques of sketching in the fashion field.

3113
(S)Clothing in an Ecological Framework. Relationship between human beings and their dress within the environment. Relative effects of custom, technology and economic factors in determination of dress in different societies.

3153
Family Clothing. Use of family resources and the study of clothing needs at various stages of the family life cycle.

3203
Functional Clothing Design. Lab 4. Prerequisites: 1100, 2573, 3102. Problem-solving approach to functional clothing design for specialized market segments (athletic sportswear, occupational clothing, children's wear, clothing for the handicapped) including performance evaluation of selected materials using standard methods of textile testing.

3213
(H,I,S)Heritage of Dress. Survey of historic modes of dress as they reflect the social, economic and cultural life of a people. Application of design principles to modern dress.

3433
Fashion Retailing. Prerequisites: 2433 and junior standing. Marketing structures at retail level; job descriptions and responsibilities at management level; financial and control functions.

3533
Decorative Fabrics. Lab 4. Prerequisite: 3 credit hours in art. Historic and contemporary textile designs. Creation of textile designs using personal inspirations, cultural expressions and a variety of techniques.

3643
Apparel and Accessories for Special Markets. Prerequisites: 2433 and completion of 60 credit hours. An analysis of the apparel and accessory needs of specialized market segments and the products designed to meet those needs, with consideration given to both product design and merchandising.

3853
Merchandise Display Essentials. Lab 2. Prerequisites: 2113, 2433 and completion of 60 credit hours. Study and application of principles and practices in arranging and displaying merchandise for commercial and educational purposes. Supervised experience working with merchandise from retail stores.

3991
Pre-Internship Seminar. Prerequisites: 24 credit hours of required CTM courses. Skills requisite to completion of a directed, practical experience in a work situation within the fashion industry.

3994
Internship. Lab 8. Prerequisites: 3991 and consent of instructor. Directed practical experience in an approved work situation related to the fashion industry.

4011
Post Internship Seminar. Prerequisite: 3994. Study and comparison of student work experiences. Individual student conferences, review of merchant supervisor reactions.

4152*
Design Through Mass Production. Lab 4. Prerequisites: 2433, 3013, MKTG 3213. Designing, costing, producing, and marketing apparel in a simulated production setting.

4243*
Draping. Lab 4. Prerequisite: 6 credit hours of 1100. Interpretation of dress design developed through the medium of draping on dress forms padded to individual measurement.

4303*
Fashion Buying and Management Procedures. Prerequisites: 3991 and completion of 90 credit hours. Successful merchandising of fashion goods. Retail management and supervision responsibilities. Case studies, apparel markets and consumer demand.

4363*
Fashion Promotion Media. Prerequisites: 2433 and completion of 60 credit hours. Advertising and other special-purpose media used in the promotion of fashion merchandise. Study and application of procedures used in planning, evaluating and directing effective sales promotion activities.

4403*
Creative Costume Design. Lab 4. Prerequisites: 3213, 3013 and 4243 or consent of instructor. Application of design principles and construction techniques in the development of original designs.

4453*
Apparel Shop Entrepreneurship. Prerequisite: completion of 90 credit hours or consent of instructor. In-depth study and development of individualized plans for opening a women's or men's apparel shop including entrepreneurship, accounting and control, merchandising and buying, operations and management, and advertising and promotions.

4523
Critical Issues in Clothing, Textiles and Merchandising. Prerequisite: senior standing. Relationships among the clothing, textiles and merchandising industries and their external environments. Special emphasis on current issues and trends, forecasting, career contacts, and application of creative decision-making skills.

4553*
Profitable Merchandising Analysis. Prerequisites: 4303 and completion of 90 credit hours. Relationship analysis of profit and loss statement. Retail mathematical calculations necessary to plan and control merchandising results - open-to-buy, mark-up, mark-down, turn-over, stock-sales ratio.

4572*
Analysis and Comparative Study of Fabrics. Lab 2. Prerequisites: 2573 and 4 credit hours of chemistry. Fiber content, yarn construction, weave, color and finish; standard methods of textile testing.

4850*
Special Unit Course in Clothing, Textiles and Merchandising. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Various units of work taught by specialists in the field.

5000*
Master's Thesis or Report. 1-6 credits, maximum 6. Research related directly to clothing, textiles and merchandising for the master's thesis or report.

5053*
History of Costume. Prerequisite: 3213. The development and preservation of historic costumes including dating criteria, storage and display.

5110*
Research Developments in CTM. 1-3 credits, maximum 3. Prerequisites: concurrent enrollment in HEC 5102. Application of research methods and investigation of current research developments in clothing, textiles and merchandising.

5232*
Experimental Clothing. Lab 4. Prerequisite: 8 credit hours in clothing and textiles. Independent and creative study of current problems in clothing construction.

5273*
Social and Cultural Aspects of Clothing. Prerequisite: 3113. An exploration of the sociological, economic, psychological and cultural aspects of dress.

5323*
Textile Analysis. Lab 4. Prerequisites: 4572 and CHEM 2463. Testing equipment and methods applicable in the determination of certain physical and chemical characteristics of textile materials.

5383*
Clothing, Textiles and Merchandising in Higher Education. Prerequisite: 9 credit hours in clothing, textiles and merchandising. Development and organization of curricula and teaching methods for clothing, textiles and merchandising.

5440*
Clothing, Textiles, Merchandising Career Internship. 1-6 credits, maximum 6. Prerequisite: consent of instructor and department head. An individualized career-oriented internship. Selected learning experiences in approved work situations in the fashion industry or in selected educational or research activities related to clothing, textiles and merchandising.

5453*
Textile Economics. Prerequisite: 9 credit hours of clothing, textiles and merchandising. Economic background of the textiles and apparel industry with emphasis on production and distribution and current national and international problems.

5533*
Functional Apparel: Theory and Design. Lab 4. Prerequisites: 2573, 4013, 5110. A holistic approach to the study of apparel design with an emphasis on integrating knowledge of the needs and functions of the individual, the structural properties of textiles and apparel design.

5653*
Current Merchandising Trends and Practices. Prerequisite: 9 credit hours in fashion merchandising. Current trends in merchandising policies and procedures. Management level problems approached through in-store observations, activities and interaction with retail executives.

5810*
Problems in Clothing, Textiles and Merchandising. 1-3 credits, maximum 6. Prerequisite: consent of instructor and department head. Individual and group investigations and discussions of special problems in the various phases of clothing, textiles and merchandising.

5923*
Marketing Aspects of the Clothing and Textiles Industry. Survey of recent developments in the marketing of fashion goods. Emphasis on current issues in fashion merchandising.

6000*
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major professor. Research in home economics for the Ph.D. degree under supervision of a graduate faculty member.

6103*
Fashion Theories and Concepts. A theory-oriented approach to the study of fashion in relation to consumption patterns. Influences on adoptive stages, dimensions of fashion cycles, recurrence of styles in clothing and other products.

6133*
Research Methods in Clothing, Textiles and Merchandising. Prerequisite: consent of instructor. Survey and discussion of research methods, experiences in research design and analysis of data.

6203*
Theories of Dress and Communication. Appearance as a type of nonverbal communication related to appearance. Theoretical structures depicting the use of dress in communication.

6303*
Consumer Behavior: Apparel and Textile Consumption. Prerequisites: 3113, MKTG 3323. Consumer behavior theories, models and empirical research findings. Construction and testing of consumer behavior models as applied to apparel and textile consumption.

6810*
Advanced Problems in Clothing, Textiles and Merchandising. 1-6 credits, maximum 6. Prerequisites: consent of instructor and department head. Intensive individual or small-group study of problems in various areas of clothing, textiles and merchandising for advanced graduate students who are working toward doctorate degrees.

COMPUTING AND INFORMATION SCIENCE (COMSC)

2113
(A)Computer Programming. Lab 2. Prerequisite: MATH 1513. Programming in a high-level programming language. Introduction to algorithms, problem-solving techniques, and structured programming. Examples of applications from various areas such as business, science or engineering.

2123
(A)Computer Science I. Prerequisites: 2113, concurrent enrollment in MATH 2265. Nonnumerical algorithms, string processing, programming style and documentation. Introduction to internal searching and sorting methods; linear linked lists.

2133
Computer Science II. Prerequisites: 2123 and 2311 or 2321. Description and implementation of non-numeric problems. The concept of an algorithm in narrative, symbolic and PDL form. Application of iterative and recursive algorithms and elementary data structures.

2203
Discrete Mathematics I. Prerequisite: MATH 1513 or 1715. Logic, set theory, proof techniques, probability and combinatorics, relations and functions, matrix algebra, graphs, Boolean algebra and lattices. Same course as MATH 2203.

2301
FORTRAN 77 Programming. Lab 2. Prerequisite: 2113. FORTRAN 77 control structures, arrays, subroutines, functions, input/output. A major programming assignment will be completed by each student enrolled in the course.

2311
PASCAL Programming. Lab 2. Prerequisite: 2113. PASCAL control structures, data structures, procedures, functions, recursive procedures, input/output.

2321
PL/I Programming. Lab 2. Prerequisite: 2113. PL/I control structures, data structures, procedures, functions, recursive procedures, based variables, input/output.

2331
SAS Programming. Lab 2. Prerequisite: 2113. SAS as a general purpose programming language. Data representation, input/output, use of built-in procedures, report generation.

3030
Industrial Practice in Computer Science. 1-6 credits, maximum 12. Prerequisites: 3443, MATH 2365, junior standing, consent of departmental adviser. Applied computing in industry. Topics vary with cooperating employers. Written reports will be specified by adviser.

3113*
Computer Organization. Lab 2. Prerequisite: 2123. Description of computer systems or subsystems from the viewpoint of elementary logic functions and logic devices. Number representations for arithmetic operations. Internal and external codes used for data representation. Control and organization of functional units; memory, processor, input-output and control. Same course as ECEN 3223.

3203
Discrete Mathematics II. Prerequisite: MATH 2203 or 3113. A continuation of COMSC 2203; algebraic structure, coding theory, finite state machines, machine decomposition, computability, formal language theory. Same course as MATH 3203.

3213*
Microcomputer Principles and Applications. Lab 2. Prerequisite: junior standing or above. Introductory microcomputers. Digital logic elements and number systems, memory components and organization. Microprocessor and microcomputer system architecture, assembly language programming, software development, interfacing techniques. Same course as ECEN 3213.

3223
Numerical Methods for Digital Computers. Prerequisites: MATH 2283, MATH 3013, knowledge of FORTRAN. Digital computer approximate solutions of algebraic and transcendental equations, solutions of linear and nonlinear equations, functional approximations, least squares curvefitting and applied topics. Practical programming experience in applications of these techniques.

3301
ADA Programming. Lab 2. Prerequisite: 2123. ADA-R control structures, data structures, subprograms; types, parallel processing, exception conditions.

3311
MODULA-2 Programming. Lab 2. Prerequisites: 2123 and 2301 or 2311. MODULA-a control structures, data structures, types, procedures, functions, modules, concurrent processes, coroutines.

3321
APL Programming. Lab 2. Prerequisite: 2123. APL symbolism, scalar, vector and array operations, functions, procedures.

3331
ALGOL 68 Programming. Lab 2. Prerequisite: 3333. Programming in the algorithmic language ALGOL 68. Simple modes, user defined modes, looping units, routines and procedures, transput.

3401
VAX Assembler. Lab 2. Prerequisite: 2123. VAX assembler instructions, addressing modes, macros, pseudo instructions, control and data registers, register conventions, virtual memory concepts.

3411
IBM Assembler. Lab 2. Prerequisite: 2123. IBM assembler instructions, addressing modes, macros, pseudo instructions, control and data register conventions, virtual memory concepts.

3421
PERKIN ELMER Assembler. Lab 2. Prerequisite: 2123. PERKIN ELMER assembler instructions, addressing modes, macros, pseudo instruction, control and data registers, register conventions, writeable control store.

3431
The C Programming Language. Lab 2. Prerequisite: 2123. C programming language types, operators, expressions, control flow, functions, structures, pointers, arrays, UNIX interface.

3443
Computer Systems. Prerequisite: 2123. Functional and register level description of computer systems, computer structures, addressing techniques, macros, linkage, input-output operations. Introduction to file processing operations and auxiliary storage devices. Programming assignments are implemented in assembly language.

3451
UNIX Programming. Lab 2. Prerequisite: 2123. The UNIX programming system. The programming environment. The UNIX file system and the shell. Use of pipes and filters.

3883
Social Issues in Computing Sciences. Prerequisites: junior standing, 9 credit hours COMSC, ENGL 3323, or concurrent enrollment. Social implications of computer use or misuse with emphasis on the effects on the individual, society and other human institutions. Social responsibilities of people involved in using or applying computers.

4113*
Techniques of Computer Science for Science and Engineering. Prerequisites: one year of calculus and senior or graduate standing. For graduate and advanced undergraduate students requiring a one-semester treatment of computing topics. No background in computing topics assumed. Comprehensive treatment of the FORTRAN programming language with emphasis on numerical applications. Number systems, finite arithmetic, iterative processes, program structuring, numerical methods, program libraries are covered. No credit for students with credit in 2113 or 2123.

4143*
Computer Graphics. Prerequisites: 3333, MATH 2265. Interactive graphics programming; graphics hardware; geometrical transformation; data structures for graphic representations; viewing in three dimensions; representation of 3D shapes; hidden edge and hidden surface removal algorithms; shading models.

4223*
Management Information Systems. Prerequisites: 2123, 2203. The design and operation of management information systems. The total systems concept, real-time systems and current development in management information theory.

4253*
Numerical Mathematics: Analysis. Prerequisites: MATH 2613, MATH 3013, knowledge of FORTRAN. Computer arithmetic and rounding errors; numerical methods and error analysis associated with interpolation, least square approximation, roots of equations, integration, finite differences and ordinary differential equations, systems of linear algebraic equations. Same course as MATH 4253.

4273*
Software Engineering. Lab 2. Prerequisites: 2133, 3443 or ECEN 3213. Principles underlying software design methodology. Standards for software design. Design decisions. Survey of software design literature. Solution of a large scale software design problem in a simulated working environment. Same course as ECEN 4273.

4283*
Computer Networks. Prerequisites: 3443 or ECEN 3213; UNIX knowledge. Computer networks, distributed systems and their systematic design. Introduction to the use, structure, and architecture of computer networks. Networking experiments to describe network topology. ISO reference model. Same course as ECEN 4283.

4323*
Operating Systems I. Lab 2. Prerequisites: 3443, STAT 2013. Dynamic procedure activation, system structure, system measurement and evaluation, memory management, process management, automatic and manual system recovery procedures.

4344*
Data Structures and Information Processing. Lab 2. Prerequisite: 2133. Storage, structures, data and information structures, list processing, trees and tree processing, graphs and graph processing, searching, sorting.

4363*
Organization of Programming Languages. Prerequisites: 2133, 3203. Programming language constructs. Run time behavior of programs. Language definition structure. Control structures and data flow. Examples from ALGOL 60, ALGOL 68, APL, SNOBOL 4, LISP and RPG.

4424*
File Structures. Lab 2. Prerequisite: 2133. Basic physical characteristics of peripheral storage devices. File organization and processing methods for sequential, direct, indexed, tree structured and inverted files. Application of data structure concepts to logical and physical file organization: Performance analysis. Elements of advanced data base systems.

4444*
Compiler Writing I. Lab 2. Prerequisite: 3443. Syntax and semantics of procedure-oriented languages and theory of translation techniques used in their compilation. Study of languages for particular application areas, including nonalgebraic languages.

4570*
Special Topics in Computing. 1-3 credits, maximum 5. Advanced topics and applications of computer science. Typical topics include operating systems, multiprocessor systems, programming systems or various mathematical and statistical packages. Designed to allow students to study topics not provided in existing courses.

5000*
Research and Thesis. 1-6 credits, maximum 6. Prerequisite: consent of major professor. A student studying for a master's degree who elects to write a thesis or a report must enroll in this course.

5013*
Linear Programming. Prerequisites: MATH 3013 or INDEN 4014; FORTRAN. Simplex algorithm to solve deterministic linear optimization models considering maximization and minimization objectives; degeneracy, alternative optima and no feasible solutions. Revised simplex procedures. Duality theory, economic interpretations, dual simplexing and complementary pivoting. Sensitivity analysis and parametric programming. Special cases of linear optimization problems and underlying mathe-

matical foundations. Large-scale models including computational considerations. Same course as INDEN 5013.

5070*
Seminar and Special Problems. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Designed to allow students to study advanced topics not provided in existing courses.

5113*
Computer Organization and Architecture. Prerequisite: 3443. Computer architecture, computer control, microprogrammed control, addressing structures, memory hierarchies, hardware description languages, specific architectures, hardware simulation, emulation.

5154*
Computer Science Migration. Lab 2. Prerequisite: graduate standing. A survey of computer science for students whose undergraduate major was not computer science. Programming in high-level languages. Programming in assembly language. Algorithm design and analysis. Computer system fundamentals. Fundamental data structures.

5253*
Digital Computer Design. Prerequisite: ECEN 3223. Analysis and design of digital computers. Arithmetic algorithms and the design of the arithmetic/logic unit (ALU). Serial and parallel data processing; control and timing systems; microprogramming; memory organization alternatives; input/output interfaces. Same course as ECEN 5253.

5313*
Formal Language Theory. Prerequisite: 4344. Formal language theory applied to procedure-oriented languages. Recursive and nonrecursive parsing algorithms. Application of finite state algorithms to lexical analysis.

5323*
Operating Systems II. Lab 2. Prerequisite: 4323. Continuation of 4323. I/O interrupt structure. Intersystem communication. Memory management. Concurrent processes, name management, resource allocation. Protection. Hardware-software interaction. Distributed systems.

5333*
Compiler Writing II. Prerequisite: 4444. Continuation of 4444. Theory and practice of compiler writing techniques. Compiler writing systems. A formal approach to computer languages.

5413*
Data and Storage Structures. Prerequisite: 4344. Data structures and their application in recursive and iterative algorithms. Static and dynamic data structure representations and processing algorithms. Dynamic and virtual storage management.

5423*
Information Organization and Retrieval. Prerequisites: 4344, 4424. Storage, classification and retrieval of information, data bases, errors, multi-key files, indexing; dynamics of file reorganization, search strategies.

5513*
Numerical Analysis I. Prerequisite: 4253 or MATH 4253. Algorithms and error analysis; solutions of equations; interpolation and approximation theory. Same course as MATH 5513.

5543*
Numerical Analysis II. Prerequisites: 4253 or MATH 4253 and MATH 4653. Discrete variable methods in ordinary differential equations including single-step and multistep methods. Iterative techniques for numerical solution of partial differential equations. Same course as MATH 5543.

5553*
Numerical Analysis III. Prerequisites: MATH 3013, COMSC 4253 or MATH 4253. Theoretical and computational methods associated with matrix algebra, linear algebraic equations and algebraic eigenvalue problems. Same course as MATH 5553.

5653*
Automata and Finite State Machines. Prerequisites: 5313 or 5113 and 5213 or MATH 3113. Finite state model, state diagrams and flow tables, equivalent states and equivalent machines. Formal grammars, context-free languages and their relation to automata. Turing machines, computability and recursive function. Same course as MATH 5653.

5663*
Computability and Decidability. Effectiveness, primitive recursivity, general recursibility, recursive functions, equivalence of computability, definitions, decidability, and recursive algorithms. Same course as MATH 5663.

5712*
Computer Operations. Prerequisites: graduate standing in computer science and consent of instructor. Experience in the operation of computers and peripheral equipment.

6000*
Research and Thesis. 2-15 credits, maximum 30. Prerequisites: graduate standing and approval of advisory committee. Independent research under the direction of a member of the graduate faculty. For students working toward a Ph.D. degree.

6023*
Nonlinear Programming. Prerequisite: 5013; FORTRAN. Theoretical and practical aspects of nonlinera optimization. Development and application of optimization techniques used for unconstrained and constrained problems; sequential search procedures, gradient methods. Newton methods and conjugate directions. Lagrange methods, quadratic programming, geometric programming, penalty and barrier methods and projection methods. Same course as INDEN 6023.

6240*
Advanced Topics in Computer Organization. 2-6 credits, maximum 12. Prerequisite: 5113 and 5253. Structure and organization of advanced computer systems, parallel and pipeline computers, methods of computation, alignment networks, conflict-free memories, bounds on computation time.

6253*
Advanced Topics in Computer Architecture. Prerequisites: 5253 or ECEN 5253. Innovations in the architecture and organization of computers, with an emphasis on parallelism. Topics may include pipelining, multiprocessors, data flow, and reduction machines. Same course as ECEN 6253

6300*
Advanced Topics in Programming Languages. 2-6 credits, maximum 12. Prerequisite: 5313. Interpreter models of programming language semantics, Vienna definition language, lambda calculus, LISP definition; Knuth semantic systems and their formulation, translational and denotational semantics. May be repeated with change of topics.

6350*
Advanced Topics in Operating Systems. 2-6 credits, maximum 12. Prerequisite: 5323. Design and analysis of operating systems. Concurrent processes, server scheduling, models of auxiliary storage, memory management, virtual systems, performance algorithms. May be repeated with a change in topics.

6400*
Advanced Topics in Information Systems. 2-6 credits, maximum 12. Prerequisites: 5413, 5423. Design and analysis of data bases and other information systems. Hierarchical, network, and relational systems; implementation of data base systems; update and retrieval algorithms; multi-user and security access mechanisms; distributed data base systems. May be repeated with change of topics.

6500*
Advanced Topics in Numerical Analysis. 2-6 credits, maximum 12. Prerequisites: 5543, 5553. Systems of nonlinear equations, nonlinear least squares problems, iterative methods for large systems of linear equations, finite element methods, solution of partial differential equations. May be repeated with change of topics.

6600*
Advanced Topics in Analysis of Algorithms. 2-6 credits, maximum 12. Prerequisite: 5413. Analysis of various algorithms. Sorting, searching, computational complexity, lower bounds for algorithms; NP-hard and NP-complete problems; parallel algorithms; proof of correctness of algorithms. May be repeated with change of topics.

6623*
Algebraic Structures of Formal Grammars. Prerequisites: 5313, 5653. Context-free languages, Kleene languages, Dyck languages, context-sensitive languages; use of algebraic systems to define languages; linear bounded automata.

CONSTRUCTION MANAGEMENT TECHNOLOGY (CONST)

1213
Introduction to Building Construction. Lab 3. Fundamentals of light building construction; techniques of architectural drawings; methods and rational used in the development of plans, elevations, sections, details and construction drawing interpretation.

1333
Construction Practice. Prerequisite: departmental approval. Supervised field experiences in construction between the freshman and senior years, emphasizing the wide variety of layout, concrete placement framing and finish techniques employed.

2252
Drawing Interpretation for Heavy Construction. Prerequisites: 1213 and 2334. Interpretation of construction drawings for heavy construction projects including civil and structural together with fabrication drawing and submittal data review.

2253
Interpretation of Building Construction Drawings. Lab 3. Prerequisites: 1213 and 2334. Interpretation of residential and commercial construction drawings including architectural, civil, structural, mechanical and electrical. Fabrication drawing and submittal data review.

2334
Materials and Methods of Construction. Structural and finish materials used in architectural construction, their properties, manufacture and applications. Light, heavy and industrial construction. Foundation layout, framing and finish work, site investigations, excavation, precast concrete, tilt up, structural steel and metal building construction and project management.

2343
Concrete Technology. Lab 3. Prerequisite: 2334. Fundamentals of concrete and concrete making materials including admixtures. Proportioning concrete mixtures. Batching, mixing, conveying, placing, finishing and curing concrete. Hot and cold weather concreting, jointing, volume change and crack control.

3263
Estimating I. Prerequisite: 2252 or 2253. Quantity takeoff with emphasis on excavation, formwork and concrete, masonry, rough carpenty and miscellaneous specialty items.

3345
Mechanical Principles. Lab 6. Designed to present mechanical concepts to nonmechanical students entering the Electrical Power program. Covers basic material science and principles of statics.

3353
Structures for Electrical Power. Lab 3. Prerequisite: 3345. Analysis of the behavior of structures used in the electrical power industry. Force and deformation analysis, foundation, types of structures and erection procedures.

3363
Timber and Form Design. Lab 3. Prerequisite: MECDT 3323. Basic timber structures with emphasis on concrete form applications.

3452
Mechanical Equipment of Buildings. Prerequisite: PHYSC 1114. Plumbing, heating and air conditioning systems as applied to residences and commercial buildings.

3462
Electrical Equipment of Buildings. Prerequisite: PHYSC 1214. Electrical and lighting systems as applied to residences and commercial buildings.

3553
Steel Design. Lab 3. Prerequisite: MECDT 3323. Analysis and design of steel beams and columns. Bolted and welded connections.

3563
Construction Law and Insurance. Legal and insurance problems as they pertain to the construction industry.

3663
Concrete Design. Lab 3. Prerequisite: MECDT 3323. Analysis and design of reinforced and pre-stressed concrete in accordance with the ACI building code.

3714
Soil Mechanics Technology. Lab 3. Prerequisites: GENT 2323 and MECDT 3323. Physical and mechanical properties of soils, and tests appropriate for construction management students.

4050
Advanced Construction Management Problems. 1-6 credits, maximum 6. Prerequisites: junior standing and consent of instructor. Special problems in construction management.

4263
Estimating II. Lab 3. Prerequisite: 3263. Extensive use of actual contract documents for quantity take-off, pricing and assembling the bid for several projects. Use of computers in estimating.

4273
Computer Estimating. Lab 3. Prerequisite: 4263. Various software programs applied to estimating for building construction. Automated take off (Digitizer) systems.

4283
Construction Organization and Management. Prerequisite: 3563. Organizing and managing office and field staff. Authority and responsibility. Introduction to the construction manager concept. Principles of management applied to construction contracting.

4293
Construction Manager Concepts. Prerequisite: 4283. Principles and applications to manage the construction process. The expanding role of the construction manager in the construction industry.

4781
Seminar. Prerequisite: senior standing and consent of instructor. Career placement and promotion within the construction industry. Aspects of the collective bargaining process. Functions of committees as service to the industry.

CURRICULUM AND INSTRUCTION EDUCATION (CIED)

1230
Reading and Study Skills for College Students. 1-4 credits, maximum 4. Lab 1-4. Instruction and laboratory experience for the improvement of reading rate, vocabulary, comprehension and study skills. Graded on pass-fail basis.

2113
(S)The School in American Society. Prerequisite: sophomore standing. The school as a major institution in its political, economic and social setting. The nature and extent of equality of educational opportunity in the U.S. Socialization of students, social class and education, the poor and the schools, ethnic groups and their school experiences, the nature of multicultural education, mainstreaming (PL 94-142), the education of women, financing and governing the schools, and the nature of teaching.

2450
Early Lab and Clinical Experience in Elementary Education I. 1-2 credits, maximum 2. Lab 3-6. Prerequisite: declaration of intention to pursue a program in Teacher Education. The initial preprofessional clinical experience in schools, kindergarten through grade eight. Required for full admission to Teacher Education. Graded on a pass-fail basis.

3122*
Utilization of Instructional Media. Familiarizes students with a broad range of instructional media and with principles and techniques related to their selection, utilization and evaluation.

3132*
Microcomputer Technologies for Education. Lab 4. Literacy level interaction with microcomputers; principles and techniques related to selection, utilization, and evaluation of user-friendly computer software for instruction.

3153
Teaching Mathematics at the Primary Level. Lab 2. Prerequisite: MATH 1314, 1513 or 1715. Developmental levels in selection and organization of content and procedures for primary mathematics education.

3283
Foundations of Reading Instruction. Prerequisite: admission to Teacher Education. Current theories of developmental reading instruction in primary and intermediate grades, including appropriate methods and materials.

3430
Early Lab and Clinical Experience in Elementary Education II. 1-2 credits, maximum 3. Lab 3-6. Prerequisite: 2450. Directed observation and teaching in schools, kindergarten through grade eight. Concurrent seminar explores multicultural education and mainstreaming programs. Graded on a pass-fail basis.

3450
Early Lab and Clinical Experience in Elementary Education III. 1-2 credits, maximum 3. Lab 3-6. Prerequisite: 3430. Advanced clinical experience in schools, kindergarten through grade eight. Concurrent seminar includes formal study of instructional planning. Graded on a pass-fail basis.

3620
Field Experiences in the Middle School. 1-4 credits, maximum 4. Lab 2-8. Prerequisites: 2450, consent of instructor. Seminars, directed observation, and particiation in a particular subject area of the middle school (grades 5-9). Experience in meeting the mental, social, physical and cultural differences among middle school children. Graded on pass-fail basis.

3710
Field Experiences in the Secondary School. 1-3 credits, maximum 3. Lab 2. Prerequisites: consent of instructor and completion of speech proficiency examination. Seminars, directed observation and participation in a particular subject area of the secondary school. Develops experience in meeting the mental, social, physical and cultural differences among children. Graded on a pass-fail basis.

3713*
Structure and Utilization of a Mathematics Laboratory. Lab 1. Historical background, future trends, theoretical and practical considerations, construction of laboratory materials and evaluation procedures in a mathematics laboratory. For experienced and inexperienced classroom teachers, superintendents, principals and mathematics supervisors.

3813
Topics of Middle School Mathematics. Prerequisite: consent of instructor. Strategies for teaching the topics of the middle grades and the mathematics basic skill areas of the middle grades (grades 5-9).

4000
Field Studies in Education. 1-4 credits, maximum 4. For students who need independent study and/or field experiences, such as spending a semester in an experimental program working with handicapped children in schools, in-depth studies in research projects, internships with school personnel.

4003*
Teaching Fundamental Concepts of Mathematics. Teaching of the basic skill areas. Study and comparison of contemporary basic mathematics textbooks. Recommended to be taken concurrently with public school practicum experiences.

4013*
Humanizing the Educational Process. Provides the student with a greater personal awareness and understanding of the dynamics of human relatedness within the classroom teaching-learning process.

4023*
Children's Literature. Survey, evaluation, selection and utilization of materials for children; extensive reading with emphasis on books which meet the needs and interest of children through grade six.

4033*
Alcohol and Drug Education. Use and misuse of alcohol and drugs. Physiological and psychological effects of drugs and the attendant problems of abuse. Guest speakers from several disciplines lend an interdisciplinary approach. Current education materials and rehabilitation programs.

4043*
Microcomputer Applications in Education. Lab 2. Prerequisite: 3132 or equivalent. Instructional computing course for educators including development and examination of instructional programs using the BASIC language, computing issues in schools, development of instructional computing plans, and hands-on experience with microcomputer applications for the classroom.

4053*
Teaching Geometry in the Secondary School. Overview of the present secondary geometry curricula and future trends. Axiomatic development of Euclidean geometry, proofs and transformational geometry from the perspective of the secondary mathematics teachers. Study and comparison of contemporary basic mathematics textbooks. Recommended to be taken concurrently with 3710 and MATH 4043.

4113*
Multi-Media Program Production. Prerequisite: 3122. Design and production of syncronized automatic sound slide programs coordinated with subject matter content. Includes photographic techniques, audio recording and sound-mixing methods, graphics, and syncronizing techniques. Individual projects required.

4123
(S)History of Education. The development of major educational ideas and programs with emphasis on the growth of public education in the United States from the Colonial period to the present.

4142*
Teaching Mathematics at the Intermediate Level. Lab 0-2. Prerequisite: 3153. Selection and organization of content, procedures for instruction, and evaluation of outcomes in teaching the mathematics of the intermediate grades. Some attention to instruction in upper grades of the elementary school.

4143*
Teaching LOGO in the Schools. Lab 0-2. Prerequisite: 3132 or equivalent. Instructional computing course for educators using LOGO language. Includes methods and integration techniques for teaching LOGO in grades K-12.

4213*
Introduction to the Visual Arts in the Curriculum. Lab 4. Provides an understanding of the theoretical basis for the use of art activities in developing sensory perception and aesthetic sensitivity as an integral part of the curriculum. Includes a wide range of opportunities for student involvement in experimentation and exploration with a variety of two- and three-dimensional art media. Emphasis on both creative expression and appreciation of the visual arts in the home, school and community as a vital aspect of instruction in the school, preschool level through grade eight.

4233*
Introduction to Reading Problems. Lab 1. Prerequisite: 3283. Identification and treatment of reading problems in the classroom including group and individual diagnostic procedures. Laboratory experiences are required.

4250*
Language Arts in the Elementary School Curriculum. 1-4 credits, maximum 4. Lab 0-6. Prerequisite: admission to Teacher Education. The purposes, selection and organization of content, teaching and learning procedures, and evaluation of outcomes in elementary school listening, speaking and writing.

4260*
Skill Development in the Reading Program. 1-3 credits, maximum 3. Lab 0-4. Prerequisite: 3283. Relationship between reading skills, child development and curriculum, and instructional strategies for sequential skill development in reading.

4270*
Reading in Content Areas in the Elementary School. 1-3 credits, maximum 3. Lab 0-4. Prerequisite: 3283. Integration of reading instruction in the elementary school curriculum with emphasis upon application of reading to various content areas.

4280*
Informal Practices in Reading. 1-3 credits, maximum 3. Lab 0-4. Prerequisite: 3283. Purposes and methods of informal instruction in reading utilizing the language experience approach and individualized voluntary reading procedures. Informal evaluation of reading development.

4290
Reading in the Elementary School. 1-4 credits, maximum 4. Lab 0-8. Prerequisites: 3283, 4233. Theory, methods and diagnostic procedures of reading in the elementary classroom. Taken concurrently with student teaching.

4320*
Social Studies in the Elementary School Curriculum. Lab 0-6. 1-4 credits, maximum 4. Prerequisite: admission to Teacher Education. Purposes, selction and organization of content, teaching and learning procedures and evaluation of outcomes in elementary social studies.

4350*
Science in the Elementary School Curriculum. 1-4 credits, maximum 4. Prerequisite: admission to Teacher Education. The purposes, selection and organization of content, teaching and learning procedures and evaluation of outcomes in elementary school science.

4363*
Design and Management of the Elementary School Classroom. Prerequisites: ABSED 3113, FRCD 3253, or consent of instructor. Design and management of the physical, social, intellectual, cultural, special needs, and learning materials aspects of the school classroom, kindergarten through grade 8. Purposes, selection, and organization of classroom management systems and teaching approaches.

4450
Internship in Elementary Education. Lab 3-36. 1-12 credits, maximum 12. Prerequisites: 3450 and full admission to Teacher Education. Advanced clinical experience as associate (student) teacher in schools, kindergarten through grade eight.

4460*
Kindergarten: Primary Education: Methods. 2-3 credits, maximum 3. Prerequisite: admission to Teacher Education. Purposes, methods of teaching, classroom design and management, classroom routine, and selection and organization of content in kindergarten–primary education.

4473*
Reading for the Secondary Teacher. Prerequisite: concurrent enrollment in 3710. Materials and procedures in the teaching of reading in secondary schools for content area teachers.

4560*
Outdoor Education Competencies. 1-4 credits, maximum 4. Lab 1. Prerequisite: 2113 or LEIS 2413. Development of (teacher/leader) competencies in the content, methods, philosophy, and historical perpective of contemporary curricula using the out-of-doors as a multidisciplinary learning laboratory.

4703*
Computer Applications in the Middle School Science Curriculum. Prerequisite: 3132 or consent of instructor. Principles and techniques related to using microcomputer technology in teaching middle school science; microcomputer interfacing, simulation, and interactive videodisk.

4713
Methods and Materials in the Secondary School I. Prerequisite: admission to Teacher Education. Purposes, selection and organization of content, teaching and learning procedures, and evaluation of outcomes in grades 7-12 appropriate for the discipline in which the student intends to qualify for teaching certification. Recommended to be taken concurrently with 3710. Available to students in discipline-specialized sections: art, foreign languages, health and physical education, journalism, language arts, mathematics, science, social studies, speech/drama.

4720
Internship in the Secondary Schools. Lab 3-36. 1-12 credits, maximum 12. Prerequisites: admission to Teacher Education, 2113, 3710, ABSED 3113 or 3213, 4723. Supervised observation and student teaching in fields in which the student intends to qualify for teaching certification. Develops awareness of and provides experience with mental, social, physical and cultural differences among adolescents.

4723
Methods and Materials in the Secondary Schools II. Prerequisites: 4713 or equivalent, verification of student teaching internship placement. Continuation of 4713 or equivalent specialized methods course. Taken concurrently with the student teaching internship experience in grades 7-12. Available to students in discipline-specialized sections: journalism, language arts, mathematics, science, social studies, speech/drama.

4730
Methods and Materials in the Schools, K-12. 1-3 credits, maximum 3. Prerequisites: 4713 or equivalent, verification of student teaching internship placement. Continuation of 4713 or equivalent specialized methods course. Taken concurrently with the student teaching internship experience in grades K-12. Available to students in discipline-specialized sections: art, foreign languages, health and physical education.

4913
(I)International Problems and the Role of the School. Prerequisite: junior or senior standing. Extends the student's intercultural awareness by focusing on international problems and expanding their meaning to include the school and its relationship to existing international concerns in other types of societies. Consideration of such international problems as natural resources, environment, food supply, urbanization and conflict resolution.

5000*
Master's Report or Thesis. 1-6 credits, maximum 6. Prerequisite: consent of adviser. Students studying for a master's degree enroll in this course for a total of 2 credit hours if they write a report or 6 hours if they write a thesis.

5023*
Comparative Education. A systematic investigation of educational institutions in various nations for the purpose of an enlarged, critical view of American education.

5033*
Teaching Foreign Languages in the Schools. Prerequisite: full admission to Teacher Education. Curriculum, materials, methods and procedures related to foreign languages (grades K-12).

5043*
Fundamentals of Teaching. Prerequisite: ABSED 5213 or 5463. Theory and research on teaching applied to classroom teaching behavior.

5053*
Fundamentals of Curriculum Development. A study of curriculum that includes philosophy, history, decision making, major concepts and terms.

5103*
Advanced Computing Applications in Education. Lab 0-2. Prerequisite: 4043 or equivalent. Includes educational applications involving authoring systems, data-base management, hardware interfacing, and non-instructional uses within the school environment. Impact of current issues on instructional computing.

5113*
Videotape Television for Instruction. Prerequisite: 4113. Educational design and production of videotape using single camera, small studio production and other technology. Individual and team projects.

5123*
Curriculum in the Secondary School. Contemporary curricular issues, philosophies and points of view in secondary school education.

5130*
Advanced Studies in Children's Literature. 1-3 credits, maximum 6. Prerequisite: 4023. The history of children's books against a world background of prevailing political, economic and social factors influencing cultural patterns and values. The tools of research in children's literature and the nature and direction of contemporary children's book publishing in the United States and abroad.

5133*
Photography for Instruction. Prerequisite: 3122. Photography skills emphasizing 35mm and instamatic type cameras with application to instruction and other communication situations such as photo-copying, use of high-contrast film for graphics, and simple photography projects for school-age students.

5143*
Language Arts in the Curriculum. Content and current issues in the language arts. Materials and methods for teaching the communication skills.

5153*
Computer-Based Instruction Development. Lab 0-2. Prerequisite: 4043 or equivalent. Examinations of curriculum strategies, related research issues, and techniques for developing computer-based instruction. Students will develop and evaluate computer-based instruction with case studies.

5173*
Kindergarten-Primary Curriculum (K-2). Current kindergarten-primary (K-2) curriculum models and programs including aims, content, methodology and evaluation. Current trends and issues in early childhood education; curriculum design and implementation. Primarily for administrators, supervisors, teachers and advanced students in early childhood education.

5223*
Teaching Science in the Elementary School. Materials, methods and classroom procedures related to science in the elementary school.

5233*
Teaching Science in the Secondary School. Materials, methods and classroom procedures related to science in the secondary school.

5252*
Teaching Mathematics in the Elementary School. Materials, methods and classroom procedures related to mathematics in the elementary school.

5263*
Remediation in School Mathematics. Lab 2. Prerequisite: 4150 or equivalent. Identification of specific learning disabilities in school mathematics. Selection of appropriate remedial measures. Completion of a case report.

5270*
Practicum in School Mathematics. 1-3 credits, maximum 6. Lab 2-6. Prerequisite: 5263. Diagnostic and therapeutic procedures in mathematics with students of all ages. Laboratory classes provide for clinical experiences in evaluation and instruction with children experiencing difficulty in mathematics.

5280*
Workshop in Science Education. 1-4 credits, maximum 4. Develops and/or implements elementary and secondary science programs.

5323*
Teaching Social Studies in the Schools. Curriculum, materials, methods and procedures related to social studies.

5350*
The Visual Arts in the Curriculum. 1-3 credits, maximum 6. Lab 2. Prerequisite: 4213. Creative approaches to the use of two- and three-dimensional media as they relate to various aspects of education. Opportunities available for periodic group and individual evaluation in order to give direction and significance to future growth.

5423*
Developmental Reading at the Primary Level. Prerequisites: 3283, 4233 and 4290 or 4473. Analysis of sequential growth in reading from the preschool level through the early elementary years. Examination of the reading process and instructional procedures.

5433*
Developmental Reading at Intermediate and Secondary Levels. Prerequisites: 3283, 4233 and 4290 or 4473. Examination of the developmental reading curriculum at intermediate, middle school and secondary levels including evaluation of teaching methods and materials.

5463*
Diagnosis and Treatment of Reading Problems. Prerequisite: 5423. Diagnosis of reading disabilities, remedial measures and work with clinical cases.

5473*
Clinical Aspects of Reading Disability. Prerequisite: 5463. Refines the diagnostic and remedial skills of the student through the study of clinical instruments, research, informal measurements and remedial approaches used in reading clinics.

5510*
In-Service in Reading. 1-6 credits, maximum 6. Guidance in the development of reading curriculum, programs, methodology and materials for in-service teacher education groups. Content developed around needs of specific groups.

5520*
Practicum in Reading. 1-6 credits, maximum 6. Lab 2-4. Prerequisite: 5463. Application of diagnostic and therapeutic procedures with readers of all ages. Laboratory classes provide for clinical experience in evaluation and instruction in developmental and remedial programs in reading for children.

5613*
Effective Teaching of Mathematics in the Secondary School. Prerequisite: consent of instructor. Directed advanced practicum in secondary school mathematical education. Includes study of current research findings in mathematical education, teaching strategies, materials and evaluation procedures in the secondary school. For experienced classroom teachers, superintendents, principals and supervisors.

5623*
Curriculum for the Culturally Different Elementary School-Age Child. Procedures, materials, curricula, techniques, instructional strategies, etc. to aid the teacher in developing an educational program for the culturally different child.

5633*
Developmental Reading for College and Adult Learners. Identification of the needs, materials, curricula, and instructional strategies for college and adult readers. The study of illiteracy. Consideration of the development, organization and supervision of programs for such learners.

5720*
Education Workshop. 1-8 credits, maximum 8. For teachers, principals, superintendents and supervisors who have definite problems in instruction or administration. Students must register for the full number of credit hours for which the workshop is scheduled for a particular term.

5732*
Seminar in Education. Prerequisite: consent of instructor. Seminar topics may differ depending upon the nature of current interests and topics in American education.

5740*
Seminar in Teacher Education. 3-9 credits, maximum 9. For cooperating teachers and university supervisors. Problems and issues in pre-service teacher education. Simulation and laboratory experiences in supervision of student teachers.

5750*
Seminar in Mathematics Education. Lab 0-2. Prerequisite: consent of instructor. Problems, issues, and trends in mathematics education.

5753*
Audiovisual Communication Strategies. Lab 2. Prerequisites: 3122 or 4113 and ABSED 5613. For students majoring in audiovisual education, curriculum development, supervision and administration. Gives students skills in the organization and curricular integration of audiovisual systems. Some of these systems are electronic student response systems, mediated individual learning tasks, multimedia presentation and large class instruction, visual literacy's role in learning, instructional communications models, microteaching and utilization of instructional television.

5773*
Administration and Supervision of Audiovisual Materials. Prerequisite: 3122. Building, planning, selecting and purchasing equipment and materials, surveying existing materials, and planning and financing adequate programs. For administrators or teachers who are responsible for audiovisual programs.

5823*
Institutional History of Education. History of elementary, secondary, and higher education in Western Civilization with emphasis upon the development of the American educational institution.

5833*
Methods in Physical Education. Prerequisites: PE 4712 and 3773. Prior completion of CIED 5043 recommended. Differentiation between teaching methods in physical education; advantages of the application of the individual methods to particular situations in teaching physical education. Same course as HPELS 5833.

5850*
Directed Study. Lab 1-3. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Directed study for master's level students.

5883*
Educational Sociology. The manner in which social forces and institutions influence education and the educational system in the United States.

6000*
Doctoral Thesis. 1-15 credits, maximum 15. Required of all candidates for the Doctor of Education degree. Credit is given upon completion of the thesis.

6033*
Analysis of Teaching. Students examine research related to teacher-classroom behavior, classroom climate and student behavior and develop competencies in several observational systems.

6080*
Seminar in Science Education. 1-6 credits, maximum 6. Problems, issues and trends in science education. The focus at the pre-service or in-service level.

6113*
Curriculum of the Elementary School. Contemporary trends, philosophies and points of view in elementary school education.

6133*
Theory to Practice in Education. Prerequisite: consent of instructor. A culminating seminar demonstrating the application of theory from several disciplines to the practical problems of education: curriculum development, organization, teaching strategies, evaluations, etc.

6152*
Current Issues in Art in the School Curriculum. Problems, issues and trends in art education programs of the elementary and secondary schools and their relationship to the total curriculum. For teachers, supervisors and administrators.

6433*
Seminar in Reading. Prerequisite: 12 credit hours in teaching of reading. Research in reading including evaluation of research proposals. Problems and issues in reading instruction are discussed using knowledge gained through both research and classroom practice.

6683*
Developmental Reading and Exceptionality. Prerequisite: 5423 or 5433. Developmental reading needs of various groups of exceptional individuals. Methods and materials of instruction.

6850*
Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing to enhance students' understanding in areas where they wish additional knowledge.

6853*
Improvement of Instruction in Reading. Problems and issues related to reading instruction. The roles of various school personnel in effecting change in curriculum and methods.

6880*
Internship in Education. 1-8 credits, maximum 8. Lab 3-24. Prerequisite: consent of instructor. Directed off-campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

6910*
Practicum. 1-6 credits, maximum 6. Prerequisite: consent of adviser. Helps the student carry out an acceptable research problem (practicum) in his/her local school situation. Credit given upon completion of the written report.

ECONOMICS (ECON)

1113
(S)The Economics of Social Issues. Issues-oriented approach. Basic economic principles introduced and developed through study of important social issues: for example, inflation, unemployment, poverty, discrimination, crime, population growth and environmental quality. Develops the economist's approach to social problems, and evaluates the contribution of economics to their solution. No credit for students with prior credit in 2013 or 2023.

2013
(S)Introduction to Macroeconomics. Prerequisite: 15 semester credit hours. The functioning and current problems of the aggregate economy: determination and analysis of national income, employment, inflation and stabilization; monetary and fiscal policy; and aspects of international interdependence.

2023
(S)Introduction to Microeconomics. Prerequisite: 2013. Goals, incentives and outcomes of economic behavior with applications and illustrations from current social issues: operation of markets for goods, services and factors of production; the behavior of firms and industries in different types of competition; income distribution; and international exchange.

3010
Special Topics in Economics. 1-3 credits, maximum 9. Prerequisites: 2023, prior approval of instructor. Analysis of a contemporary topic in economics. Course content will vary to reflect changing social issues and trends in applied economics.

3023*
Managerial Economics. Prerequisite: 2023. Application of economic theory and methodology to decision problems of private industry, nonprofit institutions and government agencies; demand and cost analysis, forecasting, pricing and investment.

3113*
Intermediate Microeconomics. Prerequisite: 2023. How the market system organizes economic activity and an evaluation of its performance. Principles of price theory developed and applied to the interactions of consumers, producers and resource owners in markets characterized by different degrees of competition.

3123*
Intermediate Macroeconomics. Prerequisite: 2023. Development of a theoretical framework for studying the determinants of national income, employment and general price level. National income accounting, consumption, investment, government spending and taxation, the supply of and demand for money. Monetary, fiscal and incomes policies considered with regard to unemployment, inflation and economic growth.

3313*
Money and Banking. Prerequisite: 2023. The economics of money and banking. Operations of commercial banks and structure and competition of the banking industry. Organization and operation of the Federal Reserve System and its effects on interest rates, employment and prices. An introduction to monetary economics and international banking concludes the course.

3423*
(S)Public Finance. Prerequisite: 3 credit hours in economics. The economics of the government sector. Scope of government activity, efficiency in government expenditures, federal budget, fiscal and debt management policy. Principles of taxation. Major tax sources, tax distribution, tax issues. Current public finance problems such as revenue sharing, negative income tax, urban transport systems and national health insurance.

3513*
Labor Economics and Labor Problems. Prerequisite: 3 credit hours in economics. Economic analysis of contemporary labor market problems and survey of U.S. unionism. The labor force, education and training, discrimination, inflation and unemployment theories of the labor movement, economic impact of unions and public policy toward labor.

3523*
(S)Poverty and Economic Insecurity. Prerequisite: 3 credit hours in economics. Problems, programs and proposals for dealing with poverty and economic insecurity.

3613*
(I)International Economic Relations. Prerequisite: 3 credit hours in economics. International trade and finance; international economic organizations; the foreign economic policy of the U.S.

3713*
Government and Business. Prerequisite: 3 credit hours in economics. Methods of measuring the extent of monopoly power in American industries and ways of evaluating the effects of this power on consumer welfare. U.S. antitrust laws, their enforcement and landmark court decisions under these laws.

3813*
Development of Economic Thought. Prerequisite: 3 credit hours in economics. The ideas of great economists with emphasis upon economic concepts and systems of thought in relation to social, ethical and political ideas under evolving historical conditions.

3823
(S)American Economic History. Economic development and economic forces in American history; emphasis upon industrialization and its impact upon our economic society since the Civil War. Same course as HIST 4513.

3903*
Economics of Energy and the Environment. Prerequisite: 2023. Issues related to the development and use of energy resources, and the management of the natural environment.

4010*
Basic Studies in Economics. 1-6 credits, maximum 6. Prerequisite: 3 credit hours in economics. Economic concepts, theory, issues and problems. Designed for elementary and secondary teachers. Economics education teaching methods included.

4213*
Econometric Methods. Prerequisites: 2023; STAT 3013 or 4013. Basic quantitative methods used in economic analysis emphasizing applications to economic problems and interpretation of empirical results. Statistical analyses, regression and forecasting techniques using computer programs.

4223*
Business and Economic Forecasting. Prerequisites: 2023; STAT 3013 or 4013. Forecasting business and economic variables. Regression models and time series models such as exponential smoothing models, seasonal models, and Box-Jenkins models. Evaluation of methods and forecasting accuracy. Application of methods using computer programs.

4313*
Advanced Banking. Prerequisite: 3313. Central and commercial banking, including Federal Reserve policymaking, banking structure, capital adequacy and taxation of banks. Friedman's proposals for monetary and banking reform.

4413*
State and Local Government Finance. Prerequisite: 3 credit hours in economics. State and local government revenue and expenditure patterns in a federal fiscal system; intergovernmental fiscal problems; taxation in a federal system; adjustment to economic growth and change.

4513*
Labor and Public Policy. Prerequisite: 3513 or MGMT 3313 or BUSL 3213. Public policy affecting union management relations; common law, state and federal legislation; Wagner, Taft-Hartley and Landrum-Griffin Acts; labor dispute adjustment with emphasis on the theory, legal status and practice of arbitration, in both private and public sectors.

4523*
Manpower, Employment and Public Policy. Introduction to the manpower field, dealing with the problems, issues and experience of public programs for combating unemployment, and of public and private programs for improving employment and earnings prospects of people, including the disadvantaged.

4643*
(I)International Economic Development. Prerequisite: 3 credit hours in economics. Problems of underdeveloped economics related to the world economy; obstacles to economic growth and policies for promoting growth.

4713*
Economics of Industries. Prerequisite: 2023. Industrial organization of major U.S. industries. The structure-conduct-performance paradigm is used to evaluate how costs and concentration interact with pricing, marketing and R&D decisions to affect industry profitability, technological progress, and the efficient allocation of resources. Case studies included.

4723*
Economic Analysis of Law. Prerequisite: 3 credit hours in economics. Use of economic analysis to explain why certain laws exist and to evaluate the effects of various alternative rules of law on economic efficiency and behavior. Emphasis on the economics of the common law areas of property, contracts, and torts. Also, products liability, crime and punishment, distributive justice, and discrimination.

4823*
Comparative Economic Systems. Prerequisite: 2023. Comparative analysis of the economic theory and institutions of capitalism, socialism, and mixed systems.

4913*
(S)Urban and Regional Economics. Prerequisite: 3 credit hours in economics. Urban and regional economics; the spatial aspects of poverty, land use, the urban environment and rural industrial development.

4923*
United States Economic Development. Prerequisite: 2023 or 2123. Changing patterns of human and material resource utilization in the United States. Market forces and structural and institution changes that have affected the economy's growth.

5000*
Research and Thesis. 1-6 credits, maximum 6. Workshop for the exploration and development of research topics. Research leading to the master's thesis.

5003*
Research Report. Prerequisite: consent of committee chairman. Supervised research for M.S. report.

5010*
Research and Independent Studies. 1-3 credits, maximum 10. Prerequisite: consent of departmental committee chairman. Supervised research under a workshop arrangement or supervised independent studies.

5020*
General Studies in Economics. 1-6 credits, maximum 6. Economic principles and problems from the general education point of view rather than that of teaching economics. Credits applied only toward Master of Science in Education or Doctor of Education.

5113*
Managerial Economics. Economic theory applied to business decision making. Concepts of microeconomics and macroeconomics related to understanding the economic system, analysis of policy, forecasting, and international economics. No credit for M.S. and Ph.D. students in economics.

5123*
Microeconomic Theory I. Prerequisites: 3113, MATH 2265 or MATH 2713. Contemporary price and allocation theory with emphasis on comparative statics.

5133*
Macroeconomic Theory I. Prerequisites: 3123, MATH 2265 or MATH 2713. National income, employment and the price level from the point of view of comparative statics.

5143*
Macroeconomic Theory II. Prerequisite: 5133. National income, employment and the price level from the point of view of dynamics. Growth models.

5163*
Microeconomic Theory II. Prerequisite: 5123. Contemporary price and allocation theory with emphasis on general equilibrium analysis. Welfare economics.

5223*
Mathematical Economics I. Prerequisites: 3113, MATH 2265 or equivalent. Mathematical concepts of single variable and multivariate calculus, topological properties of Euclidean space, convergence, linear algebra, optimization theory and the Kuhn-Tucker Theorem with applications from economic theory.

5233*
Mathematical Economics II. Prerequisite: 5223. A mathematical approach to general equilibrium and welfare economics.

5243*
Econometrics I. Prerequisite: 4213 or STAT 4043. Theory and application of econometrics to economic problems. Topics include OLS, GLS, distributed lags, serial correlation, heteroskedasticity, and simultaneous equations.

5253*
Econometrics II. Prerequisite: 5243. Advanced econometric theory covering single and simultaneous equations models, seemingly unrelated regressions, limited dependent variable models, causality, and pooled models.

5313*
Monetary Economics I. Contemporary issues in monetary theory and policy. Demand for money and supply of money theory, interest rate theory and issues in monetary policy.

5323*
Monetary Economics II. Intensive analysis of classical monetary theory and individual research on selected problems in monetary economics. The ideas of Patinkin, Wicksell, Fisher and Keynes.

5413*
Economics of the Public Sector I. Allocation and distribution effects as well as incidence of governmental budget policies.

5433*
Economics of the Public Sector II. Fiscal policy as a means of promoting economic stabilization and growth.

5533*
Manpower Analysis. Introduction to the manpower field; recruitment, training, motivation and utilization of human resources both within employing units and throughout the economy. Applications of basic concepts, data, tools and techniques of analysis to selected manpower problems.

5543*
Labor Market Theory and Analysis. A critical evaluation of the theoretical and empirical literature dealing with labor market processes; wage determination and the impact of unions on relative wages; estimation of aggregate labor supply; resource allocation and labor mobility; the inflation-employment tradeoff and the economics of labor market discrimination.

5613*
International Finance. Open economy macroeconomics and the role of devaluation, fiscal and monetary policy in the open economy, monetary approach to the balance of payments, portfolio balance and asset market approaches to the determination of exchange rates.

5623*
Economic Development I. Characteristics and problems of less-developed countries. Criteria of growth and development with emphasis on strategies for development. The role of capital, labor, technological progress and entrepreneurship. Growth models.

5633*
International Trade. International trade and commercial policy. Comparative advantage, general equilibrium and modern trade theories; welfare implications of international resource allocation models; the theory of protection and international interdependence.

5643*
Economic Development II. Major problems of development policy. Inflation and mobilization of capital, investment criteria, agriculture, foreign trade, population and manpower, planning and programming methods.

5713*
Industrial Organization I. Organization and operation of the enterprise sector of a free enterprise economy; interrelations of market structure, conduct and performance; public policies affecting these elements.

5723*
Industrial Organization II. Alternative market structures and their relationships to market performance; the empirical evidence concerning these. Public policies toward business, including emphasis on U.S. antitrust laws and economic analysis of their enforcement; theories of public utility regulation.

5813*
History of Economic Thought. Economic theories from the 18th century until the present with emphasis on the origin and improvement of analytical tools.

5903*
Regional Economic Analysis and Policy. Selected topics in location theory, regional economic growth and policies toward regional development in the U.S.

5913*
Urban Economics. The urban area as an economic system. Problems of economic policy in urban environment.

6000*
Research and Thesis. 1-12 credits, maximum 30. Prerequisite: approval of advisory committee. Workshop for the exploration and development of research topics. Research leading to the Ph.D. dissertation.

6010*
Seminar in Economic Policy. 1-3 credits, maximum 6. Intensive analysis of selected problems in economic policy. Individual research, seminar reports and group discussion of reports.

6113*
Seminar in Economic Theory. Microeconomics.

6123*
Seminar in Economic Theory. Macroeconomics.

6813*
Seminar in Economics Systems. Selected topics dealing with the economic theory and institutions of capitalism, socialism, communism, and fascism. Individual research, seminar reports, and group discussion of reports.

EDUCATION (EDUC)

1111
Orientation to Education. Required of all first-semester freshmen in the College of Education. An orientation course; study of the profession of education with particular emphasis on the skills and qualities required. Graded on pass-fail basis.

3110
Honors Directed Study. 1-3 credits, maximum 3. Prerequisite: admission to College of Education Honors program. Individualized directed study approved by a sponsoring professor or Honors coordinator.

4050
Honors Colloquium. 1-9 credits, maximum 9. Prerequisites: junior standing and consent of instructor or Honors coordinator. Study of an interdepartmental and interdisciplinary nature of various important issues and aspects as related to the field of education. Provides an intellectual challenge for the able student with a strong dedication to scholarship.

4110*
Teacher Education Seminar. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Problems, trends, and pertinent education issues. May include simulation, small-group instruction and field-based experiences. For the pre-service or in-service level.

4920
Teacher Education Practicum. 1-9 credits, maximum 9. Prerequisites: admission to Teacher Education and 15 credit hours of professional education. Directed observation and supervised laboratory and clinical experiences in appropriate teacher education program areas. Appraisal and learning theory approaches employed.

5113*
Women in Education. Methods, practices, and materials prevalent in educational institutions at all levels in the United States and their ultimate effect on females and males both as individuals and as members of society. Legal remedies and guidelines that combat discrimination by sex; sex-role stereotyping of men and women as reflected in education.

5910*
Educational Field Experiences. 1-6 credits, maximum 6. Prerequisites: senior or graduate standing and consent of instructor. Guided field experience appropriate to a specific program of study. Field experience preceded and followed by appropriate on-campus seminars, readings and reports.

6020*
Seminars in Education. 2-6 credits, maximum 6. Prerequisite: consent of instructor. Limited to graduate students who have experience in the field and knowledge of elementary techniques in research. Students pursue individual research problems under the direct supervision of members of the staff.

6023*
Doctoral Seminar. Prerequisite: approval of adviser. Open to all doctoral aspirants dealing with preparation of a proposal for the doctoral study. Mechanics and techniques of proposal and dissertation preparation and design of the proposed research.

EDUCATIONAL ADMINISTRATION AND HIGHER EDUCATION (EAHED)

4223*
Community Education: A Synopsis. Lab 1. Prerequisite: 3 hours of one of the following: CIED 2113, HEECS 4353, 4413, 4853, LEIS 2413, or SOC 1113. Introduction to community education through classroom and field-based activities and the history, philosophy, organization, roles, and publications of community education. Perspective of how community education has evolved in relation with adult education, community colleges, public schools, and recreation.

4622*
Teachers and the Law. An analysis of school-related areas out of which litigation arises, focusing especially on the legal rights and responsibilities of teachers, administrators and pupils and the generally applicable principles of law.

5000*
Thesis or Report. 1-10 credits, maximum 10. Prerequisite: consent of instructor. Master's students may earn up to two hours of credit for a report or six hours of credit for a thesis. Students working on a specialist's report may earn a maximum of 10 hours of credit.

5633*
Community Education. Purpose, organization and administration of community education and its various components.

5813*
Public School Administration. The scope and function of public school administration.

5833*
Public School Finance. Prerequisite: graduate standing. Development of conceptual bases in economics of education, taxation, distribution systems, policy analysis; application to Oklahoma school finance; and introduction to budget development.

5853*
Educational Systems, Design and Analysis. Prerequisite: 5 credit hours of statistics. Current research literature in educational administration, both common school and post-secondary studies. Substantial application of statistical and research skills to educational administration.

5940*
Organization and Administration of Occupational Education. 1-3 credits, maximum 6. The organization and implementation of vocational-technical education, with special attention on federal-state-local organizations and the implications of current legislation for implementing new programs.

6000*
Doctoral Thesis. 1-15 credits, maximum 15. Required of all candidates for the Doctor of Education degree. Credit given upon completion of the thesis.

6003*
Educational Ideas. Seminar for majors in EAHED. Decision-making processes utilized in educational systems today.

6230*
Critical Issues in Higher Education. 1-3 credits, maximum 9. Prerequisite: 6753. Issues that have shaped and are shaping higher education in American society.

6243*
Organization and Administration in Education. Research and best practice in the organization and administration of educational organizations.

6253*
The Principalship. Prerequisites: 5813, 6243 and 6263. Strategies, techniques and solutions the principal can utilize in the operation of a public school. Developing policy statements, handbooks, budgets, schedules, etc.

6263*
Supervision. The place of supervision in the improvement of instruction; a study of fundamental principles and procedures.

6333*
Public School Business Management. Prerequisite: 5833. Knowledge and skills in budget planning and development, administration, and evaluation. School accounting other business management topics.

6363*
Educational Finance: A National Perspective. Prerequisite: 5833. Theory and practice of financing American public education.

6393*
School Personnel Administration. Relationships between administration and other school personnel; recruitment, selection, promotion, morale, salary, staff relations and evaluation of teaching.

6420*
The Politics of Education. 2-3 credits, maximum 3. Activities of schools as they relate to the political environment; e.g., voter behavior, change strategies and community power structures.

6453*
Legal Aspects of Education. Legal aspects of education with special reference to Oklahoma. Separate sections for common schools and high-education. Consideration of PL 94-142, section 504 of the Rehabilitation Act of 1973, and other pertinent Oklahoma enactments; attention directed to multicultural legal provisions.

6463*
Higher Education Law. National and state constitutional provisions, laws, and court cases concerning higher education. Considerable legal research required.

6473*
Practicum in Instructional Supervision. Prerequisite: 6263 or consent of instructor. Application of modern approaches to instructional supervision through practice in recording and analyzing teacher behavior in actual classroom settings. Clinical and group methods for improving instruction are considered.

6572*
School Housing. Prerequisites: 6363 and 6453, or equivalent. Established standards and research in school housing; validity of old and new standards.

6603*
Organizational Theory in Education. Prerequisite: 6243. Selected organizational typologies, conceptualizations and theoretical frameworks as they relate to organizational behavior and behavior of personnel in organizations.

6613*
Organizing, Developing and Administering Community Education. Relationship between education and the community, with special emphasis on community needs/resources and the development of a total community education program. Skills and competencies for planning, implementing and evaluating community education programs are explored.

6622*
The School-Community Survey. Application of survey techniques and needs analysis to educational facilities, curricular programs, resource requirements, and school-community-business relations.

6650*
Problems in Educational Administration. 1-4 credits, maximum 8. Prerequisite: consent of instructor. Special administrative problem in common schools or higher education, e.g., school plant, school/community relations, administration and the instructional programs, attrition and finance.

6683*
The Community Junior College. The American two-year college including historical and philosophical development, curricula, students and the learning process, faculty and instruction, administration and governance, support and control. Principles, practices and problems of community junior colleges in America.

6703*
Finance in Higher Education. Prerequisite: 6753. Problems and prospects of financing American education, with in-depth discussion of selected topics, e.g., social capital, federal aid, faculty salaries and state support.

6710*
Special Problems. 1-4 credits, maximum 8. Prerequisite: teaching or administrative experience. Assists administrators with either recurrent or unique problems arising in common schools or in higher education. Emphasizes evaluation and planning related especially to staff, programs and faculty needs.

6713*
Effective Teaching in Colleges and Universities. Research findings on teaching-learning relationships at the college and university level. Study of methods employed to encourage, guide and evaluate student learning. Investigation and appraisal of newer instructional methods and trends.

6720*
Education Workshop. 1-4 credits, maximum 8. Enables public school and higher education personnel to analyze instructional and/or administrative problems.

6730*
Planning and Educational Change. 1-4 credits, maximum 4. Includes organizational and environmental parameters, sources of change, barriers to change, and strategies for planning and implementing organizational change.

6753*
Historical Development of Higher Education. History and development of higher education, studies of objectives and functions of institutional types and of students and faculty.

6803*
Administration in Higher Education. Prerequisite: 6753. Functions and principles of administration in higher education from historical and contemporary points of view. Both internal and external forces acting on the institution treated.

6813*
Academic Programs: Development and Implementation. Development and implementation of academic programs including curriculum for colleges and universities, investigation of teaching-learning relationships, and instructional emphasis.

6823*
Educational Leadership. Prerequisite: 6803. Marshalling scarce resources to achieve institutional goals and objectives congruent with the needs and abilities of persons associated with the institution. Research on leadership models and styles, with consideration given to application in higher education today. May also be of value to those in business and industry, politics, and government.

6833*
College and University Presidency. Prerequisite: 6803. For those who anticipate a career in college and university administration or a related management position. The role and function of the presidency.

6843*
The Academic Department. Organization and administration in higher education emphasizing an analysis of the academic department and its leader, the department head.

6850*
Directed Reading. 1-4 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with graduate standing.

6870*
Seminar. 1-4 credits, maximum 10. Prerequisite: consent of instructor. Topical issues related to administration and/or higher education, including research techniques available to analyze such topics.

6880*
Internship in Education. 1-4 credits, maximum 8. Prerequisite: consent of department head. Directed internship experiences designed to relate ideas and concepts to problems encountered in education by faculty and administrators.

6910*
Practicum. 1-5 credits, maximum 9. Required of all candidates for the Specialist in Education degree. Designed to help the student carry out an acceptable field study or research problem. Credit given upon completion of the written report.

ELECTRICAL and COMPUTER ENGINEERING (ECEN)

2211
Digital Computing for Engineers. FORTRAN compiler language, philosophy of automatic computer programming and selected numerical methods oriented toward the solution of engineering problems on the digital computer.

3013*
(L)Experimental Methods. Lab 4. Prerequisites: 3613 and ENGSC 2613, concurrent enrollment in 3113 and 3313. Basic electrical and electronic measurements and instrumentation techniques and devices. Operating principles and application of various instruments used in the practice of electrical engineering. Experiments in electronics and electromagnetic fields, designed to reinforce principles introduced in ECEN 3313 and ECEN 3613. Data processing and reduction techniques.

3113*
Energy Conversion I. Lab 2. Prerequisite: 3613, concurrent enrollment in 3013, 3313. Physical principles of electromagnetic and electromechanical energy conversion devices and their application to conventional transformers and rotating machines. Network and phasor models; steady-state performance.

3213*
Microcomputer Principles and Applications. Lab 2. Prerequisite: junior standing or above. Introductory microcomputers. Digital logic elements and number systems, memory components and organization. Microprocessor and microcomputer system architecture, assembly language programming, software development, interfacing techniques. Same course as COMSC 3213.

3223*
Digital Logic Design. Lab 2. Boolean algebra, optimization of logic networks. Design using SSI, and MSI, LSI components, ROM and PLA applications. Analysis and design of clock sequential logic networks. Flip-flops, counters, registers. Asynchronos circuit design and analysis. Laboratory experience in implementing combinational and sequential logic devices. Same course as COMSC 3113.

3313*
Electronic Fundamentals and Applications. Prerequisites: 3713, ENGSC 2613, MATH 2613, concurrent enrollment in 3013, 3113. Solid-state, discrete-component electronics: diodes and transistors, clipping and clamping circuits, power-supply filters and linear low-frequency amplifiers.

3413
Controls I. Prerequisites: ENGSC 2122; ENGSC 2613, MATH 2613; concurrent enrollment in 3613 and 3713. Laplace and z-transforms, solutions to differential and difference equations. Transfer functions and block diagram manipulation. Modeling of mechanical and electrical systems. Introduction to feedback and control system design using the root locus diagram.

3513*
Signal Analysis. Prerequisites: 3413 and 3713. Deterministic signals. Fourier series and Fourier transforms. Impulse response, convolution and correlation. Sampling theorem. Analog modulation techniques.

3613*
Fundamentals of Electromagnetic Fields. Lab 2. Prerequisites: ENGSC 2613, MATH 2613, concurrent enrollment in 3413, 3713. Maxwell's equations and their application to engineering problems in electrostatics, magnetostatics, plane wave propagation, and transmission line theory. The last three to four weeks of the semester will include two hours of labs and demonstrations per week.

3713
Introduction to Network Analysis. Prerequisites: ENGSC 2613, MATH 2613; concurrent enrollment in 3413 and 3613. Laplace transform, transfer functions, magnetically coupled circuits and two-port networks.

4001*
Electrical Engineering Seminar. Prerequisite: senior standing. Topics on professionalism technical and professional societies, and current industrial developments. Individual or group reports prepared and presented.

4010*
Technical Problems and Engineering Design. 1-12 credits, maximum 12. Prerequisite: consent of instructor. Individual independent study projects selected in consultation with the instructor; analysis or design problems, literature searches and computer simulations may be involved.

4013
Senior Design Laboratory I. Lab 4. Prerequisites: 3013, 3313, 3413, and 3213 or 3223. The design cycle for several small projects, each including establishing objectives, synthesis, analysis, construction, testing and evaluation. Use of modern lab equipment and fabrication techniques. Development of communication skills.

4023
Senior Design Laboratory II. Lab 4. Prerequisite: 4013. Continuation of ECEN 4013. Student project teams design, build, test and present results for realistic projects from university and industrial sponsors. Formulation of specifications, consideration of alternative solutions, feasibility considerations, detailed system descriptions, economic factors, safety, reliability, aesthetics, ethics and social impact.

4024
Project Engineering Laboratory. Lab 4. Prerequisites: 3022, 3223, 3313. Practical advanced lab experience. Several small projects designed, built, packaged and tested. Work in teams on realistic projects from industrial sponsors.

4133*
Power Electronics. Prerequisite: 3113. Power electronic devices, components, and their characteristics; DC to AC conversion; fundamentals of inverters and waveshaping devices; application aspects; control aspects; characteristics and state-of-the-art of advanced power inverter and power conditioning topologies.

4153*
Power System Analysis and Design. Prerequisite: 3113. Power system component models from circuit theory. Formulation and design of the load flow model and the optimum economic generator allocation problem utilizing computer methods.

4213*
Computer-based System Design. Lab 2. Prerequisites: 3213 and COMSC 2123. Design of microprocessor-based systems through proper integration of hardware and software. Serial and parallel communications, sensor interfacing, computer control of external devices, and color graphics hardware. Design of PASCAL and assembly language modules for optimum real-time system performance.

4243*
Computer Architecture. Prerequisites: 3213 and 3223. Structural organization and hardware design of digital computer systems. Review of logic circuits, integrated circuit functions and data representation. Register transfer language, CPU organization, microprogram control, arithmetic processor design, input/output and memory organization. Survey of advanced architectures.

4263*
Computer Engineering Projects. Lab 2. Prerequisites: 3213, 3223 and 4213. Team projects involving design, construction, and testing of hardware interfaced with mini- and micro-computers in instructional laboratory. Emphasis on software and hardware documentation. IEEE-488 bus; interface chips; comparison of minicomputer operating systems; IEEE-488 bus; bus analyzer; LSI interface chips; mini- and micro-computers as laboratory tools and system components.

4273*
Software Engineering. Lab 2. Prerequisites: 3213 or COMSC 3443; COMSC 2133. Principles underlying software design methodology. Standards for software design. Design decisions. Survey of software design literature. Solution of a large scale software design problem in a simulated working environment. Same course as COMSC 4273.

4283*
Computer Networks. Prerequisites: 3213 or COMSC 3443; UNIX knowledge. Computer networks, distributed systems and their systematic design. Introduction to the use, structure, and architecture of computer networks. Networking experiments to describe network topology. ISO reference model. Same course as COMSC 4283.

4303*
Digital Electronics Circuit Design. Lab 2. Prerequisite: 3313. Theory of digital and electronics circuits. Digital logic families TTL, IIL, ECL, NMOS, CMOS, GaAs. Large signal models for transistors. Implementation at RAM and ROM. Circuit design for LSI and VLSI.

4313*
Linear Electronics Circuit Design. Prerequisite: 3313. Class A and B small-signal, push-pull power, complementary symmetry, differential and operational amplifiers, utilizing field-effect transistors, bipolar transistors, tunnel diodes and integrated circuits. Emphasis on amplification in electronic devices, design and analysis of wide-band amplifier circuitry.

4353*
Communication Electronics. Prerequisite: 3313. Design of tuned voltage and power amplifiers, oscillators and mixers, modulation and detection, and parametric amplifiers.

4413*
Controls II. Prerequisites: 3413, 3513, 3713. Design of analog and digital feedback control systems, review of functions and state variable models for continuous-time and descrete-time systems, sampling, relationship between pole locations and time response, frequency domain design, root locus design, continuous-time and discrete-time compensation techniques, state variable feedback and pole positioning design.

4423*
Nonlinear and Digital Control Systems. Lab 2. Prerequisite: 4413. Nonlinear control systems; phase plane analysis. Liapunov stability criteria, describing functions; signal-modulated systems, sampled-data control and difference equations, Z-transform analysis, introduction to optimization of control systems and computer simulation of control system.

4503*
Random Signals and Noise. Prerequisites: 3413 and 3713. Analysis of electrical systems using elementary concepts of probability, random variables and random processes. Frequency and time domain response of linear systems driven by random inputs. Statistical properties of electrical noise. Analysis and design of optimum linear systems.

4523*
Communication Theory. Prerequisite: 3513. Noise in modulation systems. Digital data transmission. Design of optimal receivers. Introduction to information theory.

4533*
Data Communications. Prerequisite: 4503 or STAT 4113. Signal detection in noise. Tradeoffs between bandwidth signal-to-noise ratio and rate of information transfer. Transmission multiplexing and error handling. Elements of computer network design. Data link protocols.

4613*
Microwave Engineering, Antennas and Propagation. Prerequisite: 3613. Engineering aspects of the transmission, radiation and propagation of microwave energy. Design theory of waveguides, waveguiding systems, antennas and aspects of atmospheric propagation. Passive microwave devices such as attenuators, directional couplers and resonators. Microwave antennas; electromagnetic horns, parabolic reflectors and log-periodic structures. Atmospheric propagation; propagation in a horizontally stratified atmosphere.

4623*
Plasma Dynamics and Microwave Electronic Devices. Prerequisite: 3613. Plasma phenomena and their application to practical devices. Devices that relate to microwave power generation. Phase space, distribution functions, momentum transfer, Boltzmann equation, motion of charged particles in electromagnetic waves, hydromagnetic waves in plasmas, pinch effect, etc. Electron beams, klystrons, plasma, traveling-wave amplifiers and oscillators.

4703*
(L)Active Filter Design. Lab 2. Prerequisites: 3413 and 3713. Introduction to passive filters; operational amplifiers as network elements; filter specifications; design of active filters. Laboratory design projects and computer simulations.

4713*
Introduction to Network Synthesis. Prerequisite: 4703. Network functions and their realiability, driving-point synthesis, passive and active network synthesis.

4763*
Discrete-time Signals and Systems. Prerequisites: 3413, 3513, and 3713. Introduction to discrete linear systems using difference equations and z-transforms. Discrete Fourier analysis. Design of digital filters. Sampling theorem.

4813*
Optical Electronics. Prerequisites: 3313, 3613. Extension of electronics principles into the optical domain. Ray matrices of passive devices. Properties and propagation of Gaussian beams. Design of optical resonators and oscillators. Lasers. Propagation through fiber optics. Detection problems. Integrated optical circuits.

5000*
Thesis or Report. 1-6 credits, maximum 6. Prerequisite: approval of major professor. A student studying for the master's degree will enroll in this course for a maximum of six credit hours.

5030*
Professional Practice. 1-8 credits, maximum 8. Experience in application of electrical engineering principles to typical problems encountered in industry and government engineering design and development projects. Solutions to the problems require participation by the student in the role of junior engineer or engineer-intern. Problem solutions involve economics and ecological considerations as well as technology, and must be adequately documented.

5050*
Seminar. 1-12 credits, maximum 12. Prerequisite: consent of adviser. Students investigate certain engineering problems not normally covered in existing courses.

5103*
Energy Conversion II. Prerequisite: 3113. Dynamic model of rotating electromechanical energy converters in terms of the generalized machine concept. Time-invariant transformations are utilized to reduce the complexity of the model and to obtain the steady-state response.

5113*
Power System Analysis by Computer Methods. Quasi-static control of power systems and analysis of power systems under abnormal operating conditions. Transient stability studies. Models formulated and solutions outlined for implementation on the computer.

5123*
Engineering Systems Reliability Evaluation. Techniques and concepts needed for evaluating the long-term and short-term reliability of a system. Topics include static and spinning generation capacity; transmission, composite, interconnected, and dc system reliability evaluations; and power system security. Applications to systems other than power systems included. For students with little or no background in probability or statistics.

5153*
Direct Energy Conversion II. Energy conversion techniques and applications; thermoelectrics, thermionics, fuel cells, MHD and other processes involving electrical, mechanical and thermal energies. State-of-the-art developments in direct energy conversion using selected papers from journals and other publications. Gives the student a proper perspective of the possibilities and problems associated with satisfying future energy requirements.

5213*
Microcomputer System Design. Prerequisites: 3213 and 3223. Design, construction, programming, debugging and documentation of microcomputers interfaced to peripheral devices. Electronics considerations for incorporating different families of IC's and discrete components as needed. Specialized software to integrate the computer and its peripherals. Experimental opportunities provided.

5223*
Digital Systems Testing. Prerequisite: 3223. Testing of combinational and sequential circuits. Test generation techniques. Design of reliable and testable circuits and systems. Testing for LSI and VLSI.

5253*
Digital Computer Design. Prerequisite: 3223. Analysis and design of digital computers. Arithmetic algorithms and the design of the arithmetic/logic unit (ALU). Serial and parallel date processing; control and timing systems; microprogramming; memory organization alternatives; input/output interfaces. Same course as COMSC 5253.

5263*
VLSI Digital Systems Design. Prerequisites: 4303; recommended: 5253. Design of very large-scale digital systems on a single chip. Review of MOS technology. Design rules imposed by fabrication techniques. Systematic structures for control and data flow; system timing; highly concurrent systems. Experimental opportunities available.

5293*
Artificial Intelligence and Expert Systems. Fundamental concepts: search-oriented problem solving, knowledge representation, logical inference, building an expert system, languages and software tools and machine architectures. Applications to planning, computer vision, natural language processing, speech recognition and robotics. Development of a prototype expert system or literature search and report is required. Common lectures with INDEN 5933 and MAE 5793.

5313*
Solid-State Electronics I. An advanced study of electronic networks. Application of solid-state devices to the medium- and low-frequency regions. Integrated networks as replacements for discrete-component networks. Discrete and integrated operational amplifiers. Broad-band and tuned amplifiers.

5353*
Advanced Power Electronics. Prerequisite: 4133. Characteristics of high power semiconductor devices and the application of such devices to power conditioning, inversion, and wave shaping at high power levels.

5363*
CMOS Analog Integrated Circuit Design. Prerequisite: 4313. Advanced study of solid state CMOS linear integrated circuits. Topics include: Op Amps, comparators, multipliers, D/A and A/D converters and Op Amp building blocks. Op Amp building blocks include, differential pairs, current mirrors, gain, output stages, and references. VLSI layout and curcuit simulation using SPICE.

5413*
Control Systems I. Prerequisite: 5713. Optimal control theory for modern systems design. Specification of optimum performance indices. Dynamic programming, calculus of variations and Pontryagin's minimum principle. Iterative numerical techniques for trajectory optimization.

5513*
Introduction to Stochastic Systems. Prerequisites: 3513 and 4503 or STAT 4033. Theory and applications involving probability, random variables, functions of random variables, and stochastic processes, including Gaussian and Markov processes. Correlation, power spectral density, and nonstationary random processes. Response of linear systems to stochastic processes. State-space formulation and covariance analysis.

5523*
Estimation Theory. Prerequisite: 3513. Optimal estimation theory including linear and nonlinear estimation of discrete and continuous random functions. Wiener and Kalman filter theory included.

5533*
Modern Communication Theory. Prerequisites: 3513 and 5513 or STAT 4033. Noise as a random process, analog and digital signal detection in the presence of noise, optimum receiver design using signal space concepts and introduction to information theory. Trade-offs between bandwidth, signal-to-noise ratio and the rate of information transfer. Example system designs include earth satellite, deep space and terrestrial communication systems and computer communication networks.

5543*
Data Transportation and Protection. Data and its representation; finite field matrices, pseudorandom sequences; information protection; space division networks; synchronization; and channel and error control.

5613*
Foundations of Electrodynamics I. Prerequisite: 3613. A rigorous derivation of Maxwell's equations utilizing Coulomb's law and postulates of special relativity; the invariance of Maxwell's equations under Lorentz transformations, the four-vector form of Maxwell's equations, scalar and vector potential functions, solutions of the Laplace and Poisson equations, solutions of the homogeneous and inhomogeneous wave equations with applications to guided waves, radiation, and scattering.

5653*
Application of Electromagnetic Theory I. Intermediate-level treatment of applications of classical electromagnetic theory; cavity resonators, waveguides, refraction and scattering, surface waves, antennas, and radiation. Sufficient mathematical sophistication to equip the student for state-of-the-art research in the area.

5713*
Introduction to System Theory. State-space techniques of engineering systems analysis. Application of matrix methods to systems modeled by linear vector differential or difference equations. Develops controllability and observability conditions and eigenvalue/eigenvector assignment procedures.

5723*
Nonlinear Systems Analysis I. Prerequisite: 5713. Failure of superposition; phase plane and phase space techniques; method of perturbations, asymptotic, orbital and structural stability; subharmonic generation; generalized approaches to nonlinear systems analysis.

5753*
Digital Processing of Speech Signals. Review of digital signal processing; digital models for the speech signal. Short-time Fourier analysis, linear predictive coding of speech and an introduction to man-machine communication by voice.

5763*
Digital Signal Processing. Introduction to discrete linear systems; frequency-domain design of digital filters; quantization effects in digital filters; digital filter hardware, discrete Fourier transforms; high-speed convolution and correlation with application to digital filtering; introduction to Walsh-Fourier theory.

5783*
Random Systems Modeling and Analysis. Random dynamical systems; development of discrete modeling techniques, analysis procedures for continuous and discrete random systems. Digital implementations of algorithms for random systems featuring engineering tradeoffs between accuracy, response time, equipment requirements and complexity.

5793*
Digital Image Processing. Prerequisite: 5763. Digital image processing including acquisition and characterization of images, coding, enhancement, restoration and segmentation. Use of transforms. Use of ECEN VAX/COMTAL image processing system to develop skills in using and writing image-processing software.

5813*
Optical Engineering. Physical and physiological concepts of light and vision. Review of reflection, refraction, diffraction. Analysis of basic optical devices: dielectric interfaces, mirrors, optical cavities. Laser as an electronic oscillator. Review of gaussian beam propagation in optical circuits.

5833*
Fiber Optics. Wave propagation in a cylindrical dielectric waveguide. Solution of ray equation for a step index and graded index fiber. Monomode fiber. Optical properties of fibers: dispersion, absorption, scattering. Bandwidth considerations, laser sources: spectral purity modulation, bandwidth. Detection systems: photodetectors, heterodyne detection systems. Noise sources, frequency response.

5853*
Opto Electronics. Thermite-Gaussian beams, optical fibers and waveguides, coupling of modes. Nonlinear optical devices: modulators frequency shifters; optical power detectors. Description of optical circuits. Integrated optical circuits.

6000*
Research. 1-30 credits, maximum 30. Prerequisite: consent of major professor. Independent research for students continuing graduate study beyond the level of the M.S. degree.

6050*
Special Topics. 1-9 credits, maximum 9. Prerequisite: consent of instructor. Subjects to be selected by the graduate faculty in electrical engineering to cover advances in the state of the art.

6123*
Special Topics in Power Systems. Prerequisite: 5113. Selected relevant current topics related to power system operation and planning.

6253*
Advanced Topics in Computer Architecture. Prerequisite: 5253 or COMSC 5253. Innovations in the architecture and organization of computers, with an emphasis on parallelism. Topics may include pipelining, multiprocessors, data flow, and reduction machines. Same course as COMSC 6253.

6263*
Advanced VLSI Design and Applications. Prerequisites: 5223 and 5263. System timing. Designing testable integrated circuits. Specialized parallel processing architectures. Application examples.

6413*
Digital Control Systems. Prerequisite: 5413. Study of the computer as a control element in complex processes. Basic sampling theory. Analog-to-digital and digital-to-analog conversion of data. Analysis of analog-digital systems via Z-transform methods and difference equations in state-variable form. Stability criteria and design approaches for digital compensation. Simulation of digital control systems on the hybrid computer.

6450*
Control Systems II. 1-3 credits, maximum 6. Prerequisites: 5413 and 5523. Advanced topics in optimal control systems. Dynamic programming and the maximum principle applied to stochastic systems. Optimum state estimation and the separation theorem. Selected topics from recent developments in adaptive and stochastic control.

6523*
Introduction to Information Theory. Prerequisite: 5513. Mathematical theory of information (Shannon theory) including information measure and transmission rates and capacities. Source coding theory including algebraic and error-correcting codes. Design of waveforms for noise immunity. Information transfer in learning systems.

6550*
Topics in Statistical Communication Theory. 1-3 credits, maximum 6. Prerequisite: 5513. Advanced topics chosen from recent developments, including learning and adaptive systems, optimal adaptive estimation theory, decision theory applied to engineering problems, modulation and detection theory and analysis and processing of seismic data.

6653*
Applications of Electromagnetic Theory II. Applications of quantum electrodynamics. Topics of current interest with sufficient mathematical sophistication to equip the student for state-of-the-art research in the area.

6713*
Advanced Topics in Network Synthesis. Prerequisite: 5753. Chosen from recent developments. R-network synthesis, state model approach to network synthesis. N-port network synthesis, multivariable synthesis, sensitivity.

6723*
Nonlinear Systems Analysis II. Prerequisite: 5723 or MAE 5723. Topics in nonlinear systems theory selected from the current literature. May include nonlinear stability theory, multi-input describing functions, nonlinear feedback control theory, the problem of Lure and Popov's criterion, multiparameter perturbation theory.

6813*
Solid-State Techniques. Prerequisite: 5813. Device fabrication; wafer preparation, etching and masking techniques, alloying, bonding, testing, Epitaxial techniques, special topics.

ELECTRICAL POWER TECHNOLOGY (EPT)

3103
Introduction to Electrical Power. Lab 3. Prerequisites: junior standing and trigonometry. Overview of the electrical industry with selected topics and laboratory to familiarize the student with electrical power systems. Technical language and symbology of the industry; surveying as applied to the needs of electrical power.

3213
Power Systems I. Prerequisites: MATH 2373 and basic electricity. Voltage, current and power relationships in single-phase and polyphase electric circuits and systems. Power transformers theory, operation, testing, and connections to power systems. Methods of starting and controlling electrical machines.

3224
Power Circuits and Machinery. Lab 3. Prerequisite: 3103. Balanced operation of poly-phase electric circuits, DC and AC machinery and power transformers. Laboratory includes connections, testing and terminal behavior of operating electric circuits, machines and transformers. Control of both DC and AC machinery.

4003
Nuclear Power. Lab 3. Sustained nuclear chain reaction. Reactor kinetics and shielding. Measurements of nuclear properties of fuels and moderators.

4050
Advanced Electrical Power Problems. 1-4 credits, maximum 4. Prerequisite: junior standing and consent of department head. Special problems in the electrical power area.

4113
Power Systems II. Prerequisites: 3213, 3224, MATH 2383. Transmission and distribution line parameters, system modeling load flow analysis. Mathematical techniques in the analysis of large networks. Problem procedures are computer assisted.

4124
Switchgear and Protective Relaying. Lab 3. Prerequisite: 3213. Types of switchgear and protective devices discussed as to construction, use, testing, installation and maintenance.

4134
Control Circuits and Systems. Lab 3. Prerequisites: 3224 and basic electronics. Operational amplifiers, synchros and digital concepts in control and analog to digital converters. Analysis techniques such as Laplace transforms and control systems modeling using both physical variables and block diagram techniques.

4223
Advanced Topics in Electrical Power. Prerequisites: 4113, 4124. Electric energy systems planning, operation control, and protection. System problem solutions are computer assisted.

4234
Solid State Power Electronics. Lab 3. Prerequisite: 4134. Solid state electronic devices such as thyristors, power switches, rectifiers and switched DC sources. AC voltage controllers, three-phase controllers and controlled rectifier circuits. Choppers, inverters, cycloconverters, cycloinverters, and uninterruptable power supplied will be studied.

ELECTRONICS AND COMPUTER TECHNOLOGY (ECT)

1003
(A)Introduction to Microcomputer Programming. Lab 2. Co-requisite: MATH 1513. Programming a microcomputer in BASIC. Algorithms to solve defined problems. Numerical limitations of small machines.

1104
(L)Fundamentals of Electricity. Lab 3. Elementary principles of electricity covering basic electric units. Ohm's law, Kirchoff's law, circuit solutions, network solutions, magnetism, inductance and capacitance.

1112
(L)Electronic Devices and Programming. Lab 3. Co-requisite: 1104 or EPT 3103. Solid-state devices in electronic amplifiers and power supplies. Introduction to the BASIC programming language on a microcomputer.

1224
(L)Electronic Amplifiers I. Lab 3. Prerequisite: 1112; co-requisite: 1244. Amplifiers using bipolar and FET transistors. RC-coupled, direct-coupled and transformer-coupled circuits. Bias stabilizing and feedback techniques.

1244
(L)Circuit Analysis I. Lab 3. Prerequisites: 1104 and MATH 1715; Co-requisite: 1224. Transient analysis of electric circuits. The use of network theorems. Resonant circuits and filters and AC power including three-phase.

2213
Essentials of Electricity. Lab 2. Prerequisites: MATH 1513, 1613. Electric circuits and machines, including Ohm's law, magnetism, direct-current motors, generators and controls, alternating current, single-phase circuits, polyphase circuits and alternating current machinery. For non-electronics majors only.

2303
Measurements and Control. Lab 2. Prerequisites: 1224 and 1244. Corequisite: 2544, MATH 2373. Electrical and electronic measurement techniques. Programming and use of programmable logic controllers. Emphasis on acquiring a measurement and developing the control-signal logic.

2544
Pulse and Digital Techniques. Lab 3. Prerequisites: 1224, 1244, and MATH 1613. Electronic circuits used in digital control and computation. Pulse generation, Boolean algebra and logic circuits.

2633
Microcomputer Principles and Applications. Lab 3. Prerequisites: 2544 and COMSC 2113. Introduces microcomputers from a hardware point of view, combining a study of machine language programming and microcomputer hardware in a highly laboratory-oriented presentation. Emphasizes interfacing the microcomputer as a programmable controller of external systems and devices.

2634
Communication Circuits and Systems. Lab 3. Prerequisites: 1224, 1244, 2303, MATH 2373. Receiver and transmitter circuits and systems, introduction to elementary antennas, modulation and detection systems, oscillators and tuned amplifiers.

273I
Electronic Fabrication Techniques. Lab 3. Prerequisites: 2303 and 2634. Laboratory projects for modern electronics engineering technicians. Circuit test, development and fabrication in wired and printed form.

3003
Principles of Electrical Power. Lab 2. Prerequisite: 2213. Polyphase power distribution systems, transformer connections and industrial electrical motors. Selection and methods of control of polyphase induction motors.

3103
Fundamentals of Electronics. Lab 2. Prerequisite: 2213, Co-requisite: MATH 2373. Electronics for non-electronics majors. Fundamentals of electronic physics, electronic device principles and characteristics, and transistor circuits. Application of electronic circuits to industrial measurement and control equipment.

3113
Circuit Analysis II. Prerequisites: 2544, COMSC 2113 and MATH 2373. Application of elementary switching functions and Laplace transforms to electronic circuit analysis. Circuit analysis in the S-plane, transfer functions and computer applications.

3123
Numerical Methods for Technology. Lab 3. Prerequisites: 3113, MATH 2833 and junior standing. Advanced programming techniques for the solution of engineering technology problems. Microcomputer and associated software use to solve matrixes and simultaneous linear equations, interpolation and approximation, solve differential equations, Fourier analysis, and fast Fourier transforms.

3234
Nondestructive Testing. Lab 2. Commonly used nondestructive testing in industry; radiography. Magneflux, liquid penetrant, ultrasonic and eddy current testing.

3263
Electronic Digital Systems. Lab 3. Prerequisite: 2633. Use of both minicomputers and microcomputers in controlling I/O devices. Students required to develop interface circuitry in a project setting to meet assigned specifications. Programming of a PDP/11 in assembly language.

3354
Electronic Amplifiers II. Lab 3. Prerequisite: 1224. Advanced topics in amplifiers, bias stabilizing, stability of feedback amplifiers, DC amplifiers, differential amplifiers and operational amplifiers.

3363
Data Acquisition and Control. Lab 2. Prerequisite: 2633. Data acquisition and the control of automatic test equipment through the IEEE 488 BUS. Transducers D/A and A/D converters, multiplexers, and sample/hold circuits included. Use of a microcomputer in controlling test equipment. Silicon-controlled rectifiers as power-control devices.

4050
Advanced Electronic Problems. 1-4 credits, maximum 4. Prerequisites: junior standing and consent of head of Department. Special problems in the electronic area.

4153
Data Communications. Lab 3. Prerequisites: 2633, 2634, and 3263. Data communications including multiplexing concepts, sampling techniques, encoding techniques. Telemetry, digitized voice, TTY, and bulk transmission systems.

4314
Control Circuits. Lab 3. Prerequisite: 3113. Components, principles and techniques basic to electronic control systems. Feedback control theory, transducers, servos and motors.

4654
Microwave Techniques. Lab 3. Prerequisites: 2634, 3113. Communication principles and measurement techniques in the UHF and microwave spectrum, coaxial and waveguide transmission lines, antenna systems and signal transmission, modulation and detectors, oscillators and amplifiers, introduction to signal transmission and modulation methods.

4832
Senior Project. Lab 3. Prerequisite: 16 credit hours of upper-division electronics courses. The synthesizing element in the electronics study plan. Pertinent topics from the first three years reviewed and integrated into a senior design project.

ENGINEERING (ENGR)

1111
Introduction to Engineering. Advisement, counseling and enrollment procedures; methodology in solving engineering problems; engineering ethics and practice.

1212
Introduction to Engineering II. Prerequisite: 1111. Continuation of 1111.

1311
Introductory Engineering Graphics. Principles, techniques and skills of graphics as used in engineering.

1412
Introductory Engineering Computer Programming. Programming to solve problems typical of practice in engineering. Techniques and methods.

1501
Women in Engineering Seminar. Prerequisite: consent of instructor. Opportunities to meet and talk with established women engineers. Potential problems faced by women in engineering and topics of particular interest to women students in engineering.

2030
Co-op Industrial Practice I. 1-6 credits, maximum 12. Prerequisites: sophomore standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by advisor. Application of credit to meet degree requirements varies with level and department.

2100
Orientation Projects. Lab 2-6. 1-3 credits, maximum 3. Prerequisite: pre-engineering standing. Enrollment in independent study or small groups. Projects to assist students with special needs to adjust to engineering curriculum.

2113
(N)Science and Technology in a Modern Society. Prerequisite: MATH 1314 or MATH 1513 or equivalent. Concepts and ideas in science and technology relevant to participation in decisions in our technological age.

3030
Co-op Industrial Practice II. 1-6 credits, maximum 12. Prerequisites: junior standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by adviser. Application of credit to meet degree requirements varies with level and department.

3111
Introduction to Engineering for Transfer Students. Prerequisite: transfer status with 28 or more credit hours. Adjustments from previous college situation needed to select a proper course of studies based on abilities, aptitudes and interests.

3333
(N)Acoustics of Music and Speech. Prerequisite: 45 credit hours completed. Algebra base treatment of the physical principles of sound in music and speech, and the sense of hearing. Sound production by musical instruments, acoustic response of auditoriums, and principles of sound reinforcement.

4030
Co-op Industrial Practice III. 1-6 credits, maximum 12. Prerequisites: senior standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by adviser. Application of credit to meet degree requirements varies with level and department.

4060*
Topics in Technology and Society. 1-3 credits, maximum 6. Problems of society relating to technology and added problems stemming from their solution. Minimal reliance on mathematics; for engineering and nonengineering students.

5010*
Studies in Engineering Instruction and Research. 1-3 credits, maximum 6. Prerequisite: current or expected appointment as a graduate teaching or research assistant. Formalizes the participation of the teaching and research assistant in the procedures and seminars necessary for satisfactory performance of duties. Not to be used on study plans toward a degree in the Graduate College. Graded on pass-fail basis.

ENGINEERING SCIENCE (ENGSC)

2112
Statics. Lab 2. Prerequisites: PHYSC 2014 and MATH 2265. Resultants of force systems, static equilibrium of rigid bodies and statics of structures. Shear and moment diagrams.

2122
Elementary Dynamics. Prerequisite: 2112. Dynamic equilibrium of particles and bodies. Work-energy and impulse momentum principles.

2142
Strength of Materials. Prerequisite: 2112. Bending moments, deformation and displacements in elastic and plastic deformable bodies.

2213
Thermodynamics. Prerequisites: CHEM 1515, PHYSC 2014, MATH 2265. Properties of substances and principles governing changes in form of energy. First and second laws.

2613
Introduction to Electrical Science. Prerequisites: PHYSC 2114 and MATH 2365. Elements of electrical engineering; AC and DC circuits, mesh and node formulation of network equations, steady-state response to sinusoids, energy, power and power factor.

3233
Fluid Mechanics and Heat Transfer. Prerequisites: MATH 2365 or concurrent enrollment and CHEM 1515, PHYSC 2014. Fluid statics, laminar and turbulent momentum transfer and convective heat transfer at introductory level. Dimensional analysis. Flow analysis of real fluids with the Bernoulli equation. Conduction and radiation of heat; heat exchanger analysis.

3313*
Materials Science. Prerequisite: CHEM 1515. Introductor y level. Relationship between structure and properties of materials and engineering applications. Atomic, microscopic and macroscopic properties.

ENGINEERING TECHNOLOGY

(See specific technology programs listed alphabetically)

ENGLISH (ENGL)

0003
Remedial Composition for International Graduate Students. Lab 2. Sentence structure, paragraphing, idiomatic usage, punctuation, vocabulary, pronunciation and documentation. Graded on pass-fail basis.

0123
Basic Composition. Intensive instruction in grammar and error avoidance (especially the differences between spoken and written English), paragraph structure, and essay writing. May be used for skills remediation or to satisfy high school curricular deficiency in English.

1010
Studies in English Composition. 1-2 credits, maximum 2. Special study in composition to allow transfer students to fulfill general education requirements as established by Regent's policy.

1013
International Freshman Composition I. Lab 2. Restricted to students whose native language is not English. Expository writing with emphasis on structure and development. Special attention to problems of English as a second language. This course may be substituted for 1113.

1033
International Freshman Composition II. Prerequisite: 1013 or 1113. Restricted to students whose native language is not English. Expository composition with emphasis on technique and style in writing research papers. May be substituted for 1213.

1113
Freshman Composition I. The fundamentals of expository writing with emphasis on structure, development and style.

1213
Freshman Composition II. Prerequisite:1013 or 1113. Expository composition with emphasis on technique and style through intensive and extensive readings.

1313
Critical Analysis and Writing I. Prerequisite: English ACT score 24 and above. Review of fundamentals as necessary. Individualized instruction in writing on topics based on discussion of student's interests. Class size limited. This course may be substituted for 1113.

1413
Critical Analysis and Writing II. Prerequisites: advanced-standing credit or an "A" or "B" in 1113 and acceptable ACT scores. Individually directed writing growing from discussions of books and ideas. Class size limited. This course may be substituted for 1213.

1923
Masterpieces of Literature. Readings in the great works of the most important writers of Britain and America, such as Shakespeare, Dickens, Twain, Faulkner, and others.

2023
(H)Readings in Biological Sciences. Reading and study skills, systematic thinking processes and abilities in organization and expression as applied to the life sciences.

2333
Introduction to Technical Writing. Prerequisite: 1113. Does not meet any part of the six-hour composition requirement for the bachelor's degree. Technical literature and publications in the student's area of specialization. Emphasis on clarity, simplicity and careful organization.

2413
(H)Introduction to Literature. Fiction, drama/film and poetry. Written critical exercises and discussion.

2443
(H,SpD)Languages of the World. A comprehensive survey of world languages. The essential structural and historical organization of languages. The process of languages as a basic human function. Same course as FLL 2443.

2513
(H)Introduction to Creative Writing. Literary composition with emphasis on techniques and style through readings and writings in fiction, poetry and drama.

2543
(H)Survey of British Literature I. The beginnings through the Neo-Classic Period.

2653
(H)Survey of British Literature II. The Romantic Period to the present.

2773
(H)Survey of American Literature I. The Puritans through the Romantic Period.

2883
(H)Survey of American Literature II. The Romantic Period to the present.

3003
English Major Internship. Prerequisite: 9 hours of English. A practicum to allow the student to experience various vocational situations and demands.

3033
Fiction Writing. Prerequisite: 2513. Directed readings and practice in writing fiction with special attention to techniques.

3043
Poetry Writing. Prerequisite: 2513. Directed readings and practice in writing poetry with special attention to techniques.

3053
Scriptwriting. Prerequisite: 2513. Directed readings and practice in writing scripts with special attention to techniques.

3123
(H)Classical Mythology. The heritage of classical Greek and Roman myths as revealed in selected examples of British and American literature.

3143
(H,SpD)American Folklore. Historical perspective; traditions, common cultural experiences and varied ethnic contributions to American life before the Century as expressed in American folklore.

3163
World Literature I. Selected literary masterpieces exemplifying ideals and values in Western cultures.

3173
World Literature II. Selected literary masterpieces exemplifying ideals and values in non-Western cultures. Emphasis on the study of non-Western literature available in English.

3200
Special Problems in Language and Literature. 1-3 credits, maximum 3. Prerequisite: 9 credit hours of English. Specialized readings and independent study.

3203
Advanced Composition and Rhetoric. Prerequisite: 9 hours of English. Theories of regulative grammar and rhetoric as applied to the writing process.

3233
Criticism. Study and application of principal critical theories in literature, film, or technical writing.

3323
Technical Writing. Prerequisites: 1113, 1323, and junior standing. Applied writing in areas of specialization. Intensive practice in professional writing modes, styles, research techniques and editing for specialized audiences and/or publications. This course may be substituted for 1323 with an "A" or "B" in 1113 and recommendation of student's college.

3333
(H)Short Story. Origins, development, theory and craft of the short story.

3353
(H)Film as Literature. Film and literature as narrative forms.

3363
(H)Drama. Origins, development, theory and craft of drama.

3603
British Literature to 1600. Historical development. Major writers and their works.

3633
(H)British Literature 1600-1800. Historical development. Major writers and their works.

3643
British Literature 1800-1900. Historical development. Major writers and their works.

3653
British Literature Post 1900. Historical development. Major writers and their works.

3703
(H)American Literature to 1800. Historical development. Major writers and their works.

3713
(H)American Literature 1800-1900. Historical development. Major writers and their works.

3723
(H)American Literature Post 1900. Historical development. Major writers and their works.

4003*
History of the English Language. Prerequisite: 9 credit hours of English. The growth of the English language.

4013*
English Grammar. Prerequisite: 9 credit hours of English. The traditional terminology and concepts of English grammar leading or evolving into the several current systems of description.

4063*
Descriptive Linguistics. Prerequisite: 9 credit hours of English. The methodology of linguistic analysis.

4083*
Applied Linguistics. Prerequisite: 9 credit hours of English. The application of linguistic theory to literary analysis.

4093*
Language in America. Historical development of American English. Regional, social and cultural language differences.

4263*
Aesthetics of Film. Major theoretical approaches to the art of cinema: auteurism, semiotics, structuralism, historicism.

4303*
British Drama 1500-1660. Genre development. Major writers and their works.

4313*
British Drama 1660-1800. Genre development. Major writers and their works.

4323*
(H)British Drama Post 1800. Genre development. Major writers and their works.

4333*
(H)American Drama. Genre development. Major writers and their works.

4403*
American Poetry to 1900. Genre development. Major writers and their works.

4413*
American Poetry Post 1900. Genre development. Major writers and their works.

4433*
British Poetry Post 1900. Genre development. Major writers and their works.

4453*
Contemporary Literature. Genre development. Major writers in the novel, poetry, or drama and their works.

4520*
Problems in English. 1-3 credits, maximum 6. Prerequisite: 12 credit hours of English. Specialized readings and independent studies.

4523*
Technical Writing Internship. Prerequisite: 6 credit hours of English including 3323. Practice in writing resumes, proposals, abstracts and articles. Concentrated review of mechanics, proofreading, editing and interviewing techniques. Second eight weeks will include internship experience.

4533*
Advanced Technical Writing. Prerequisite: 6 credit hours of English including 3323. Specialized writing projects growing out of areas of specialization with emphasis on practical and marketable skills.

4543*
Technical Editing. Prerequisite: 9 credit hours of English. Scientific and technical editing skills; emphasis on editing project.

4550*
Problems in Technical Writing. 1-3 credits, maximum 3. Prerequisite: 9 credit hours of English. Research methods, emphasis on research project.

4563*
Scientific and Technical Literature. Prerequisite: 6 credit hours of English. Scientific and technical style.

4633*
Advanced Fiction Writing. Prerequisite: 3033. Student practice and composition.

4643*
Advanced Poetry Writing. Prerequisite: 3043. Student practice and composition.

4653*
Advanced Scriptwriting. Prerequisite: 3053. Student practice and composition.

4703*
(H)Chaucer. *The Canterbury Tales* in Middle English.

4713*
(H)Milton. The more notable minor poems, prose selections and the major poems–*Paradise Lost, Paradise Regained* and *Samson Agonistes*–studied critically in context of the 17th Century.

4723*
(H)Shakespeare. Major plays and selected criticism.

4730*
Single Author or Work. 3 credits, maximum 6. The works of a single author such as Hawthorne, Coleridge, or Faulkner or a single work and selected criticism such as *The Bible, The Prelude, Moby Dick, Ulysses.*

4773*
Literature by Women. The collection of literature written by women in England and America, classical and modern figures.

4803*
(H)British Romantic Poetry. Genre development. Major writers and their works.

4813*
(H)British Victorian Poetry. Genre development. Major writers and their works.

4823*
(H)British Novel 1700-1800. Genre development. Major writers and their works.

4833*
(H)British Novel 1800-1900. Genre development. Major writers and their works.

4843*
(H)British Novel Post 1900. Genre development. Major writers and their works.

4853*
(H)American Novel to 1900. Genre development. Major writers and their works.

4863*
(H)American Novel Post 1900. Genre development. Major writers and their works.

4933*
Minority, Ethnic or Regional Literature. The study of minority, ethnic or regional American literature. Topic varies by semester.

5000*
Thesis. 1-6 credits, maximum 6. M.A. thesis.

5013*
Introduction to Graduate Studies. Principles and procedures in scholarly research.

5023*
Old English. Major works in Old English.

5053*
Single Author or Work. The works of a single author such as Spenser, Shakespeare, Pope, or Nabokov or a single work and selected criticism such as *Hamlet, Huckleberry Finn,* or Pound's *Cantos.*

5063*
Seminar in Shakespeare. Intensive study of a limited number of plays. Assignment of problems to individual students.

5073*
Old English Poetry. Prerequisite: 5023. Beowulf in Old English and selected criticism.

5083*
Seminar in Chaucer. *The Canterbury Tales* in Middle English; language study, criticism.

5093*
Seminar in Milton. Poetry, major prose, and criticism.

5120*
Studies in Teaching English as a Second Language. 1-3 credits, maximum 6. Selected topics in teaching English as a second language; e.g. cross-cultural communication, materials preparation, bilingual education.

5130*
Studies in English Grammar. 3 credits, maximum 6. Selected study of current topics in grammatical theory as it applies to the teaching of English.

5140*
Seminar in Linguistics. 3 credits, maximum 6. Selective study of current topics in linguistics.

5163*
Middle English Literature. Major works in Middle English.

5210*
Seminar or Directed Study. 1-6 credits, maximum 9. Specialized readings or independent studies.

5213*
Teaching Freshman Composition. Materials and methods of instruction in freshman composition.

5223*
Teaching Technical and Business Writing. Materials and methods of instruction in teaching technical and business writing.

5243*
Teaching English as a Second Language. Theories of second language acquisition. Materials and mehtods of instruction.

5293*
Interdisciplinary Uses of English. Interdisciplinary study with emphasis on multiple uses of literature and writing: for example film, new media, popular culture, American studies.

5313*
Internship, Teaching English as a Second Language. Supervised teaching of beginning through advanced English as a second language courses.

5333*
Seminar in TESL: Testing. Standardized testing for teaching English as a second language.

5410*
Seminar in British Literature of the 16th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 16th century.

5420*
Seminar in British Literature of the 17th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 17th century.

5440*
Seminar in British Literature of the 18th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 18th century.

5460*
Seminar in British Literature of the 19th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 19th century.

5480*
Seminar in British Literature of the 20th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 20th century.

5520*
Internship in Technical Writing. 1-3 credits, maximum 6. Practice in writing appropriate documents such as proposals, manuals (software, hardware, reference, training), articles, functional specifications in job-simulation situations. Review of academic materials as appropriate.

5533*
Seminar in Advanced Technical Writing. Specialized writing projects growing out of student's special interests and emphasizing the student's career preparation. Coverage of manuals, proposals, and visual aids used to communicate technical information.

5543*
Seminar in Scientific and Technical Editing. Managing technical documentation production; developing scientific and technical editing skills; special emphasis on editing project.

5630*
Seminar in Early American Literature. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 17th and 18th centuries.

5660*
Seminar in American Literature of the 19th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 19th century.

5680*
Seminar in American Literature of the 20th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 20th century.

5733*
Seminar in Creative Writing: Fiction. Writing fiction at the professional level.

5743*
Seminar in Creative Writing: Poetry. Writing poetry at the professional level.

5753*
Seminar in Creative Writing: Scriptwriting. Scriptwriting at the professional level.

5990*
Special Problems. 1-3 credits, maximum 6. Investigation into a designated area of English leading to materials for creative component option (M.A.).

6000*
Dissertation. 1-6 credits, maximum 20. Ph.D. dissertation.

6133*
Studies in Creative Writing: Fiction. Prerequisite: 5733. Individual projects in fiction.

6143*
Studies in Creative Writing: Poetry. Prerequisite: 5743. Individual projects in poetry.

6153*
Studies in Creative Writing: Scriptwriting. Prerequisite: 5753. Individual projects in scriptwriting.

6210*
Seminar or Directed Study. 1-6 credits, maximum 9. Specialized readings or independent studies.

6220*
Studies in Fiction. 3 credits, maximum 6. Selected work in fiction, for example development of short fiction, contemporary short fiction, contemporary novel.

6230*
Studies in Poetry. 3 credits, maximum 6. Selected work in poetry, for example modern poetry and contemporary poetry.

6240*
Studies in Drama. 3 credits, maximum 6. Selected work in drama, for example American, British, Tudor-Stuart, pre-Shakespearean.

6253*
Studies in New Media. Selected work in new media, for example film, literary adapation to film, film and television.

6260*
Studies in Literary Criticism. 3 credits, maximum 6. Selected work in literary criticism, for example ancient and neo-classical, 19th century, 20th century.

6500*
Studies in Technical Writing. 1-3 credits, maximum 6. Selected topics in technical writing.

ENTOMOLOGY (ENTO)

2001
(N)Introduction to Entomology. Lab 4. Basic morphology, physiology and development in lecture and insect order recognition in the laboratory.

2003
Insects and Man. Insect development, behavior, ecology, and the relationship of insects to man.

2201
Insect Control Concepts. Lab 4. Prerequisite: 2001. A survey of methods of insect control, application equipment and techniques.

3002
Livestock Entomology. Lab 4. Prerequisite: 2001. Economic importance, biology and control of pests affecting domestic animals.

3021
Insect Pests of Stored Products. Lab 4. Prerequisite: 2001. The biology, damage and control of insect pests of stored products.

3022
(N)Apiculture. Biology of the honeybee and other bees.

3112
(N)Horticultural Insects. Lab 2. Prerequisites: 2001, 2201. Identification, habits and control of insects attacking ornamentals, fruits and vegetables.

3332
Field Crop Insects. Lab 2. Prerequisites: 2001, 2201. Life histories, ecology and control of insects injurious to field and forage crops.

3463
(N)Forest Insects. Lab 2. The biology and control of insects injurious to shade tree, forest and forest products.

3554*
(N)Insect Biology, Family Classification and Systematics. Lab 4. Prerequisite: 2001. Biology, systematics and family classification. Use of and construction of taxonomic keys, collecting, and preparation of insects.

3883*
Survey of Entomology for Agriculturists. Lab 2. Entomology for workers in the field of agriculture. Current identification, biology and control of agricultural pests.

4123*
Household and Structural Pests. Lab 4. Prerequisite: 2201 or 3553. Classification and practical work on control of insects and rodents in dwellings, warehouses and other commercial establishments.

4223*
(L)Statistical Ecology. Lab 2. Prerequisites: 2001, plus one course each in ecology and statistics. Interrelations of insects with their environment. Population ecology of insects and environmental contamination problems of insect control.

4523*
Principles of Insect Pest Management. Lab 2. Prerequisite: 3112 or 3332 or 3553. Modern concepts of pest regulation and the influence of alternatives on the agroecosystem and economics of crop production. Identification of economically important insect pests in the Southwest.

4800
Undergraduate Traineeship. 1-5 credits, maximum 5. Prerequisite: consent of instructor. Participation in research or extension pest management programs of Departmental faculty.

4854*
Medical and Veterinary Entomology. Lab 4. Prerequisite: 3553. Biology and control of insects affecting public health.

4913*
Pesticides in the Environment. Prerequisites: BISC 1403, CHEM 1225. A discussion of pesticides (chiefly fungicides, insecticides, herbicides and nematocides), including potential movement, degradation, fate and significance in the environment. Same course as AGRON 4913 and PLP 4913.

5000*
Master's Research and Thesis. 1-6 credits, maximum 6. Research in entomology.

5002*
Insect Biochemistry. Prerequisites: BIOCH 3653. Biochemical processes in insects with emphasis on how biochemical pathways are used by the insect to adapt to its environment.

5004*
Acarology and Araneology. Lab 6. Biology, behavior, development and classification of ticks and other mites and spiders.

5043*
Insect Physiology. Prerequisites: course in organic chemistry and 9 credit hours biology. Functions of the organ systems of insects. Lecture-demonstrations of selected insect physiology techniques.

5224*
Classification of Immature Insects. Lab 6. Prerequisite : 3553. Classification, collecting and preservation of immature forms.

5330*
Advanced Systematic Entomology. 1-5 credits, maximum 5. Prerequisite: 5464. Special problems in advanced systematic entomology.

5332*
Literature of Zoological Science. Prerequisite: ENTO 2001 or BISC 1602 or equivalent. Mechanics of the library, use and preparation of bibliographies, preparation of a scientific paper, taxonomic indices and literature.

5464*
Systematic Entomology. Lab 4. Prerequisite: 3553 or equivalent. Classification and comparative biologies of terrestrial insects.

5484*
Advanced Biology and Classification: Aquatic Insects. Lab 4. Prerequisite: 3553. Biology and classification of aquatic insects. Provides an understanding of the identification, ecology, behavior and biological importance of such insects.

5512*
Biological Control. Prerequisite: 4523. Principles and practices of insect control with inimical organisms.

5550*
Advanced Agronomic Entomology. 1-5 credits, maximum 5. Prerequisite: 4523. Special problems in advanced agronomic entomology.

5612*
Host Plant Resistance to Insects. Prerequisite: AGRON 3553. Insect population management by host plant resistance.

5644*
Insect Morphology. Prerequisite: 3553. Insect development and comparative morphology.

5660*
Readings in Integrated Pest Management. 1-2 credits, maximum 2. Prerequisite: 4523 or equivalent. Reading and discussion of current publications relating to biological and economic theories that form the basis for integrated pest management (IPM) programs.

5710*
Advanced Medical and Veterinary Entomology. 1-5 credits, maximum 5. Prerequisite: 4854. Special problems in methods of disease transmission, animal parasite control and the relationships existing between parasite and host.

5733*
Ecological Systems Analysis. Lab 2. Prerequisites: COMSC 2113 and STAT 4023. Concepts, methods, and materials of systems analysis. Use and application of systems theory in an agricultural context. Examples from many agricultural endeavors. Application of systems theory to problems in their specific area of study.

5753*
Insecticide Toxicology. Prerequisite: organic chemistry or 15 credit hours biology. Properties and mode of action of the major insecticidal materials. Assessment of their impact on the environment.

5850*
Epidemiology of Arthropod-Borne Diseases. 1-4 credits, maximum 4. Lab to be arranged. Prerequisite: 4854 or equivalent. The relationships existing between the hosts, arthropod vectors and causal agents of disease and the principles of disease prevention or suppression by the intelligent use of biological principles.

5870*
Seminar. 1 credit, maximum 5. Prerequisite: consent of instructor. Written and oral reports and discussion of recent developments in entomology.

6000*
Doctoral Research and Dissertation. 1-10 credits, maximum 30. Prerequisite: M.S. in entomology or permission of major professor. Independent investigation under the direction and supervision of a major professor.

6100*
Advanced Insect Physiology. 1-5 credits, maximum 5. Prerequisite: 4043. Special problems in advanced insect physiology.

ENVIRONMENTAL SCIENCE (ENVIR)

5000*
Research for Thesis or Report. 1-6, maximum 6. Prerequisites: approval of advisory committee and departmental steering committee. Research leading to master's thesis or report.

5103*
Environmental Problem Analysis. Required for environmental science option. Multidisciplinary team investigation of environmental problems. Problem formulation, review of applicable theory from different disciplines, data collection from field, library and laboratory, mathematical modeling and application of appropriate techniques of analysis to selected environmental problems and environmental impact assessments.

5300*
Seminar in Environmental Science. 1-3 credits, maximum 6. Selected environmental problems, individual research, seminar reports and group discussion of reports.

6000*
Research for Dissertation. 1-12 credits, maximum 24. Prerequisite: approval of advisory committee and departmental steering committee. Research leading to the Ph.D. dissertation.



FAMILY RELATIONS AND CHILD DEVELOPMENT (FRCD)

2003
(S)Dynamics of Family Relationships. An ecological approach to interpersonal relationships through study of the processes in the family that influence the way members relate to each other throughout their lives. Practice in application of principles is included.

2113
(S)Human Development Within the Family: A Lifespan Perspective. Human development within the family system from a lifespan perspective. Principles of development and dynamics of behavior and relationships. Directed observation.

2213
(S)Human Sexuality and the Family. Sexual development emphasizing personal adjustment and interaction with family and culture.

2611
The Professional in Family Services. Prerequisite: HEC 1111 or equivalent. Builds skills in decision-making, priority-setting, self-assertion, and self-assessment. Volunteer and field experience options available in the field of family services.

3013
(S)Adulthood: Early Years. Prerequisite: 6 credit hours in FRCD, sociology or psychology. Study of the unique characteristics of human development during youth and early adulthood. Emphasis on individual behavior and personal relationships as one establishes oneself as an adult. Focus on factors having an impact upon the individual, family, peer and intimate relationships, parenthood, vocational and career development. Application to personal experience.

3112
Parent-Child Relationship. For parents, teachers or others who expect to be responsible for young children. Increases understanding of the needs and feelings of both the developing child and the adult caregiver. A wide variety of philosophies and techniques explored out of which individuals can devise their own comfortable, effective parenting styles.

3143
(S)Marriage. Consideration of courtship and marriage with special emphasis on building a healthy paired relationship; communication and decision making; and coping with such problems as money, sex, role taking, in-laws and children.

3213
Child Development and Guidance: Early Childhood. The physical, social, emotional and cognitive development of the young child. Utilization of this information in creating appropriately nurturant environments and devising effective guidance strategies. Directed observation in preschool laboratories.

3220
Early Childhood Education Practicum. 1-4 credits, maximum 4. Participation in the Child Development Laboratories. Experiences related to guidance, activities and program planning.

3233
Early Childhood Education: Program Development. Creating learning environments that facilitate children's physical development; skills in communication, inquiry, creative expression, and interpersonal relations; cognitive development; and emotional development. Planning, implementing, and evaluating developmentally appropriate integrated learning experiences.

3253
Child Development and Guidance: School Age. Influence of the family experience on the physical, intellectual, social and emotional development of children in the school and pre-adolescent years. The role of parents, teachers and community leaders. Application of principles of development and guidance in actual work with children.

3303*
Early Childhood Education: Play, Art and Music. Prerequisite: course in child development. Consideration of appropriate experiences in the areas of play, art and music for children under six. Observation and participation with children in the Child Development Laboratories and other groups.

3333
Child Development and Guidance: Adolescence. Development of the adolescent physically, socially, intellectually and emotionally with emphasis on the search for identity, heterosexual development, vocational choice and interpersonal relations. Observation of adolescents.

3403*
Early Childhood Education: Literature and Language Arts. Prerequisite: 3213 or equivalent. Consideration of appropriate experiences in the areas of literature and language arts. Experiences with nursery school, kindergarten and other children's groups.

3503*
Early Childhood Education: Science, Mathematics, and Social Studies. Prerequisite: 3213 or equivalent. Study of appropriate experiences in physical and natural sciences, mathematics and social studies.

3613
Professional Services for Children and Families. Study of selected services for children and families.

3623
Fundamentals for the Helping Professional. Prerequisite: 3613. Development of fundamental skills and techniques used by those in various helping professions as viewed from the systems theory perspective. Observation and interviewing techniques, problem-solving and advocacy skills, and introduction to grant writing.

3753
(S)Family Development. Relationships over the life course within the American family. Variations in form and function of the family system related to cultural, economic, and social contexts.

3810
Practicum or Internship in FRCD. 1-9 credits, maximum 9. Prerequisites: 3213 and 3233, or 3613 and 3623. Observation and participation in programs for children, youth, adults and families. Supervision by FRCD faculty members or their designated representatives.

4023*
Parent-School-Community Relationships. Prerequisite: senior or graduate standing. Effective ways for the home, school and the community to work together to provide for the optimum development of young children, including children from other cultures and ethnic groups.

4133*
Organizing and Administering Programs for Families and Young Children. Development, management, and evaluation of programs serving families and children.

4252*
History and Philosophy of Early Childhood Education. Prerequisites: courses in child development and early childhood education and senior or graduate standing. History of early childhood education; theoretical foundations and methods of early childhood curriculum models, including multicultural and nonsexist approaches; and current major issues in early childhood education.

4420*
Preschool Teaching. 1-7 credits, maximum 7. Lab 3-21. Prerequisites: 3213, 3233, 3303, 3403, 3503, and pre-registration with director of Child Development Laboratories. Preschool teaching with responsibility in nursery school–kindergarten groups.

4463*
Child Development and Guidance: Infancy and Toddlerhood. Development and behavior of infants and toddlers. Directed experience with children of this age.

4533*
Adulthood: Middle Years. Study of the unique characteristics of life between young adulthood and the later years. Special emphasis on physical, intellectual, personal, family and career development in middle age.

4543*
Adulthood: Later Years. Analysis of the aging process. Interrelation between physical, psychological and social development in later years.

4673*
Theories and Issues in Family Relationships. Prerequisite: 3753. Introduction to family theories. Current research and issues related to family dynamics, relationships, and crises within the context of the family system.

4743*
(L)Introduction to Research Methodology in Family Relations and Child Development. Understanding research processes and development of skills needed to be consumers of scientific literature in FRCD. Includes practice in reading research and statistics, introduction to how computers are used in this research and demonstration of basic principles of assessment in children and families.

4793*
(I)The Family: A World Perspective. Family structure and interaction that transcend specific cultures or nationalities; historical perspectives; and examination of specific cultural and national examples of family forms.

4811
Seminar in Family Services. Prerequisite: HEECS 4113 or concurrent enrollment. Pre-employment seminar. Individual competencies related to family services, career options, and the process of seeking employment.

4850*
Special Unit Courses in Family Relations, Child Development and Early Childhood Education. 1-6 credits, maximum 6. Various units taught by specialists in the field.

5000*
Master's Thesis. 1-6 credits, maximum 6. Research in FRCD for M.S. degree.

5030*
Teaching Human Development and Family Life. 1-3 credits , maximum 3. Prerequisite: 3753 or 4673. Content and teaching aids in teaching family relationships, family life, child development or human development.

5110*
Research Developments in FRCD. 1-3 credits, maximum 3. Prerequisite: concurrent enrollment in HEC 5102. Current development and needs in research in FRCD including application of research methods to FRCD and research planning.

5122*
Computer Applications and Analysis in FRCD Research. Creating variable codebooks, coding data for input and inputing data for computer analysis using the SPSS-X package. No computer experience necessary.

5140*
Methods of Teaching Child Development and Guidance. 1-3 credits, maximum 3. Prerequisites: 2113 and 3213 or equivalents. Content-related materials, learning experiences and methods of teaching child development in classes for youth and adults in secondary schools and colleges.

5213*
Child Behavior and Development. Consideration of theory and significant areas of research that contribute to the understanding of child behavior and development.

5243*
Family Crises and Resources. Crises and special problems encountered in family living; individual and community resources pertinent to them.

5253*
Early Childhood Education: Curriculum. Implications of child development theory and research for planning educational programs and learning experiences appropriate for young children.

5323*
Issues in Family Studies. Prerequisite: 3753. Current and classic literature in family studies. Consideration of philosophical bases and current research issues relevant to the family as a field of study.

5363*
Marital and Premarital Enrichment Education. 2-3 credits, maximum 3. Analysis of varieties of couple relationships and educational models that enable couples to enrich their relationships. Techniques for analysis and treatment of interpersonal problems through study of case materials. Classroom experience includes simulation of counseling and educational processes.

5443*
Early Childhood Education: Theory and Practice of Group Programs. Prerequisites: 3303, 3404, 3503. Daily and long-range curriculum development for children under six in relation to age needs, individual development, and equipment and physical facilities.

5470*
Developments and Innovations in Family Relations, Child Development and Early Childhood. 1-9 credits, maximum 9. Analysis of current developments and innovative practices in one or more of the specified areas. Emphasis upon evolving concepts with implications for programs serving societal needs in these areas.

5520*
Family Relationships and Child Development Workshop. 1-6 credits, maximum 8. Units of study for leaders in family life education and related fields.

5543*
Coping with Family Crises: Illness, Death, Divorce and other Crises. Strategies for helping families deal with various family crises including illness, death and divorce. Focus on dealing with these from a family systems approach.

5590*
Practicum in FRCD. 1-12 credits, maximum 12. Prerequisites: 5593, ABSED 5562. Supervised experience in various settings relevant in FRCD. May include work in the Child Development Laboratory, the Family and Child Science Center working with families, or other relevant placements.

5593*
Systems Theory and Applications to the Family. Examination of the cybernetic roots and terminology used with general systems theory providing an understanding, appreciation and integration of the role of "systems" approaches to family theory and clinical practice.

5750*
Seminar in Child Development and Family Relationships. 1-8 credits, maximum 8. Current research in child development and family relationships. Critical study of classic and current research.

5810*
Problems in Child Development, Family Relationships and Early Childhood Education. 1-9 credits, maximum 9. Directed individual study in family relations, child development and early childhood education.

5880*
Early Childhood Education: Administration. 2-3 credits, maximum 3. Administration of programs for young children including consideration of information base for decision-making, aspects of effective organizational functioning and evaluation of policies and procedures.

5883*
Philosophy and Critical Issues in Early Childhood Education. A review of the contribution of early and contemporary educators to early childhood education. Current problems and critical issues.

5983*
Theories of Child Behavior and Development. Prerequisite: 6 credit hours at graduate level in child development or related areas. Major theories and supportive research that contribute to the understanding of child behavior and development.

5993*
Theories of Family Relationships. Prerequisite: 6 credit hours at graduate level in family relationships. Theoretical configurations and current conceptual frameworks in family relationships. Overview of theory construction.

6000*
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major professor. Research in home economics for the Ph.D. degree under supervision of a graduate faculty member.

6110*
Research Problems in Family Relations and Child Development. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special research studies under the supervision of a graduate faculty member.

6250*
Seminar in Child Development. 1-6 credits, maximum 6. Prerequisite: 5213 or equivalent. Selected topics in child development with special attention given to recent research literature and current theory.

6350*
Seminar in Family Studies. 1-6 credits, maximum 6. Prerequisite: 5323 or consent of instructor. Current research and theory in the family area; selected topics.

6783*
Advanced Research Methods in Family Relations and Child Development. Prerequisites: one course in research methods and one in statistics. Research design and analysis of data appropriate to the areas of family relations and child development.

6810*
Advanced Problems in Family and Child Studies. 1-9 credits, maximum 9. Individual or group study of a significant aspect of family and child studies.

6993*
Analysis and Application of Family Theory. Prerequisite: 5993. Family theory process, including logic, theory construction, and relating conceptual orientations to current research areas.

FINANCE (FIN)

2123
Personal Finance. A first course in the management of the individual's financial affairs. Budgeting, use of credit, mortgage financing, investment and estate planning.

3113
Finance. Prerequisites: ACCTG 2203, ECON 2023, STAT 2023. Operational and strategic financial problems including allocation of funds, asset management, financial information systems, financial structure, policy determination and analysis of the financial environment.

3613
General Insurance. Introduction to the theory and general principles of insurance. A broad analysis of the elements and operation of property, casualty, health and life insurance.

3623
Property and Casualty Insurance. Prerequisite: 3613. Emphasis on loss and the insurance contract from fire, marine, property damage, automobile and other liability and loss adjustment. Rate formulation, social implications, government regulations and government regulation of the insurance industry.

3633
Life and Group Insurance. Prerequisite: 3613. Principles of insurance applied to life and human values. Group plans in industry, with coverage emphasizing the managerial point of view.

3713
Real Estate Investment and Finance. Prerequisite: 3113. An introductory course in real estate investment and finance. Financing real estate, financial leverage and financial planning, the institutional structure of mortgage lending, managing risks, investment strategies and decisions.

3813
Trust and Estate Management. Prerequisites: 3113, ACCTG 2203, BUSL 3213. Overview of trust and estate management from the point of view of a trust officer in a commercial bank. Emphasizes the need of financial managers for an understanding of problems, patterns and trends in trust and estate management.

4113*
Financial Markets and Institutions. Prerequisite: ECON 3313. Money and capital markets, flow-of-funds, commercial banks and other financial intermediaries.

4213*
International Financial Management. Prerequisite: 3113. Financial problems of multinational corporations. Designed to develop a sound conceptual understanding of the environmental factors that affect decisions of financial managers; to extend the current developments in the theory of financial management to incorporate variables peculiar to international operations; and to formulate financial strategies under different business systems and ideologies.

4223
Investments. Prerequisite: 3113. Various approaches to selecting and timing investment opportunities, e.g., common stocks, bonds, commodities and options. Modern concepts of portfolio theory.

4333*
Financial Management. Prerequisite: 3113. Theories and practice applicable to the financial administration of a firm. A variety of teaching methods used in conjunction with readings and cases to illustrate financial problems and techniques of solution.

4443*
Banking Strategies and Policies. Prerequisites: 3113 and ECON 3313. Theories and practices of bank asset management; banking markets and competition.

4550*
Selected Topics in Finance. 1-6 hours credit, maximum 6. Prerequisite: 3113. Advanced topics in finance. Topics are updated each semester.

4613*
Risk Management. Prerequisite: 3613. Elements of corporate risk control and management.

5123*
Investment Theory and Strategy. Prerequisite: 5353. Selected investment topics and advanced portfolio management techniques.

5243*
Financial Markets. Prerequisite: 5353. An analysis of the structure of financial markets, the determination and behavior of interest rates, the functioning of financial institutions, the nature of financial market instruments, and the flow of funds.

5353*
Theory and Practice of Financial Management. Prerequisite: ACCTG 5103. Concepts and theories applicable to the financial administration of a firm. Cases, problems and readings to illustrate various financial problems and techniques of solution.

5460*
Seminar in Finance. 3-6 credits, maximum 6. Prerequisite: consent of instructor. Advanced research with emphasis on theoretical problems and solutions. Selected topics covered.

5513*
Theory of Finance. Prerequisite: 5353. Development of theoretical structure of financial decisions beginning with case of certainty and moving to uncertainty models. Fundamental decisions of investment, financing, and production within the context of economic theory of choice and capital market equilibrium.

5550*
Special Topics in Finance. 1-6 credits, maximum 6. Prerequisite: 5353. Theoretical and applied aspects of specialized financial areas. Evaluation of models, current trends and problems.

5613*
Corporate Financial Planning. Prerequisite: 5353. Financial planning in a systems framework. An integration of existing financial theory and practice. Financial planning systems allowing the manager to acquire an overview of the various functions of the firm; to examine alternative courses of action with speed and thoroughness; to reduce the response time in reacting to change in the environment and to improve future decisions by learning from feedback of previous decisions.

FIRE PROTECTION AND SAFETY TECHNOLOGY (FIRET)

1013
Introduction to Loss Control and Risk Management. Lab 3. Basic concepts and methodologies from the fields of fire protection, occupational health, occupational safety and radiation health.

1213
Fire Safety Hazards Recognition. Lab 3. "The Fire Problem." Physical, chemical and electrical hazards and their relationship to loss of property and/or life. Safe storage, transportation and handling practices to eliminate or control the risk of fire in the home, business and industry.

1373
Fire Suppression and Detection Systems. Lab 3. The design, installation, maintenance and utilization of portable fire-extinguishing appliances and pre-engineered systems. Operational capabilities and utilization requirements of fire detection and signaling systems. Fire detection and suppression applied in practical laboratory problems.

1413
Fundamentals of Ionizing Radiation. Lab 3. Radioactivity, half-life, emission of particulate and electromagnetic radiation and action of radiation in various types of materials. Use of the Geiger-Mueller counter for detecting ionizing radiation.

1684
Industrial Loss Prevention. Lab 3. Prerequisite: 1213 or consent of instructor. Specific industrial processes, equipment, facilities and work practices for detecting and controlling potential hazards.

2013
Electrical Safety Codes. Lab 3. Prerequisites: EET 2213, MATH 1613. Safety-oriented design, installation, operation and maintenance of electrical power distribution systems based on current electrical codes and safety standards.

2143
Structural Designs for Fire and Life Safety. Lab 3. Prerequisite: GENT 1113. Building construction standards and codes to assure maximum life and property safety from fires, explosions and natural disaster. Egress design specifications, occupancy and construction classifications and fire protection requirements for building construction and materials.

2153
Fire Protection Management. Prerequisite: prior or concurrent enrollment in all other fire protection courses. Applied human relations, technical knowledge and skills for achieving optimum effectiveness from a fire protection organization.

2243
Automatic Fire Suppression Systems. Lab 3. Prerequisites: 1373 and MATH 1613. Detailed current standards for selection, design, installation, operation and maintenance of automatic fire suppression systems. Laboratory problems on applicable technological principles.

2483
Fire Protection Hydraulics and Water Supply Analysis. Lab 3. Prerequisites: 1373 and MATH 1513. Fluid flow through hoses, pipes, pumps and fire protection appliances. Water supply and distribution analysis using hydraulic calculations. Testing techniques to detect anomalies in design or performance capabilities.

3013
Industrial Safety Organization. Survey course. Recognition, evaluation and control of occupational health and safety hazards. Accident prevention, accident analysis, training techniques, workman's compensation insurance, guarding and personal protective equipment.

3023
Occupational Safety Techniques. Lab 3. Prerequisite: 3013. Occupational facilities, equipment and operations and their inherent hazards. Directed towards worker, machine and environmental control.

3113
Advanced Extinguishing Systems Design and Analysis. Prerequisites: 2483, 2243. Automatic fixed fire-extinguishing systems and water supply systems. Emphasis upon computer assistance through use of existing design programs.

3222
Industrial Security Applications. Safeguarding of industrial property, personnel and proprietary information.

3233
Radiological Safety. Lab 2. Ionizing radiation problems; detection and measurement, shielding and exposurelimiting, radiation health aspects, storage, handling and disposal.

3713
Hydraulic Design of Automatic Sprinkler Systems. Prerequisites: 1373, 2483, MATH 1513. Hydraulic calculation technique for the design and analysis of automatic sprinkler fire extinguishing systems.

3723
Industrial Fire Pump Installations. Prerequisites: 2483, MATH 1513. Applications, design and analysis of industrial fire pump installations. Graphical analysis of fire pump contributions to existing fire protection water supply systems emphasized.

3733
Sprinkler System Design for High Piled and Rack Storage. Prerequisites: 2243, MATH 1513. Specific design techniques for sprinkler system protection of commodities stored in solid piles or racks over 12 feet in height.

4050
Advanced Fire Protection and Safety Problems. 1-4 credits, maximum 6. Prerequisite: consent of department head. Special technical problems in fire protection and safety.

4123
Advanced Fire and Safety Problems. Selected problems in the fire, occupational safety, occupational health and industrial security areas. Research or state-of-the-art technologies to prevent or correct such problems.

4133
(L)Industrial Hygiene Instrumentation. Lab 3. Prerequisites: CHEM 1515 and PHYSC 1114. Description, operation and application of quantitative instruments in general use in industrial hygiene.

4224
Elements of Industrial Hygiene. Lab 3. Prerequisites: CHEM 1515 and junior standing. Toxic or irritating substances, physical, biological, ergonomic and other occupational stress factors causing employee illness or discomfort. Environmental pollution sources and controls.

4333
System Safety Management. Lab 3. Prerequisite: prior or concurrent enrollment in all other fire/safety subjects. Fire/safety techniques to recognize, evaluate and control potential occupational hazards. Critical path, LAD, PERT and human factors concepts.

4403
Hazardous Materials Incident Management. Lab 3. Prerequisites: 3013, CHEM 1515. An interdisciplinary approach to hazardous materials incident management. Legislative requirements. Emphasis on comprehensive safety and health program compliance relating to hazardous materials incidents or waste sites. Regulatory code activities, transport-related inspections, incident modeling, and use of environmental safety software for problem solving and documentation.

FOOD, NUTRITION AND INSTITUTION ADMINISTRATION (FNIA)

1113
(N)Basic Human Nutrition. Functions of the nutrients in human life processes. Nutrient relationship to health as a basis for food choices. Open to all University students.

2111
Professional Careers in Dietetics. Prerequisite: HEC 1111 or concurrent enrollment. Career opportunities in dietetics. Roles, responsibilities and professional expectations of dietetics professionals. Routes to professional memberships and current issues in professionalism.

2113
Introductory Food Preparation and Management. Lab 3. Selection, preparation, management and service of food.

2123
Fundamentals of Dining Room Management. Lab 3. Prerequisite: 2113. Experience in organization and management of table and beverage service in varied food service settings. Same course as HRAD 2123.

3133
(L)Science of Food Preparation. Prerequisites: 2113 or HRAD 1113, organic chemistry. Application of scientific principles to food preparation. Same course as HRAD 3133.

3213
Management in Hospitality and Food Service Systems. Prerequisite: a course in economics. Function and methods of management as related to the hospitality and food service industries. Same course as HRAD 3213.

3333
Nutrition and Dietetics. Prerequisites: 1113, organic chemistry, physiology. Metabolism of nutrients; their role and function in the human living organism and the further application to selection of diet.

3440
FNIA Practicum. 1-3 hours, maximum 3. Supervised work experience in a food service or health care facility.

3543
(I,S)Food and the Human Environment. Impact of the various factors which affect food availability, production, processing, distribution and consumption of food in the world. Challenges and solutions to the world food crisis.

3553
Purchasing in Hospitality and Food Service Systems. Lab 2. Prerequisite: 3133 or concurrent enrollment. Procurement of food and nonfood materials in hospitality and related industries. Same as HRAD 3553.

3652
Food Conservation and Preservation. Lab 3. Prerequisites: 3133, organic chemistry, microbiology. Modern methods and principles of food conservation and preservation including freezing techniques; laboratory experience with different methods.

3851
Dietetics as a Profession. Identification of changing roles, appropriate responsibilities and professional expectations of dietetic practitioners by practice level and substantive category. Professional organizations, routes to membership in the American Dietetic Association; accreditation, licensure and other aspects of the profession.

4013*
Experimental Foods. Lab 6. Prerequisite: 3133 or consent of instructor. Investigations in physical, chemical and sensory qualities of foods under experimental conditions. Development of an individual research project.

4123*
Nutrition in Disease. Prerequisites: 3333; one biochemistry course; concurrent enrollment in practicum. Physiological and metabolic bases for dietary modifications in disease. Interpretation of laboratory data as it applies to nutritional care.

4223*
Nutrition in the Life Cycle. Prerequisites: 1113 or equivalent. Nutritional needs and dietary concerns of individuals from conception through old age.

4333
Food, Beverage and Labor Cost Controls. Prerequisites: ACCTG 2203, junior standing or consent of instructor. Food, beverage and labor cost control systems associated with hospitality industry operations. Same course as HRAD 4333.

4363*
Quantity Food Production Management. Lab 4. Prerequisites: 2123, 3133, 3553, a course in accounting or mathematics or consent of instructor. Organization, purchasing, preparation and service of food for large groups. Same course as HRAD 4363.

4372*
Creative Teaching of Nutrition. Prerequisite: a course in nutrition. Techniques for development and presentation of nutrition information that will motivate people of various ages to improve their food habits. Identification and development of teaching aids.

4573*
Institution Organization and Management. Lab 3. Prerequisites: FNIA or HRAD 3553, 4363. The organization of personnel and resources in a food service institution and the techniques required by the manager. Lab consists of work experience in Residence Hall Food Services. Same course as HRAD 4573.

4641*
Seminar in Food and Nutrition. Prerequisite: upper-division standing. Reading and reporting on various topics in food and nutrition. Emphasis on interpreting journal articles and research results. Open to all upper-division University students.

4693*
Institution Administration. Lab 3. Prerequisite: 4573 or concurrent enrollment. Supervised administrative responsibilities in food services and related institutions such as hotels. Same course as HRAD 4693.

4733*
Community Nutrition. Prerequisite: 1113 or equivalent. Application of nutrition, management, education and communication principles to community nutrition programs and services. Field work required.

4850*
Special Unit Course in Food, Nutrition and Institution Administration. 1-3 credits, maximum 6. Special units of study in this Department.

5000*
Research in Food, Nutrition and Institution Administration. 1-6 credits, maximum 6. Prerequisite: approval of adviser. Individual research and thesis that will fulfill the requirements for the master's degree.

5012*
Public Policy Development in Food, Nutrition and Related Programs. Rationale underlying selected governmental programs in food and nutrition and other home economics areas and assessment of the effectiveness of the programs.

5110*
Research Developments in FNIA. 1-3 credits, maximum 3. Prerequisite: concurrent enrollment in HEC 5102. Current developments and needs in research in FNIA including application of research methods to FNIA and research planning.

5113*
Investigational Cookery. Prerequisite: 4013. Food science, food quality and physical characteristics of food.

5230*
New Findings in Nutrition. 1-3 credits, maximum 6. Prerequisite: 1113. Current emphases in nutrition, with implications for nutrition research, education, and public service.

5233*
Quantity Food Development. Lab 5. Prerequisite: 4363 or equivalent. Experimental approach to methods in quantity food production as related to time factor, institution equipment and proportions of ingredients.

5343*
Organization and Management of Food Service Systems. Prerequisite: 4573 or equivalent. Contemporary theories of organizational structures as applied in the management of foodservice systems.

5363*
Maternal and Infant Nutrition. Prerequisite: 1113 or equivalent. Nutritional needs and dietary concerns during pregnancy, lactation and the first year of life. Implications for nutrition intervention and education.

5373*
Childhood Nutrition. Lab 6. Prerequisite: 1113 or equivalent. Nutritional needs of children, preschool through elementary school years. Dietary implications for child care, school food service and parent education.

5383*
Nutrition for the Adolescent and Young Adult. Prerequisite: 1113 or equivalent. Nutritional needs and dietary concerns during adolescence and young adulthood. Implications for nutrition education and research.

5393*
Nutrition for the Elderly. Prerequisite: 1113 or equivalent. Nutritional needs, and dietary concerns of the elderly. Implications for food and nutrition programs, policies, research and education.

5462*
Food Service Layout and Equipment. Prerequisite: HRAD 4472. Food service layouts and specifications for institutional equipment.

5463*
Advanced Human Nutrition. Prerequisites: a biochemistry course and an upper-level nutrition course. Application to the human being of metabolic processes which involve essential dietary components.

5593*
Food Service Systems Management II. Prerequisite: 5343. Consideration of advanced administrative problems. Case studies in food service systems.

5613*
Organization and Management of School Lunch Rooms. Lab 2. Prerequisite: 4363 or equivalent experience in operation of school lunchrooms. Organizing equipment and operation of school lunchrooms. Special problems required.

5650*
Advanced Food Conservation and Processing. 2 credits, maximum 2. Lab 3. Prerequisite: 4013. Recent advances in food processing in relation to quality of product and conservation of food nutrients.

5673*
Food Service Systems Manpower Management. Lab 3. Principles and practices of management in the procurement, development, maintenance and utilization of an effective and satisfied working force in food service systems.

5743*
Experimental Methods in Food and Nutrition Research. Prerequisites: a course in biochemistry, a course in statistics, a graduate course in food or nutrition. Experiment al design for research in food and nutrition based on analytical laboratory techniques and other research methodology.

5753*
Administrative Dietetics. Organizing and managing food service systems as indicated in Competencies for the Dietetic Internship. Includes leadership competence, professional development, interpretation of research, implementation of change, financial planning and computer applications. Dietetic interns enroll concurrently with the internship; open to other FNIA graduate students.

5850*
Food, Nutrition and Institution Administration Workshop. 1-3 credits, maximum 4. Prerequisite: graduate standing. Selected phases of food nutrition and institution administration.

5870*
Problems in Food, Nutrition or Institution Administration. 1-4 credits, maximum 9. Newer problems and methods in food, nutrition or institution administration; animal experimentation or other research.

5960*
Food, Nutrition and Institution Administration Seminar. 1 credit, maximum 2. Prerequisite: for M.S. students. Individual reports and group discussion of current issues in food, nutrition and institution administration.

6000*
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major professor.

6113*
Critical Analysis of Current Research in FNIA. Prerequisites: graduate standing in FNIA, 3333 and 5463 or equivalent, or consent of instructor. Recent research relevant to issues in food, nutrition and institution administration.

6870*
Independent Study in FNIA. 1-3 credits, maximum 6. Selected areas of study in human nutrition or food service systems management for advanced graduate students working toward doctorate degree.

6960*
Seminar in Food, Nutrition and Institution Administration. 1 credit, maximum 3. Oral presentations of research papers and group discussions of recent literature and findings in food, nutrition and institution administration. Doctoral level.

FOREIGN LANGUAGES AND LITERATURES (FLL)

The Department of Foreign Languages and Literatures offers courses under the prefix FLL, and in the following languages each of which has its own prefix: Chinese, French, German, Greek, Japanese, Latin, Russian and Spanish. These languages are listed in alphabetical order of prefix.

1000
(I)Special Studies in Foreign Language and Literatures. 1-10 credits, maximum 10. Special studies in areas not regularly offered; basic level.

2000
(I)Special Study in Foreign Language and Literatures: Intermediate. 1-5 credits, maximum 10. Prerequisite: 10 hours or equivalent in target language (applies only to language course). Special study in areas other than those offered in regular program; intermediate level.

2103
(H)Masterworks of Western Culture: Ancient and Medieval. Ideas and values of Western culture as revealed through literary, artistic, historical, and philosophical contexts from Greek, Roman, and Medieval periods.

2203
(H)Masterworks of Western Culture: Modern. Ideas and values of Western culture as revealed through literary, artistic, historical, and philosophical contexts from the Renaissance to the Modern period.

2443
(H,SpD)Languages of the World. A comprehensive survey of world languages. The essential structural and historical organization of languages. The process of languages as a basic human function. Same course as ENGL 2443.

3500
Specialized Study in a Modern Foreign Language. 1-20 credits, maximum 20. Lab 1-5. Prerequisite: consent of instructor. Instruction and/or tutorial work in a modern foreign language other than those offered in a major program.

3503
(H,I)Asian Humanities: China and Japan. The many-faceted cultures of China and Japan from the first expression in poetry and philosophy through popular stories, plays and novels of later times, with continuing attention to music and art.

4000
Specialized Studies in Foreign Language and Literature. 1-9 credits, maximum 9. Lab 1-9. Prerequisite: junior standing or consent of instructor. Individual guided study, tutorial or seminar on specially selected topics in a foreign language or literature.

5210*
Graduate Studies in Foreign Languages. 1-6 credits, maximum 20. Prerequisite: 15 upper-division hours in the language. Graduate studies in foreign languages.

FORESTRY (FOR)

1123
Elements of Forestry. Lab 3. Modern forestry and related resource management.

2134
Dendrology. Lab 4. Prerequisite: BISC 1403. Identification, taxonomy and distribution of forest trees and shrubs of the United States; their environmental requirements and utilization.

2773
Timber Harvesting. Timber harvesting systems, methods, equipment and planning, including topics in timber procurement, timber sales, harvest economics, logging safety, environmental considerations, and industrial operations.

3001
Multiple Use of Forest Resources. Prerequisite: 2773. One-week segment of an 8-week summer field session. Management of regional forest resources, including wildlife, watershed, range recreation, and timber.

3002
Silvics and Field Silviculture. Prerequisites: 2134, 2773, BISC 1304 and 1403. Two-week segment of an 8-week summer field session. Field study of forest ecological relationships; examination and measurement of site productivity and stand dynamics; examination of current silviculture practices in major forest regions of North America.

3004
Forest Measurements I. Prerequisites: 2773, MATH 1715 and STAT 2013. Four-week segment of an 8-week summer field session. An introduction to the measurements of forests, forest products, standing trees, growth, and the application of mensurational techniques to timber valuation and analysis.

3011
Harvesting and Utilization. Prerequisite: 2773. One-week segment of an 8-week summer field session. Descriptive role of timber harvesting and forest products utilization in forest management including demonstrations, tours to logging operations and manufacturing facilities, and participation in field practices.

3021
Forest Surveying. Prerequisite: MATH 1715. First week of an 8-week summer field session. An introduction to the art and science of forest field surveying, including the tracing of old property lines, data gathering for topographic maps, traversing, and forest road layout.

3223*
Silviculture. Lab 3. Prerequisite: 3413. Principles and techniques of natural and artificial regeneration, intermediate cultural treatments, and silvicultural systems applicable in various forest cover types.

3333*
Fire Management. An introduction to the unique role of fire in the forestry enterprise; chemistry and physics of fire, fire weather, impact of fire on ecosystems, and systems developed to make fire-related decisions.

3413
Forest Ecology. Lab 3. Prerequisite: 3002. Study of the forest as a biological community with emphasis on the interrelationships between trees, other organisms comprising the community and the physical environment.

3443*
Forest Genetics and Tree Improvement. Prerequisite: 3413. A study of mechanisms of inheritance, types of genetic variance, the development of natural populations, variation patterns, genetic improvement systems, and forest tree improvement methods as part of forest and nursery management systems.

3554*
Wood Properties. Lab 2. Prerequisite: 3011. Structure, properties, identification of wood; treatment of forest products.

3643
(N)Forest Environment and Related Resources. The interrelationships and uses of the soil, wood, water, wildlife, range resources and recreational environment for man's benefit. No credit for forestry majors.

3663
Forest Measurements II. Lab 2. Prerequisites: 3004 and an introductory course in computer programming. The application of statistical methods to forestry problems including stand volume estimation, growth measurement, and volume table construction. Introduction to the use and significance of forest yield tables in forest management. Applications of microcomputing to analysis of forestry data.

3882*
Aerial Photogrammetry. Lab 3. Prerequisite: MATH 1613. Use of aerial photographs in natural resources fields. Study of scale, parallax, planimetric mapping and photo interpretation.

3993*
Forest Economics and Finance. Prerequisite: 3001, 3004, 3011, 3663 and AGEC 1114. Economic factors and analytical methods influencing decisions in forest resource management; factors affecting the production of wood products; arithmetic of interest and investment criteria; economics of nonmarket goods.

4103*
Wood Treatments and Preservation. Prerequisite: 3554. Industrial treatment of wood with respect to drying, adhesion, protective coatings, resistance to decay, and dimensional stability.

4113*
Forest Products. Prerequisite: 3554. Production, distribution and uses of major forest products.

4223*
Timber Management. Lab 2. Prerequisites: 3223 and 3993. Regulation of forest growing stock to meet management objectives. Land and timber appraisals. Organization of the forest enterprise to meet financial objectives of management. Four-day field trip may be required.

4333*
Forest Resource Management: Planning and Decision Making. Lab 2. Prerequisites: 4223 and COMSC 2113. Applications of mathematical and statistical models in solving forest resource management problems. Integrated case studies to synthesize economic, mathematical, biological, political and administrative principles.

4443*
Forest Administration and Policy. Prerequisite: senior standing. Forest policy and legislation; personnel matters, organization, supervision and financing of federal, state and private forest enterprises.

4500*
Forest Problems. 1-3 credits, maximum 3. Prerequisite: upper division standing, GPA of 2.50 or better and consent of instructor. Selected problems in forestry.

4553
Forest Recreation. Prerequisite: senior standing. Forest recreation and the agencies involved in administering such areas; their policies and management programs and the ir impact on the recreation resource. Emphasis on the public sector but the private sector also covered.

4563*
Tree Physiology. Prerequisites: 3413 and 3554. The physiology of growth, development and responses of woody plants with particular consideration of the influence of genetic and environmental factors on physiological processes in trees; application of physiological principles in predicting the effects of silvicultural practices on tree growth response.

4601*
Contemporary Issues in Forest Policy. Prerequisite: senior standing. Current issues in forest policy, public land allocation and use, alternatives for nonindustrial private forest lands, current legislation pertaining to forest resources, etc. A reading/discussion format is scheduled in the evenings at participants' homes. Enrollment limited.

4613*
Forest Biometry. Lab 2. Prerequisites: 3663 and MATH 2713. Application of mathematical and statistical methods to the unique characteristics of forest trees and stands. Development of models for individual tree taper and volume. Theory and development of growth and yield models.

4811*
Forest Hydrology Laboratory. Lab 2. Prerequisite: 4813, previous or concurrent. Techniques to evaluate the hydrologic processes and characteristics of forest and other wildland watersheds; precipitation, runoff, infiltration, erosion processes. Water quality assessment in wildland settings.

4813*
Forest Watershed Management. Prerequisite: senior standing. Hydrologic process and characteristics of forest and range watersheds; management principles and techniques for improving water yield and quality; watershed protection and rehabilitation.

5000*
Research and Thesis. 1-6 credits, maximum 6. Open to students working for a Master of Science degree in forest resources.

5003*
Productivity of Forest Stands. Lab 2. Prerequisites: 3223, AGRON 2124, STAT 5013 or equivalent. Integrated study of the ecological, and genetic factors controlling the productivity of forest stands. Analysis of natural, economic and social factors influencing silvicultural treatment of forest stands. Tree and stand response to silvicultural manipulation.

5010*
Graduate Seminar. 1 credit, maximum 2. Presentation of current and new concepts in forest land management and research techniques for their investigation. Required for the Master of Science degree.

5030*
Advanced Forestry Problems. 1-3 credits, maximum 9. Individual problems in advanced forestry subject-matter appropriate to students with capability at the master's level.

5032*
Advanced Timber Management. Case studies exemplifying biological and business principles for managing timberlands. Public and industry policies and objectives for timber management.

5043*
Forestry Research Methods. Methods used in forestry research; choice of biological materials and species: experimental design in forestry, analysis of forest data and interpretation of results for integrated forest.

5143*
Economics of Multiple Use of Forests. Prerequisite: 3993. Application of capital theory, production economics, welfare and conservation criteria and related developments in theory and analytical models to decision-making in the management of public and private forests for combination of timber, water, wildlife, range, recreation and other environmental values.

5753*
Forest Genetics. Prerequisites: 3443 and ANSI 3423 or AGRON 3553. Patterns in forest tree populations; estimation and application of genetic parameters to developing improved tree populations. Development of selection indices and experimental design as related to applied tree breeding programs.

5762*
Forest Tree Breeding. Prerequisite: 3443. The application of silvicultural and genetic principles to the commercial production of genetically improved forest trees.

5813*
Land Use and Water Quality. Prerequisites: a basic hydrology class, general chemistry. Nonpoint source pollution; relationships between land use and water quality with an emphasis on forestry, mined land, agriculture, and urban land uses. Focus on current research.

FRENCH (FRNCH)

1115
(I)Elementary French I. Lab 1 1/2. Main elements of grammar and pronunciation, with work on the four basic skills of listening comprehension, speaking, reading and writing.

1225
(I)Elementary French II. Lab 1 1/2. Prerequisite: 1115 or equivalent. Continuation of 1115.

2112
(H,I)Intermediate Reading and Conversation I. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Reading and discussion of simpler French texts, mostly cultural. May be taken concurrently with other 2000-level French courses.

2113
(H,I)Intermediate French I. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Review and further presentation of grammar and pronunciation; consolidation of basic skills, with additional emphasis on writing. May be taken concurrently with other 2000-level French courses.

2222
(H,I)Intermediate French II. Lab 1. Prerequisite: 2113 or equivalent competence. (May have been gained in high school.) Continuation of 2113. May be taken concurrently with other 2000-level French courses.

2223
(H,I)Intermediate Reading and Conversation II. Lab 1. Prerequisite: 2112 or equivalent competence. (May have been gained in high school.) Reading and discussion of more advanced French texts, mostly literary. May be taken concurrently with other 2000-level French courses.

3013
French for Reading Requirements I. Translation of French readings into English.

3023
French for Reading Requirements II. Prerequisite: 3013. Translation of French readings into English.

3073
French Conversation. Prerequisite: 20 hours of French or equivalent. Colloquial speech, with discussion of French newspapers and magazines. Practice in brief public address in French.

3203
(I)Advanced Written Expression. Lab 1. Prerequisite: 20 hours of French or equivalent. Practice in composition and stylistics, designed to bring students up to a high level of proficiency in writing. May be taken before or after 3213.

3213
(H,I)Advanced Grammar. Lab 1. Prerequisite: 20 hours of French or equivalent. May be taken before or after 3203.

3343
(I)Business French. Prerequisite: 2223 or equivalent. Applied French for students in commercial and technical fields. Overview and strategies of business and economic climate in France.

3463
(I)Advanced Diction and Phonetics. Lab 1. Prerequisite: 20 credit hours of French. Required course for teacher certification. French speech sounds and intonation patterns, with practice to improve the student's pronunciation.

3853
Introduction to Analysis of French Literature. Prerequisite: 20 hours of French or equivalent. Close reading of shorter texts in a variety of literary genres, with presentation of French versification and literary terminology.

3902
(H,I)Orientation to Internship Abroad. Prerequisites: 12 hours of French or equivalent proficiency. Preparatory course for summer practicum in French-speaking country.

3903
(H,I)Internship Abroad. Prerequisite: 3902. Practical studies in a French-speaking country. Supervised research papers and reports, and oral testing, during and following the practicum.

4113
(H,I)French Literature in Translation. Cultural and humanistic significance of French literature; reading and discussion of selected complete works, using combined lecture, discussion and seminar approaches. Independent tutorial study encouraged for part of course. Taught in English.

4153
(H,I)History of French Literature I. Prerequisite: 20 credit hours of French or equivalent. Historical survey of French literature before 1700, with reading of representative texts.

4163
(I)History of French Literature II. Prerequisite: 20 credit hours of French or equivalent. Historical survey of French literature of the eighteenth century, with reading of representative texts.

4173
History of French Literature III. Prerequisite: 20 credit hours of French or equivalent. Historical survey of French literature of the nineteenth century, with reading of representative texts.

4183
History of French Literature IV. Prerequisite: 20 credit hours of French or equivalent. Historical survey of French literature of the twentieth century, with reading of representative texts.

4333
(H,I)Backgrounds of Modern French Civilization. Prerequisite: 20 credit hours of French or equivalent.

4550
(I)Directed Studies in French. 1-3 credits, maximum 9. Lab 1-2. Prerequisite: 20 credit hours of French or equivalent. Individual or group study of French language or literature.

4573
(H,I)Modern French Theater. Prerequisite: 20 credit hour s of French or equivalent. Analysis of French plays from the 19th and 20th Centuries.

5110*
Advanced Studies in French. 1-3 credits, maximum 9. Prerequisite: 15 credit hours of upper-division French. Discussion or research in specialized topics.

GENERAL ADMINISTRATION (GENAD)

3413*
Consumer Issues in American Society. Prerequisite: ECON 1113 or 2123. The role of consumerism and its influence on business policies; the development of public and nonpublic consumer protection efforts; and personal and family financial planning and decision making, including budgeting, savings and investments, credit, buying problems and insurance.

4213*
Administrative Strategies for Women in Business. Identification and analysis of the theoretical concepts and practical tools enabling a woman to demonstrate effectiveness in the business environment. Changing advancement opportunities for women, clarification of career goals, conflict management, delegation of authority, division of labor, decision making, motivation, supervision and analysis of executive styles.

4433*
Business, Government and the Consumer. Prerequisite: ECON 1113 or 2123. Existing consumer protection programs, consumer legislation and consumer representation in local, state and federal governments, including methods of teaching.

GENERAL ENGINEERING (GENEN)

4010
Senior Design Project. 2-4 credits, maximum 4. Prerequisite: senior standing in General Engineering. Capstone design project through independent application of engineering principles and concepts from the disciplines covered in earlier coursework.

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: approval of major professor. Thesis or report.

5030*
Engineering Practice. 1-12 credits, maximum 12. Professionally supervised engineering problem involving authentic projects for which the student assumes a degree of professional responsibility. Activities must be approved in advance by the student's adviser and may consist of engineering experience on-campus or off-campus or both. Periodic reports both oral and written required as specified by the adviser.

5110*
Seminar. 1-6 credits, maximum 6. Prerequisite: approval of major professor. Independent or guided study in a topic area selected to enhance a student's program.

6000*
Research and Thesis. 1-30 credits, maximum 30. Prerequisite: consent of graduate committee and approval of student's advisory committee. Independent research under the supervision of a member of the graduate faculty for students pursuing work beyond the master's level.

6110*
Advanced Study. 1-12 credits, maximum 12. Prerequisite: approval of the student's advisory committee. Advanced study and investigation under the supervision of a member of the graduate faculty parallel in interest and advanced to and supported by the 5000-series courses.

GENERAL TECHNOLOGY (GENT)

1031
Personal and Occupational Guidance. Orientation in job requirements of engineering technician occupations. Personality development and leadership training. Graded on pass-fail basis.

1103
Industrial Materials. Structures, physical and mechanical properties of industrial materials used in manufacturing processes. Methods of testing industrial materials; methods of production of metals.

1113
Essentials of Mechanical and Architectural Drafting. Lab 3. Mechanical and architectural drafting conventions and practices in business and industry. Fundamental drafting skills and techniques; Interpretation and utilization of graphic media and engineering drawings in effective technological communications.

1153
Technical Drawing. Lab 6. Drawing and drafting room practices, procedures and techniques. Interpretation of typical industrial drawings. Students with two years high school or one year practical drafting may substitute an advanced course in Mechanical Design Technology with the consent of their advisers.

1222
Machine Tool Practices. Lab 3. Fundamental hand and machine tool processes; correct usage of tools and instruments. Cutting, filing, squaring, drilling, reaming, tapping, threading, boring , milling and precision inspection.

1320
Technological Problems. 1-3 credits, maximum 6. Prerequisite: consent of instructor and adviser. Problems in applied technology of particular interest to currently employed technicians.

1525
Technical College Algebra and Trigonometry. Application of algebra, vector algebra and trigonometry using problems encountered in technical subjects.

2050
Advanced Technological Problems. 1-4 credits, maximum 6. Prerequisite: consent of instructor and adviser. Problems in applied engineering science that are of particular interest to the engineering technician.

2323
Statics. Prerequisites: MATH 1613 and PHYSC 1114. Forces acting on bodies at rest; forces, moments of force, distributed forces, reactions, free-body diagrams, friction, internal forces and moments of inertia. Applications.

2650
Technical Projects. 1-4 credits, maximum 4. Prerequisite: completion of three semesters' work in a technical institute curriculum. Special projects assigned by advisers with the approval of the director. A comprehensive written report must be prepared and an oral examination may also be required.

2772
Motion and Time Study. Lab 3. Prerequisite: sophomore standing. Developing procedure for effective utilization of effort in industrial operations; analyzing job situations with stop watch, motion picture camera and other motion economy equipment.

2812
Statistics. Fundamental statistical measures, elementary probability, histograms, cumulative curves, linear correlation and regression, analysis of variance, estimation and significance tests.

3113
Principles of Supervision. Prerequisite: junior standing. A study of the fundamental principles of organizing, planning, staffing, controlling and directing as applied to first-line supervisory roles in industry.

GENETICS (GENE)

3003*
Heredity and Man. Study of human heredity; the impact of genetics on human endeavor.

5102*
Molecular Genetics. Prerequisites: BIOCH 3653 or BISC 3014 and one course in genetics or consent of instructor. An introduction to molecular genetics on the graduate level.

GEOGRAPHY (GEOG)

1113
(S,SpD)Introduction to Geographic Behavior. The major organizing concepts of economic and cultural geography. Man's geographic behavior in terms of his spatial organization of the earth's surface and his development of regional and political systems.

1114
(L,N,SpD)Physical Geography. Distribution and analysis of natural features of the earth. Landforms, soils, minerals, water, climates, flora and fauna. Emphasis on man-environment relations where appropriate.

2113
Field Observation and Mapping. Lab 2. Collecting and compiling data for weather, climate, land-use, social, economic, land-capability and cadastral maps.

2253
(I,S)World Regional Geography. The world's major culture regions, with emphasis on geographic aspects of contemporary economic, social and political relationships with the physical environment.

3003
Geographic Instructional Applications. Prerequisites: 1113, 1114 or 2253 or concurrent enrollment. Techniques and strategy for teaching basic geographic concepts and skills.

3023
(N)Climatology. Characteristics and distribution of world's climate. Patterns and associations of temperature, precipitation, pressure and winds. Field trips.

3033
(N)Meteorology. Physical elements which cause and influence weather.

3113
(N)Oceanography. History of the science, origin and structure of the basins, geomorphology of the floor, circulation, tides, waves, sediments, life in the ocean and interaction of the ocean and atmosphere.

3123
(S)Urban Geography. Locational aspects of urbanization; functions of and relations among cities and between cities and rural areas; internal structure of urban areas.

3163
(S)Economic Geography. Processes significant to the spatial structure of economic systems. Production, consumption and exchange activities examined in regard to location, distribution, aerial differentiation and spatial interaction patterns. Attention given to processes of change as well as to steady states.

3253
(S)Conservation of Natural Resources. Problems and corrective methods of conservation of land, water, forests, wildlife, minerals and people.

3313
Cartography. Lab 2. Prerequisite: junior standing. Theory, design, and effective portrayal of data on maps.

3363
(I,S)Geography of Africa. General patterns of population and cultural heritage in Africa; focus on element s and patterns that contrast with Western civilization.

3513
(S)Political Geography. Major political structures and geopolitical implications of location, shape, area, culture and natural environment of nations and states. Spatial analysis of voting behavior.

3523
Geographical Concepts and Techniques I. Lab 2. Prerequisites: 1113 or 1114, and STAT 2013. Modern concepts and techniques for geographical analysis and research including data acquisition and manipulation from field and secondary sources.

3533
Geographical Concepts and Techniques II. Prerequisite: 3523. The utility and goals of geographic inquiry in the solution of problems including concepts of spatial structures, distributive processes, networks, interactions and areal associations.

3613
(S)Geography of the United States. A geographic analysis of the United States with emphasis on regional variations of social, economic and physical phenomena.

3633
Regional Analysis and Planning. An introduction to methods of examining and analyzing regions. Examination and interpretation of the spatial, social and ecological aspects of regional planning. Same course as ZOOL 3633.

3653
(S,SpD)Geography of Oklahoma. Geographic interpretation of physical, economic, historical and scenic features.

3723
(I,S)Geography of Western Europe. Location and analysis of natural, economic and cultural features of Western Europe.

3733
(I,S)Geography of East Europe and USSR. A regional analysis encompassing cultural, economic and physical features.

3743
(I,S)Geography of Latin America. Areal distribution and analysis of physical, cultural and economic features of Middle and South America.

3753
(I)Geography of Asia. Systematic interpretation of significant spatial patterns of man and natural environment. (Exclusive of USSR.)

3813
Historical Geography. The reconstruction of the historical landscape of selected regions from a geographical point of view. Spatial relationships recorded in journals and literature of the past in the light of the present. These materials related to present through sequential developments of patterns of spatial organization.

3913
(S)Social Geography. Geographic impacts of human social behavior. Emphasis on the concepts of social space, density, crowding, territoriality, diffusion, migration, environmental perception. Geographic aspects of selected social problems. Relationship between social geography and environmental planning.

4003*
Natural Hazards. Human perception of and response to extreme natural events (such as tornadoes, floods, earthquakes, drought and disease). Examination of mitigation and relief procedures at local, state and national levels.

4010
Undergraduate Cooperative Education Internship. 1-9 credits, maximum 9. Prerequisite: consent of departmental adviser and permission of instructor. Practical experience in applying geographical concepts to societal problems. Students work with both agency representatives and faculty members.

4013*
(N)Biometeorology. Prerequisite: 3033. Interrelationships of meteorology to botany, zoology, agriculture, forestry, transportation, and air pollution.

4113*
Advanced Physical Geography. Lab 2. Emphasis on one or several specialized topics from the broad area of physical geography.

4123*
Geographic Aspects of Urban Planning. Prerequisite: 3123. Spatial aspects of urban planning: development of planning theory, various planning tools, and specific problem areas such as urban renewal and urban transportation.

4163*
Geography of International Economic Systems. Prerequisite: 2253 or 3163. Emphasis on international flows of goods and services resulting from differences in comparative economic advantages. International trade and aid patterns from a geographic perspective. Resource use, transportation patterns, and levels of economic development.

4213
(S)Geography of Sport. Spatial analysis of sport; its origin and diffusion, geographical organization and regional variation. Geographical movements and interaction associated with sport. Application of geographical solutions for reorganization and reform. Focus on both U.S. and international scene.

4223
(H,S)Geography of Music. Geographical and historical analysis of music as a cultural trait. The cultural significance of music and how it varies from place to place as well as how it helps shape the character of a place.

4323*
Computer Cartography. Lab 2. Use of packaged computer programs to produce maps on both the printer and the plotter.

4333*
(L)Remote Sensing. Lab 2. Prerequisite: 3523 or FOR 3882 or GEOL 3202 or 5153. Use of several types of sensors and imagery in solving problems. LANDSAT imagery use. Uses and limitations of data extraction techniques, manual and computer-assisted. Applications to a variety of specific problems.

4343
Geographic Information Systems. Lab 1. Prerequisites: 3313 or 4323 or 4333. Evaluation and application of various manual and computer-assisted Geographic Information Systems (GIS); sources of data, conceptual approaches, equipment, and software. Discussion of various output products, specific applications, and GIS relationships to modeling.

4640*
Geographic Regions. 1-9 credits, maximum 9. Prerequisite: permission of instructor. Specialized directed study of specific local and foreign regions.

4713*
History and Philosophy of Geography. Historical research questions and techniques, the structure of contemporary geography and its relations to other fields of study, and future prospects for geography.

4910*
Topics in Geography. 1-6 credits, maximum 9. Prerequisite: permission of instructor. Specialized physical, social and methodological topics in geography.

4921*
Applications of Geographic Analysis. Prerequisites: 3523, 3533. For geography majors or minors only. Applications of concepts and techniques relating to the students' specializations. Designed to reinforce and synthesize knowledge gained from previous course work.

4930*
Readings in Geography. 1-3 credits, maximum 9. Prerequisite: permission of instructor. Directed readings on selected topics, regions or methods in geography.

5000*
Thesis. 1-6 credits, maximum 6. Open only to students working on the master's degree in geography.

5010*
Graduate Cooperative Education Internship. 1-9 credits, maximum 9. Prerequisites: consent of departmental adviser and permission of instructor. Practical experience in applying geographical concepts to societal problems. Emphasis on programs in planning and geographic education.

5013*
Advanced Geographical Analysis I. Lab 2. Prerequisites: 3533 and one course in statistics. Library, field techniques, questionnaires and data processing in geographical research contexts.

5023*
Advanced Geographical Analysis II. Lab 2. Prerequisite: 5013. Application of models to geographic problem solving.

5033*
Geographic Education. For both prospective and experienced teachers of geography. Geography's role in the social and behavioral sciences; analysis of geography curricula, comparison of various instructional approaches (traditional and experimental); and examination of current research in geographic education.

5111*
Remote Sensing of the Physical and Cultural Environment. Prerequisite: undergraduate course in remote sensing and one course in statistics. Advanced interpretation and analysis of remotely sensed data on physical and cultural features of the earth's surface.

5303*
Geographic Methodology. Prerequisite: 9 credit hours of geography. The nature of geography and its relation to other fields of study. The scientific validity of concepts and questions used in contemporary geographic research. Strategies for development, synthesis, communication and use of the geographic body of knowledge.

5340*
Field Techniques in Geography. 1-3 credits, maximum 6. Prerequisite: 6 credit hours of geography or consent of instructor. Collection and analysis of field data. Field trips.

5430*
Special Studies in Regional Analysis. 1-6 credits, maximum 6. Prerequisite: 3533. Application of geographical analysis to selected regions.

5450*
Seminar in Geography. 1-6 credits, maximum 15. Prerequisite: graduate standing in geography or consent of instructor. Specialized topics in geography.

5510*
Research Problems in Geography. 1-3 credits, maximum 9. Prerequisite: permission of instructor.

GEOLOGY (GEOL)

1011
(L,N)General Geology Lab. Lab 2. Prerequisite: previous or concurrent registration in 1014. Environmental experiments in the geosciences. Field trips required.

1014
(N)General Geology. Lab 2. The influence of geology and related earth sciences on the human environment. Emphasizes energy and material resources, beneficial and hazardous natural processes, and the planetary and biological evolution of earth. Lab investigations are environmentally oriented. Field trips required.

1114
(L,N)Physical Geology. Lab 2. Composition and structure of the earth and the modification of its surface by internal and external processes. Mineral resources, sources of energy, and environmental aspects of geology. A background in precollege science and math is recommended. Field trips required.

1124
Physical Geology for Petroleum Technologists. Lab 3. Composition and structure of the earth, chiefly as related to oil and gas. Emphasis on basic stratigraphic and structural-geologic principles applied to oil exploration and production. Field trips required.

1224
(L,N)Historical Geology. Lab 3. Prerequisite: 1114. Earth history, with major emphasis on mountain-building, development of continents and oceans and evolution of animals and plants . Field trips required.

2014
(N)Scenic Geologic Regions. Prerequisite: 1014 or equivalent recommended. The geologic story of national parks and scenic regions in North America and throughout the world.

2031
(L,N)Geologic Field Investigation. Prerequisite: introductory geology. One week of required field study at sites of geological interest and significance.

2253
Mineralogy. Lab 3. Prerequisites: 1114 or equivalent, CHEM 1314 or equivalent. Crystallography and systematic study of mineral groups and their genesis. Identification of minerals by physical and chemical properties. Field trips required.

2353
Optical Mineralogy. Lab 2. Prerequisite: 2253. Study of the optical properties of non-opaque crystals by transmitted light using the petrographic microscope. Mineral identification using oil-immersion and thin-section methods.

2364
Elementary Petrology. Lab 3. Prerequisite: 2254. Origin, occurrence and classification of rocks; hand-specimen identification. Field trips required.

3004
Earth Science for Teachers. Prerequisite: 1114. Teaching natural earth systems and their environmental impact. Use of an adaptation approach in organizing, presenting, and evaluating earth science concepts in the curriculum.

3014
Structural Geology. Lab 3. Prerequisites: 1224, MATH 1613 and PHYSC 1114. Behavior of earth materials during various deformational processes and analysis of the resulting structural features. Field trips required.

3024*
Geology for Engineers. Lab 3. Prerequisite: junior standing in engineering. Physical geology with emphasis on applications to civil engineering. Field trips required.

3033*
Stratigraphy. Lab 3. Prerequisite: 1224. Principles of stratigraphy and their applications. Laboratory emphasizes realistic practical problems undertaken in the field and in the laboratory. Field trips required. Nonmajors may receive graduate credit.

3073*
Geomorphology. Lab 3. Prerequisites: 1224 or consent of instructor. Study of land forms and the processes that form them, using topographic maps, air photos, remotely-sensed images, soils maps and field techniques. Field trips required.

3103*
Paleontology and Biostratigraphy. Lab 3. Prerequisites: 1224, BISC 1114 or equivalent. Morphology and systematics of major invertebrate macro- and microfossil groups. Basic principles of biostratigraphy. Field trips required.

3124
Advanced Geology for Petroleum Technologists. Lab 3. Prerequisite: 1124 or equivalent. Principles and techniques of solving problems in structural and stratigraphic entrapment of oil and gas. Emphasis on interpretation of subsurface data and maps, including well logs and various kinds of maps. Field trips required.

3546*
Field Geology. Lab 6. Prerequisites: 2364, 3014, 3033, 3073. Six weeks of field methods in geology including mapping by pace and compass, plane table and aerial photographs. Required of all geology majors. Transportation and room and board fees required.

4010*
Geology Colloquium. 1 credit, maximum 8. Prerequisite: junior standing. Lectures and demonstrations of timely interest in geology. Field trips may be required.

4023*
Petroleum Geology. Prerequisites: 3014 and 3033. Origin, migration and accumulation of petroleum, requirements for source rock, reservoir rock and traps. Structure and stratigraphy of selected oil fields. Field trips required.

4213*
Global Tectonics. Prerequisite: 3014. Principles and major concepts of global tectonics. Emphasis on the tectonics of major mountain chains of North America, Europe, South America, and Eastern Asia. Field trip required.

4453*
Hydrogeology I. Water cycle with emphasis on surface water, ground water, water quality pollution, and water law. Interrelations between the sciences and the humanities.

4463*
Hydrogeology II. Lab 3. Prerequisite: 4453. Physical ground-water systems. Realistic problems to acquaint students with ground-water occurrence and movement. Geologic, geophysical, hydraulic, geochemical and modeling techniques used to define a ground-water system. Field trips required.

4563*
Sedimentology. Lab 3. Prerequisites: 3546, senior standing. Sediments, sedimentary processes and sedimentary environments, geometry and internal features of sediments. Field trips required.

4663*
Economic Geology. Lab 3. Prerequisite: 2364. Descriptive geology origin, economic utilization of metallic and nonmetallic minerals and rocks. Field trips required.

4990*
Special Problems in Earth Science. 1-8 credits, maximum 8. Prerequisites: 25 hours of geology and permission of instructor. Individually designed study projects involving assigned reading, library work, field work, laboratory work or a combination of these. Field trips may be required.

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: approval of graduate committee. Work toward master's thesis in geology.

5050*
Problems in Economic Geology. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Individually-designed problems in economic geology. Field trips may be required.

5100*
Problems in Hydrogeology. 1-4 credits, maximum 8. Prerequisite: 4453. Advanced problems in hydrogeology with emphasis on quantitative methods. Field trips may be required.

5150*
Problems in Engineering Geophysics. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Advanced problems in engineering geophysics with emphasis on problem solving. Field trips may be required.

5183*
Advanced Paleontology. Lab 3. Prerequisite: 3103 or equivalent. In depth study of selected fossil groups with emphasis on marine micropaleontology. Student projects on assigned fossil groups with presentation of results both orally and in writing. Field trips required.

5203*
Advanced Structural Geology. Lab 3. Prerequisite: 3014. The theoretical, experimental and descriptive approach to structural geology; includes correlations between stress field, rock type, and structural style in petroleum exploration.

5223*
Advanced Map Interpretation. Lab 3. Prerequisite: 3014. Geometric techniques and analysis of complex structural terrain. Elucidation of geological history by study of selected maps. Field trip required.

5253*
Diagenesis of Clastic Rocks. Lab 3. Prerequisites: 2254, 2364. Structure, composition, occurrence, and identification of clay minerals and other diagenetic minerals in clastic rocks. Identification of minerals by x-ray diffraction and optical methods. Use of diagenesis in exploring for hydrocarbons. Field trips required.

5283*
Subsurface Geologic Methods. Lab 3. Prerequisites: 3014, 3033. Use of subsurface geologic information from cores and well logs to prepare maps and identify oil and gas prospects. Field trips required.

5303*
Applied Geophysics. Lab 3. Prerequisite: PHYSC 1214. Principles of exploration geophysics with emphasis on the petroleum and mineral industries. Field trips required.

5353*
Advanced Well Log Analysis. Lab 3. Prerequisites: 3033 or 3124. The geologic interpretation of a variety of well logs, involving both modern and "old" logs. The art of interpretation emphasized, as well as quantitative methods. Some exercises involve concurrent interpretation of well logs and core samples, or well logs and bit cuttings.

5363*
Sedimentary Petrography of Nonclastic Rocks. Lab 3. Prerequisite: 4563. Systematic classification of nonclastic marine and nonmarine sedimentary rocks. Recognition of evidence of depositional environments and diagenesis, using petrographic methods. Field trips required.

5403*
Geochemistry. Prerequisites: 2364 and general chemistry . Application of chemical principles to geological processes. Emphasis on chemical sedimentology, stable isotopes, and Eh-ph diagrams.

5443*
Engineering Geophysics. Lab 3. Prerequisites: 1114 or 3024; PHYSC 1214 or equivalent. Geological aspects of problems associated with environmental engineering, ground-water pollution and regional and urban planning. Problem assessment and field methods. Two required field projects include geophysical surveys using resistivity and seismic refraction methods. Field trip required.

5453*
Advanced Hydrogeology. Lab 3. Prerequisites: 4453, COMSC 2113 or equivalent, MATH 2265 and 2365 or equivalent. Advanced quantitative techniques used to address ground-water management and pollution. Advanced field and laboratory techniques as well as management and chemical transport models applied to actual field problems and case studies. Field trips required.

5503*
Environmental Geology. Prerequisite: 3073. Application of principles of geology to environmental studies and to land and resource planning and development. Methods of acquiring, compiling and transferring geologic information for the purposes described above, with emphasis upon environmental geologic mapping. Field trips required.

5523*
Organic Geochemistry. Lab 3. Prerequisite: introductory chemistry. Introduction to some environmental aspects of organic geochemistry. Soils and sediments as pollutant receptors, sources of pollutants and selected aspects of environmental health.

5553*
Environmental Geochemistry. Lab 3. Prerequisite: introductory chemistry. Origin and evolution of natural water quality. Distribution and mobility of elements in the secondary environment. Computational methods for the interpretation of water analyses.

5603*
Basin Analysis. Lab 1. Prerequisites: 3546, 5203, 5223, 5253, 5363. Team-taught course. Interpretations of the evolution of selected sedimentary basins. Emphasis on facies analysis, petrography, diagenesis, and structural evolution. Field trips required.

5710*
Advanced Studies in Geology. 1-4 credits, maximum 8. Prerequisite: consent of instructor. Individual library, laboratory and/or field projects on facets of geology not covered by existing courses. Field trips may be required.

GERMAN (GRMN)

1115
(I)Elementary German I. Lab 1 1/2. Main elements of grammar and pronunciation, with work on the four basic skills of listening comprehension, speaking, reading and writing.

1225
(I)Elementary German II. Lab 1 1/2. Prerequisite: 1115 or equivalent. Continuation of 1115.

2112
(H,I) Intermediate Conversation and Composition I. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Colloquial speech patterns and grammar. May be taken concurrently with other 2000-level German courses.

2113
(H,I) First Readings in German. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Selections from German newspapers and other contemporary material. May be taken concurrently with other 2000-level German courses.

2222
(H,I)Intermediate Conversation and Composition II. Lab 1. Prerequisite: 2112 or equivalent competence. (May have been gained in high school.) Continuation of 2112, with further work in composition, conversation and grammar. May be taken concurrently with other 2000-level German courses.

2223
(H,I)Introduction to German Literature. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Reading and analysis of prose, drama and poetry; literary appreciation. May be taken concurrently with other 2000-level German courses.

3013
German for Reading Requirements I. Reading in the humanities and the sciences. Translation from German to English.

3023
German for Reading Requirements II. Prerequisite: 3013 or equivalent. Intermediate and advanced reading in the humanities and sciences. Translation from German to English.

3333
(H,I)Backgrounds of Modern German Civilization. Prerequisite: 20 credit hours of German or equivalent. Historical, cultural, political and literary trends in the formation of German civilization.

3343
(I)Business German. Lab 1. Prerequisite: 20 credit hours of German or equivalent. Introduction to business practices and economic environment in Germany. Study of specialized vocabulary.

3463
(I)Advanced Diction and Phonetics. Lab 1. Prerequisite: 15 credit hours of German or equivalent. Required course for teacher certification. German speech sounds and intonation patterns. Practice to improve the student's pronunciation.

3803
(H,I)Advanced Conversation. Lab 1. Prerequisite: 20 credit hours of German or equivalent. Colloquial speech forms and sentence structure. Practice in brief public address in German.

3813
(H,I)Advanced Grammar and Composition. Lab 1. Prerequisite: 20 credit hours of German or equivalent. Practice in original composition in German. Problematic points of German grammar and stylistics.

3902
(H,I)Orientation to Internship Abroad. Prerequisite: 20 hours of German or equivalent. Preparation for residential internship in a German-speaking country. Culture, civilization, and contemporary conditions, and communication for students accepted for international cooperative education program.

3903
(H,I)Internship Abroad. Lab TBA. Prerequisite: 3902. Practical studies in a German-speaking country. Supervised research papers and reports, and oral testing, during and following the practicum.

4153
(H,I)Survey of German Literature I. Prerequisite: 20 credit hours of German or equivalent. German literature from the beginning to 1785.

4163
(H,I)Survey of German Literature II. Prerequisite: 20 credit hours of German or equivalent. German literature from 1785 to the present.

4513
(H,I)The Age of Goethe. Prerequisite: 20 credit hours of German or equivalent. Principal figures of German Classicism and Romanticism.

4523
(H,I)19th Century German Theater. Prerequisite: 20 credit hours of German or equivalent. Kleist, Buchner, Grillparzer, Hebbel, Hauptman and others.

4533
(H,I)19th Century German Novelle and Lyric. Prerequisite: 20 credit hours of German or equivalent. Prose and lyric from Romanticism to Naturalism.

4543
(H,I)20th Century German Literature. Prerequisite: 20 credit hours of German or equivalent. Main currents in German literature from Naturalism until present day.

4550
(I)Studies in German. 1-3 credits, maximum 9. Prerequisite: 20 credit hours of German or equivalent competence. Reading and discussion of vital subjects in German.

GRADUATE (GRAD)

5880*
Graduate Traveling Scholar. Credit will vary depending on the program of each traveling scholar, maximum 12. Prerequisite: graduate-degree candidacy. Enrollment of graduate traveling scholars in academic or research courses.

5990*
Graduate Research and Teaching Practicum. 1-6 credits, maximum 12. Prerequisite: graduate standing. Graduate-level instructional program in research and teaching techniques and procedures. Graded on pass-fail basis.

6010*
Research or Intern Practicum. 1-9 credits, maximum 12. Prerequisite: graduate standing. Graduate-level internship program for public administration, service or research. Blends the theoretical and absolute phase of the academic with practical on-the-job experience.

GREEK (GREEK)

1113
(I)Elementary Classical Greek I. Grammar and vocabulary of Ancient Greek.

1223
(I)Elementary Classical Greek II. Prerequisite: 1113 or equivalent. A continuation of 1113. Grammar and readings of classical Greek authors.

2113
(I)Elementary Classical Greek III. Prerequisite: 1223 or equivalent. A continuation of 1223. Grammar and readings of classical Greek authors.

2213
(H,I)Intermediate Readings. Prerequisite: 2113 or equivalent. An introduction to a variety of classical authors to increase reading facility and grammatical comprehension.

3330
(I)Advanced Readings. 1-6 credits, maximum 9. Prerequisite: 2213. Prose authors, epic poetry, drama, Koine Greek and religious texts.

HEALTH (HLTH)

2213
Foundations in Health Education and Wellness. Analysis of major concepts e.g. degenerative disease, human exercise capacity, health behavior, etc.

2220
Laboratory and Clinical Experiences in Health. 1-3 credits, maximum 3. Prerequisite: 2213. Directed observation and supervised laboratory and clinical experiences in appropriate teacher education and wellness program areas.

2602
First Aid. Lab 2. A competency/performance-based first aid course.

2603
Total Wellness. Knowledge, attitudes and practices related to self-direction of health behavior for total well-being.

2653
Applied Anatomy. Action and location of individual muscles and muscle groups. Anatomy as applied to a living person. Common anatomical injuries and diseases will be presented with each joint structure.

2663
Care and Prevention of Athletic Injuries. Prerequisite: 2653. Symptoms of common athletic injuries, their immediate treatment and care.

3613
Community Health Programs. Structure and function of health agencies and programs in the total community.

3623
School Health Programs. Prerequisite: 2603. The identity and relationships of school health instruction, services and environments.

3653
Advanced Care and Prevention of Athletic Injuries. Lab 2. Prerequisite: 2633. Advanced techniques applied to athletic injuries.

4333*
Wellness Lifestyles. Traditional concepts of wellness examined and evaluated, with emphasis on contemporary application.

4503*
Fitness and Weight Management. Prerequisites: FNIA 1113, PHSI 3113. Knowledge about the conditions and problems associated with fitness and weight control. Scientific literature on the health aspects of obesity, various techniques for assessing body composition, exercise and eating programs for optimal fitness and weight management.

4643
Methods in School and Community Health Education. Conceptual and value approach to health education through a variety of teaching methodologies.

4902
Athletic Therapy Modalities. Lab 1. Prerequisite: 4992. Commonly used therapeutic devices used for training rooms.

4983*
Human Electrocardiographic Interpretation. Prerequisite: PHSI 3113. Knowledge concerning the collection and interpretation of the electrocardiogram (EKG) and its relationship to heart anatomy, physiology and electrophysiology.

4992
Athletic Rehabilitation. Lab 1. Prerequisites: 2653, 3663. Scientific methods in conditioning athletes and rehabilitation of injured athletes. Practical rehabilitation will be under the direct supervision of the OSU medical faculty.

4993*
Strategies in Teaching Human Sexuality. Prerequisite: 2603. Development of techniques, strategies, and methodologies for teaching sex education in schools and/or community settings.

HEALTH, PHYSICAL EDUCATION AND LEISURE (HPELS)

3010
Health, Physical Education and Leisure Sciences Workshop. 1-3 credits, maximum 6. Concentrated study of selected areas of health, physical education and leisure sciences. Problems in instruction and administration not normally available in undergraduate curriculum.

4010
Directed Study. 1-3 credits, maximum 6. Prerequisite: written approval by department head. Supervised readings, research or independent study of trends and issues related to the area of health, physical education or leisure services.

4480
Internship. 4-16 credits, maximum 16. Prerequisite: last semester-senior year status. Supervised field work experiences in health, physical education or leisure services.

5000*
Thesis or Report. 1-6 credits, maximum 6.

5003*
History and Philosophy of Physical Education. The history and philosophies of physical education beginning with ancient Greece and continuing through modern Europe and America.

5010*
Seminar. 1-2 credits, maximum 4. Selected topics from the profession not covered in other courses. Presentation and critique of research proposals and results.

5020*
Health, Physical Education and Leisure Workshop. 1-6 credits, maximum 6. Selected areas of health, physical education and leisure.

5023*
Legal Aspects of Health, Physical Education and Leisure Sciences. The law: its application and interpretation as it applies to teachers, coaches and administrators of health, physical education and leisure sciences programs.

5030*
Field Problems in Health, Physical Education or Leisure Sciences. 1-6 credits, maximum 6. Individual investigations.

5043*
Trends and Issues in Health, Physical Education and Leisure Sciences. Major trends and issues in higher education and professional preparation; principles, practices, problems and improvements in HPELS; future needs and program innovations.

5053*
Research Design in Health, Physical Education and Leisure. Prerequisites: PSYCH 5303 or STAT 5013 or equivalent. Research design with applicability toward HPEL. Provides the student with a conceptual understanding of theory, tools and processes involved in designing research studies.

5063*
Statistical Computing and Proposal Writing. Prerequisite: 5053. Instruction in the use of SPSS-x and BMDP software using WYLBUR. Preparation of research proposals for students in health, physical education and leisure.

5073*
Sport: Psychological Aspects. Psychological foundations of sport emphasizing performance enhancement by athletes through psychological training techniques.

5413*
Organization and Administration of Recreation. Systematic approach to problem solving and decision making for structure, personnel management, finance and program development for recreation delivery systems.

5423*
Camp Administration and Programming. Management, budget, site development , program evaluation and selection and training of personnel.

5433*
Development of Leisure Services Delivery Systems. Concepts and principles of administration and management, including planning, organization, supervision and evaluation for a variety of leisure services delivery systems.

5443*
Social Foundations of Recreation and Leisure. Social and philosophical foundations of recreation and leisure with emphasis on the contributions of recreation and its effect on man throughout history.

5453*
Practicum for Human Service Professionals. A wilderness-based program for educators and human service professionals utilizing Colorado Outward Bound Schools experiential educational model for adapting traditional teaching methodologies.

5513*
Organization and Administration of School and Community Health Education. Basic functions and principles of organization and administration pertaining to both school and community agencies.

5523*
Critical Issues in Health. Current school, community and national health problems.

5533*
School Health Curriculum. Knowledge and experience in curriculum development and evaluation.

5543*
Health Education in the Community. Health education in the community setting through various nonschool agencies in conjunction with actual medical care facilities.

5613*
Cardiac Rehabilitation. Prerequisites: HLTH 2653 and PHSI 3113 or equivalent. Factors involved in cardiovascular disease. History, implementation and administration of cardiac rehabilitation programs.

5723*
Curriculum Development in Health, Physical Education and Leisure Services. Identification and analysis of curriculum theories with emphasis on traditional and innovative approaches to curriculum design for programs in HPELS.

5733*
Motor Learning. Research in psychology and physical education relevant to the understanding of the nature and basis of motor skill learning.

5753*
Laboratory Assessment of Human Work Capacity. Prerequisite: PHSI 3113 or equivalent. Instruction and practice in use of modern laboratory facilities, equipment and techniques used in the evaluation of human work capacity.

5763*
Administration of Health, Physical Education, Leisure and Sports Programs in Higher Education.

5773*
Corrective Physical Education. Prerequisites: HLTH 2653 and 3652. Prevention, detection and correction of remediable physical defects.

5793*
Mechanical Analysis of Physical Education Activities. Prerequisites: HLTH 2653, 3663, HPELS 5823 and 5843. Application of physical laws to physical education activities.

5823*
Advanced Applied Anatomy. Prerequisite: HLTH 2653. Structure and movement of the human body with emphasis on the relationship of physical activity to musculoskeletal and neurological factors.

5833*
Methods in Physical Education. Prerequisites: PE 4712 and 3773, CIED 5043 recommended. Differentiation between teaching methods in physical education; advantages of the application of the individual methods to particular situations in teaching physical education. Same course as CIED 5833.

5843*
Quantitative Biomechanics and Kinesiology. Prerequisites: 5823, HLTH 3663. Analytical approach to the study of human motion as applied to kinesiological description and kinematic and kinetic evaluation.

5853*
Stress Testing and Exercise Prescription. Lab 2. Prerequisite: PHSI 3113 or equivalent. Theory and practice in resting and exercise EKG, stress test protocols and exercise prescription.

5873*
Human Bioenergetics. Prerequisite: PHSI 3113 or equivalent. Human energy production, utilization and storage in response to exercise.

6010*
Independent Study in Health, Physical Education and Leisure Services. 1-6 credit hours, maximum 6.

HISTORY (HIST)

1010
Studies in American History. 1-2 credits, maximum 2. Special study in American History to allow transfer students to fulfill general education requirements as established by Regents' policy.

1103
(S)Survey of American History. Meaning, vitality, and uniqueness of United States history since 1492 through a thematic examination of our nation's past. Satisfies, with POLSC 2013, the State law requirement of 6 credit hours of history and government before graduation. No credit for students with prior credit in HIST 1483 or 1493.

1483
(S)American History to 1865. From European background through Civil War. Satisfies, with POLSC 2013, State law requirement of 6 credit hours of history and government before graduation. No credit for students with credit in HIST 1103.

1493
(S)American History Since 1865. May be taken independently of HIST 1483. Development of the United States including the growth of industry and its impact on society and foreign affairs. Satisfies, with POLSC 2013, State law requirement of 6 credit hours of history and government before graduation. No credit for student s with credit in HIST 1103.

1613
(H,I,S,SpD)Western Civilization to 1500. Lab 1. History of western civilization from ancient world to Reformation. Laboratory discussion sessions on interpretation of primary sources in translation.

1623
(H,I,S,SpD)Western Civilization After 1500. Lab 1. History of western civilization from Reformation to present. Laboratory discussion sessions on interpretation of primary sources in translation.

1713
(H,I,S)Survey of Oriental Civilization. The independent yet related histories of India, China, Japan, Korea and Southeast Asia with special attention to the origins and development of oriental civilization from pre-history to the 17th Century and on the contribution of power and violence to the evolution of civilization.

2323
(S)Oklahoma History. Early exploration and establishment of Indian Territory; the rise and demise of the Five Indian Nations; and the organization and development of the 41st state to the present. Required of all candidates for teacher's licensure/certification in social studies.

3003
(I,S)Soviet Union: History, Society and Culture. A comprehensive view of the Soviet Union, stressing those issues in the political, economic, technological, geographical and cultural spheres which are most relevant to the current situation. Accessible to beginning undergraduates. Same course as POLSC 3003, and RUSS 3003.

3013
(H,I)Ancient Near East. The Ancient world from the beginnings of recorded history through the Egyptian, Mesopotamian, Hebrew and Persian civilizations, in addition to the minor civilizations of the area.

3023
(H,I)Ancient Greece. The Greek world from the Bronze Age through Alexander the Great with special emphasis on politics, culture and institutions of Classical Greece.

3033
(H,I)Ancient Rome. Political, social, economic and cultural history of the Roman Republic and Empire.

3153
(H,I)Russia to 1861. Political, institutional, societal and economic development of Russia from the Kievan period to the Great Reforms.

3163
(H,I)Russia Since 1861. Modernizations of Russia in the 19th and 20th centuries. Great reforms and their effects and the 1917 revolutions and their consequences.

3173
(H,I)Eastern Europe, 1000-1800. Formation of the eastern European nations and the influence of Rome, Byzantium, the Ottoman Empire, Russia, Austria and Prussia on them.

3183
(H,I)Eastern Europe Since 1800. Formation and impact of nationalism, industrialization, and power politics on the peoples of eastern Europe.

3203
(H,I)Early Middle Ages, 325-1000. Economic, social, cultural and religious developments in Byzantium, Islam, and the Germanic West, which succeeded imperial Rome.

3233
(H,I)Medieval Europe, 1000-1350. High and Late Middle Ages in the West with emphasis on political, social, economic and intellectual development.

3243
(H,I)Renaissance and Reformation, 1350-1618. Social, cultural, intellectual, political, economic and religious developments which led to the flowering of modern western civilization.

3253
(H,I)Early Modern Europe, 1618-1815. Economic, social, political, cultural, intellectual and religious transformation of Europe from the opening of the Thirty Years War to the Congress of Vienna.

3263
(H,I)Modern Europe, 1815-1914. Impact of modernization on the character of European society. Factors that transformed the Continent into a battle ground in the 20th century.

3273
(H,I)Modern Europe Since 1914. Origins, character and impact of the first World War; emergence and consequences of the totalitarian state; nature of political and intellectual terrorism. Effects of worldwide economic depression; dilemmas of modern democracies; political collapse of Europe as a consequence of World War II.

3293*
History of Christianity. An intellectual and cultural history of Christianity from the second century to the present day. Same course as REL 3293.

3333
(I)History of the Second World War. Problems leading to World War II with their international implications and consideration of the war years.

3353
(H,I,S)Imperial Spain, 1450-1800. The rise and fall of the world's first modern imperial power, from Spain's emergence under the "Catholic kings" to its rejuvenation under the Bourbons, with topics on political, artistic, and cultural history.

3373
(I,S)Medieval England: 55 B.C.—A.D. 1485. English History from Roman Britain to the beginning of the Tudor period. Development of the English constitution from the early Germanic state through feudalism to the New Monarchy.

3383
(I,S)Tudor-Stuart England. History of England from the War of the Roses through the coming of the House of Hanover in 1714. Development of the centralized state, parliamentary reaction, reorientation of the English society and economy, and the English Reformation.

3393
(I,S)Modern England: 1714—Present. English history from the arrival of the house of Hanover through the decline of British influence following the Second World War. Political, social, and economic problems encountered as a result of the creation of the first modern industrialized state.

3403
(H,I)East Asia to 1800. Traditional Chinese civilization and its impact on Japan, Korea and Southeast Asia.

3413
(H,I,S)East Asia Since 1800. Impact of the Occident on China, Japan and Southeast Asia. Problems of trade and diplomacy; political and industrial transformation of Japan; revolutionary process in China; the rise of nationalism in Southeast Asia.

3423
(H,I)Modern Japan. Modernization process in Japan since 1868.

3433
(H,I)Modern China. Response of China to the West since 1840, with stress on economic, social and intellectual currents.

3453
(H,I)Colonial Latin America. Impact on the Indian cultures of Spanish and Portuguese conquerors, priests, administrators and entrepreneurs in the creation of a new society. Class structure, 18th Century reforms, and independence movements.

3463
(H,I,S)Modern Latin America. Latin America republics emphasizing the dictators and the liberal reform movements of the 19th century. U.S. involvement and the recent social revolutions of the 20th Century.

3473
(I)British Empire and Commonwealth of Nations. Growth and transformation of the British Empire between the Elizabethan Age and World War I. Causes and consequences of the dissolution of the Empire after 1945.

3613
(S)American Colonial Period to 1750. Colonization of British and French North America; colonial political, social, cultural, intellectual and economic development; international rivalries; the imperial structure.

3623
(S)Era of the American Revolution. British imperial problems; the American Revolution; political, cultural, economic, social and religious change; the War for Independence; the Articles of Confederation; the critical years.

3633
(S)Early National Period, 1787—1828. Drafting and adopting the Constitution, organizing the government, Jeffersonian Republicanism, the War of 1812, territorial expansion, the new West, nationalism and sectionalism.

3643
(S)The Jacksonian Era, 1828—1850. Development of a modern political system and an entrepreneurial economy; social reform; territorial expansion; and sectionalism.

3653
(S)Civil War and Reconstruction, 1850—1877. Causes, decisive events, personalities and consequences of the disruption and reunion of the United States.

3663
(S)Robber Barons and Reformers: U.S. History, 1877-1919. The impact of industrialization upon American society and politics. America's rise to world power, the Progressive movement and World War I.

3673
(S)America Since 1919. The United States since the 1920's with emphasis upon the 1920's, the depression, the New Deal, World War II and its aftermath; retreat from imperialism in the 1920's to world leadership in the 1950's.

3743
(S)Trans-Appalachian West. Settlement and development of the frontier east of the Mississippi River including the French and Spanish provinces, British occupation, Indian resistance and American conquest through the Jacksonian Era.

3753
(S)Trans-Mississippi West. Emergence of the modern West from Spanish and French settlement and exploration, the Rocky Mountain fur trade, the settlement of Texas, Oregon, California, and Utah, the mining, ranching and farming frontiers, the Indian Wars and transportation.

3763
(S)American Southwest. Southwestern states of Texas, Arizona, New Mexico and California from the Spanish colonial period to the present. Mining, ranching, farming frontiers, Indian wars of the Apache, Comanche and other southwestern tribes, and the emergence of the modern Southwest.

3773
(S)Old South. Social, political and industrial conditions in the South before the Civil War.

3783
(S)New South. Recent history and major current social and economic problems of the southern regions of the United States.

3793
(S)Indians in America. American Indian from Columbus to the present, emphasizing tribal reaction to European and United States cultural contract and government policy.

3913
(H,S)History of Medicine. Historical growth of medicine and its relationship to the society in which it develops. Scientific problems, cultural, religious, and economic problems associated with the historical development of medicine.

3923
(H,S)Science in Society. Impact of science on society and of society on science during selected periods of history.

3943
(H)Religion in America. Impact of the varieties of American religious experience on national life.

3973
Historical Methods and Interpretations. Required of all history majors. Introduction to historical methods and interpretations.

3980
Studies in History. 1-3 credits, maximum 9. Presented for general audiences. Not intended for history majors.

4063
Historic Preservation. Focuses on the United States and examines the history and theory of the preservation movement, the legal basis for preservation of the built environment, and the methodology of preservation.

4143
American Agricultural History. Growth and development of the agricultural foundation of the United States, including the social, technological and economic contributions made by agriculture.

4163
(I)World Agricultural History. Impact of land and food throughout history. Agricultural problems from Biblical times to the current world food crises.

4253
American Foreign Relations to 1917. American experience in foreign relations from colonial times to World War I.

4273
American Foreign Relations Since 1917. America's emergence as the decisive factor in the world balance of power.

4353
American Military History. Civil-military relations, the military implications of American foreign policy, and the impact of technological advances on warfare since colonial times.

4463
(H)American Social and Intellectual History to 1865. American society in nonpolitical aspects: sections, classes, national culture and social structure, immigration, education, religion, reform, world influences; ends with Civil War.

4483
(H)American Social and Intellectual History Since 1865. Continuation of 4463; may be taken independently. Emphasis on nonpolitical aspects of American society and thought and on world influences.

4503
(S)American Urban History. Impact of urbanization upon American communities from 1865 to the present. Evolving political and social institutions, social change, technological innovations and planning theories.

4513
(S)American Economic History. Economic development and economic forces in American history; emphasis upon industrialization and its impact upon our economic society since the Civil War. Same course as ECON 3823.

4523
American Environmental History. Development of an environmental context for American history by probing the diverse and changing responses of Americans toward their environment.

4533
(S)Blacks in America. Achievements of the black man in America and his participation in the development of the United States.

4543
Indians of Oklahoma. The Five Civilized Tribes and Plains Indians and their role in the history of Oklahoma to the present.

4553
(S)Women in America. Women in pioneer American life, politics, family, work and modern society.

4573
(H)Women in Western Civilization. Women in the development of Western Civilization from the earliest times to the present.

4613*
(H,I)History of Culture in India. Literature and arts of India and Pakistan studied in their historical and philosophical context. Same course as REL 4613.

4980*
Topics in History. 1-3 credits, maximum 9. For students interested in pursuing either a research or a reading project. Open to honors students in history and to others by permission of the Department head.

5000*
Thesis. 1-6 credits, maximum 6.

5003*
Applied History Report. Prerequisite: consent of graduate committee. Research in applied history.

5023*
Historical Methods. Methods of historical research and the writing of history.

5030*
Applied History Internship. 3-6 credits, maximum 6. Prerequisite: consent of graduate committee. Supervised practical experience in applied history.

5120*
Reading Seminar in American History. 3 credits, maximum 15. Historiographical and bibliographical study of special areas of American history.

5140*
Reading Seminar in European and World History. 3 credits, maximum 15. Historiographical and bibliographical study of special areas of European and World history.

5220*
Research Seminar in American History. 3 credits, maximum 15. Research in selected problems in American history.

5240*
Research Seminar in European and World History. 3 credits, maximum 15. Research in selected problems in European and World history.

6000*
Doctoral Dissertation. 1-19 credits, maximum 30. Prerequisite: admission to candidacy. Advanced research in history.

6023*
Historiography. Major writers of history, historical schools and patterns of developments in historical interpretation from the earliest times to present.

6120*
Special Studies in History. 1-3 credits, maximum 36. The meaning and operation of the historical processes and develop capabilities for clarity of statement, investigation, and creative, critical attitude. Areas studied vary from semester to semester.

HOME ECONOMICS (HEC)

1111
Career Exploration in Home Economics. Developing and applying concepts relating to individual values and goals to assist in career decision making. Required for all freshman students in home economics.

4110*
The Home Economist in the Contemporary World. 1-2 credits, maximum 6. Prerequisite: senior standing. Field experiences related to issues affecting the family in contemporary society and the unique responsibilities of the home economist as they interface as agents of change.

5102*
Methods of Home Economics Research. Methods of research in various areas of home economics including types of research and such aspects as problem definition, design, sampling, data collection, data analysis, reporting and reviewing. This course or equivalent required of all graduate students in home economics.

5151*
Interdepartmental Home Economics Seminar. Analysis of current issues from the perspective of home economics. Application of research findings related to issues.

6180*
Research Seminar. 1-3 credits, maximum 3. Prerequisite: graduate course in research methods or consent of instructor. Research in home economics with emphasis on problems involving a multidisciplinary approach. Methodological analysis of research. Development and evaluation of research focused on current problems.

6990*
Seminar in Home Economics. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Analysis of philosophy, critical issues, current developments and interrelationships among elements in home economics.

HOME ECONOMICS EDUCATION AND COMMUNITY SERVICES (HEECS)

2102
Professional Laboratory Experiences in Home Economics Education and Community Services. Lab 2. Realistic experiences in different professional career areas acquainting students with the diversity of responsibilities as applied to the variety of audiences served. Those entering the teacher certification option need to spend the equivalent of 2 hours per week in the public schools.

3313
Home Economics Curriculum Development and Evaluation. Lab 2. Prerequisite: provisional admission to Teacher Education. Theory and application of models of curriculum development and evaluation. Administration and interpretation of assessment techniques; design and use of teacher-made tests. Utilization of educational objectives, strategies, resources, and evaluation of learning and programs.

4102*
Philosophy of Home Economics Education. Basis for developing a home economics education philosophy as related to present day theories of education including multi-cultural education, diversity of learners, characteristics of effective teachers, ethical considerations and other major contemporary issues in public education.

4103*
Managing Career Decisions. Applications of decision making models for career and life planning. Self-assessment, career alternatives, career mobility, work/family issues and resource identification. Student seeking teacher certification will complete a module on methods of teaching career education.

4113
Home Economics: Professionalism, Issues and Actions. History and philosophy of home economics. Current issues and strategies for professional development, integration of core concepts and theories, and involvement in public policy.

4203*
Strategies for Teaching. Learning theories and strategies for planning, teaching and evaluating formal and nonformal programs. Not applicable for teaching licensure.

4210
Seminar in Vocational Home Economics. 1-4 credits, maximum 4. A study of the bases for vocational home economics, its diverse audiences and its relationship to all areas of vocational education.

4212*
Extension Programs in Home Economics. Development, organization and methods of home economics public service programs.

4213*
Media, Materials and Techniques in Home Economics Education. Lab 6. Prerequisite: 3313 and full admission to University Teacher Education. Application of educational principles to specific home economics subject matter. Experiences with verbal and non-verbal communication, teaching and evaluation techniques, audiovisual materials, computers and a variety of teaching aids. Development of proficiency in use of various media.

4333*
Organization of School and Community Home Economics Programs. Prerequisite: full admission to teacher education. Leadership responsibility and activities of the home economics teacher in youth organizations, adult education, and effective interaction with parents and community.

4353*
Strategies for Working with Adults in Community Services. Theories of adult development as they affect learning activities of adults in family-related programs. Implications are analyzed in relation to planning and selecting programs, media, and teaching strategies.

4413*
Management of Volunteer Programs. Prerequisite: junior, senior or graduate standing. For family and human service professionals who will have responsibility for utilizing volunteer personnel in achieving program goals. Overview of issues in volunteering, management and leadership strategies for maximizing volunteer effectiveness and strategies for evaluating volunteer service.

4610*
Field Experience in Home Economics Education and Community Services. 1-8 credits, maximum 8. Prerequisites: consent of adviser and department head. Supervised observation and participation in community programs serving the educational needs of families.

4620*
Seminar in Occupational Home Economics. 1-6 credits, maximum 6. Lab 6. Organization, outlook and current trends in occupational home economics programs. Explores requirements for employment in business, industry, home-based business and self-employment.

4720
Student Teaching in Home Economics. 1-12 credits, maximum 12. Lab 3-36. Prerequisite: full admission to Teacher Education and student teaching. Study and development of a philosophy and competencies in home economics education through directed teaching experience in an approved vocational program. Participation starts at the beginning of the semester in the assigned school.

4750*
Independent Study in Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Various units of work related to specific problems in home economics education.

4820*
Program Planning. 2-4 credits, maximum 4. Factors that influence planning and change in educational programs relating to community services and home economics. Principles of program development in agencies and institutions with differing purposes and organizational structures.

4983*
Conference and Meeting Planning. Prerequisite: junior, senior or graduate standing. Planning and implementing conferences, teleconferences, conventions, special events, seminars and symposia. Includes designing, promoting, managing and evaluating educational events.

5000*
Master's Thesis or Report. 1-6 credits, maximum 6. Prerequisite: consent of major adviser. Research in home economics for M.S. degree.

5010*
Seminar in Family and Community Services. 1-6 credits. Prerequisite: consent of instructor. Philosophy, trends, and issues affecting leadership, management, implementation, and accountability of family and community service organizations.

5103*
Research Methods in Home Economics. Recent problem areas and techniques of home economics research, followed by experiences in identifying researchable problems, planning and selecting procedures for carrying out studies and interpreting findings.

5110*
Home Economics Curriculum Development. 2-3 credits, maximum 3. Prerequisite: methods course. A study of major concepts, philosophies and strategies that influence curriculum decisions in home economics programs at all educational levels.

5212*
Administration and Supervision of Nonformal Education Programs. Prerequisite: graduate standing. Contemporary theories on administrative skills, management process, managerial styles, and supervisory behavior as they relate to goal orientation, performance, productivity, and professional development.

5223*
Contemporary Programs in Home Economics Education and Community Services. Educational philosophies, trends, policies and issues that impact upon home economics and community service programs.

5312*
Participative Leadership. Prerequisite: graduate standing. An examination of contemporary theory and practice related to participative leadership, collaborative planning, and shared responsibility for resource development and program accountability in nonformal educational programs. Practical application of theoretical constructs in group leadership skills, conflict management and team building.

5330*
Teaching Consumer Education and Resource Management. 1-3 credits, maximum 3. Prerequisites: ECON 1113, HIDCS 2413 or equivalent or consent of instructor. Objectives, methods, materials and evaluation in teaching consumer education and resource management cooperatively planned and/or taught with HIDCS.

5340*
Supervision of Student Teaching in Home Economics. 2-3 credits, maximum 3. Prerequisite: teaching experience. The preparation of home economics teachers with emphasis upon the provision of learning experiences for student teachers.

5413*
Management of Family and Community Service Programs. Prerequisites: graduate standing and one year work experience. Planning, personnel development, resource development, management and evaluation for community service.

5423*
Promoting Community Service Programs. Strategies for promoting participation and community support for non-profit programs. Applications to the promotional problems of organizations.

5440*
Teaching Human Development and Family Life. 2-3 credits, maximum 3. Prerequisites: FRCD 2113 and FRCD 3753 or equivalents. Study of objectives, methods, materials and evaluation in teaching human development and family life. Cooperatively planned and/or taught with FRCD.

5520*
Independent Study in Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed study in areas of home economics education.

5610*
Internship-Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of department head. Selected learning experiences relating to career goals in approved settings.

5663*
Evaluation Design in Home Economics Education and Community Services. Fundamental principles of evaluation, emphasis on instrumentation.

5750*
Community Services Workshop. 1-6 credits, maximum 6. Analysis of client, staff and administrative problems in health and human services.

5810*
Seminar in Home Economics Education and Community Service. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Concerns of educators and community service professionals.

5990*
Problems in Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Individual or group study of a definite aspect of home economics education.

6000*
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major adviser. Independent research for doctoral dissertation.

6103*
Design and Implementation of Programs in Home Economics and Community Services. Theories, resources, strategies and issues for bringing about change in groups and individuals applied to home economics and community services programs.

6203*
Research Design in Home Economics. Research design, funding, computer assistance and experience in communicating research results.

6393*
Administration of Home Economics. Principles, processes, techniques and issues in relation to administration.

6523*
Home Economics in Higher Education. Educational objectives and their implementation in home economics at the upper-division and graduate level.

6563*
Evaluation Research Models. Prerequisite: 5103 or consent of instructor. Process of evaluation related to research purpose and design and to assess evaluation research models appropriate to home economics.

6750*
Independent Study in Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Intensive study in selected areas of home economics education for advanced graduate students working toward doctorate degrees.

6810*
Home Economics Education and Community Services Seminar. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Critical study of problems and recent developments in home economics education and community services.

HORTICULTURE (HORT)

1002
Home Horticulture. Lab 2. Horticulture around the home. Planning and care of home grounds, the fruit and vegetable garden and selection, use and care of indoor plants. Intended for non-majors only.

1013
(N)Principles of Horticulture and Landscape Design. Lab 2. Horticultural principles and practices; basics of landscape design; characteristics and use of horticultural plants; scope and development of the horticultural industry.

2112
(N)Indoor Plants. Lab 2. Prerequisite: 1013. Identification, cultural requirements and use of ornamental foliage and flowering plants for indoor gardens.

2212
Herbaceous Plants. Lab 2. Prerequisite: 1013. Identification, cultural requirements and landscape value of ornamental flowering herbaceous plants.

2652
Basic Floral Design. Lab 2. Fundamentals of floral arrangement and design for the home and the retail shop; basic skills useful to flower shop employment and operation.

3010
Internship in Horticulture and Landscape Architecture. 1-6 credits, maximum 6. Prerequisites: 45 credit hours and approval of adviser. Supervised work experience with approved public and private employers in horticulture, landscape architecture, or related fields. Credit will not substitute for required courses.

3013
Arboriculture. Lab 2. Prerequisites: 3312 and 3322 or FOR 2134, and AGRON 2124. Selection, planting, establishment, nutrition, pruning, pest and disease control and other maintenance considerations for trees, shrubs and vines.

3083
(L)Plant Propagation. Lab 1. Prerequisites: 1013, AGRON 2124 and BISC 1403. BOT 3233 and 3463 suggested. Principles and practices involved in propagation of plants. Anatomical, morphological and physiological aspects of sexual and asexual methods of regeneration and their importance.

3113
Greenhouse Management. Lab 3. Prerequisites: 1013, 2112, BISC 1403 and MATH 1213. Commercial greenhouse operation with emphasis on floricultural plant production aspects; environment, growing media, fertilizers and application methods, watering, pest and disease control, chemical growth regulators, production costs.

3153
Turf Management. Prerequisite: 1013, AGRON 2124 and 2 hours plant science. Selection, establishment and maintenance of grass species and other plant materials for special use areas.

3213
Fruit and Nut Production. Prerequisite: BISC 1403. Commercial production of fruits and nuts, with emphasis on pecan, apple, peach, strawberry, blackberry and blueberry. A two-day field trip is required.

3312*
Landscape Plant Materials I. Lab 2. Prerequisite: BISC 1114 or 1403. Identification, adaptation, tolerance and use of deciduous trees, shrubs, vines and ground covers in the landscape.

3322*
Landscape Plant Materials II. Lab 2. Prerequisites: 3312 and BISC 1114 or 1403. Identification, adaptation, tolerance and use of evergreen trees, shrubs, vines and ground covers in the landscape.

3433*
Commercial Vegetable Production. Prerequisites: 1013, AGRON 2124 and BISC 1403. Commercial production and marketing of vegetable crops.

3544*
Nursery Production. Lab 2. Prerequisites: 3312 and 3322, AGRON 2124, BOT 3463, PLP 3344 and any course in entomology. The propagation, production, management and marketing of commercial nursery stock.

3553
Advanced Floral Design and Marketing. Lab 2. Prerequisite: 2652. Preparation, arrangement, care and marketing of floral products in the retail shop, advanced designing, pricing, wholesale purchasing and retail selling.

4212
Vocational Horticulture. Lab 4. Prerequisite: concurrent enrollment in AGED 4200. An overview of horticulture including floriculture, ornamentals, vegetables, landscape design, fruits and nuts as they relate to vocational agriculture programs. Taken in conjunction with AGED 4200.

4313*
Commercial Flower Production and Marketing. Lab 3. Prerequisite: 3113. Commercial production of cut flower, pot plant and bedding plant crops. Application of plant physiological principles to crop culture, crop production costs and marketing.

4453*
Turfgrass Science. Lab 3. Prerequisite: 3153. Investigation of environmental stresses imposed on turfgrass and the interrelationship between stress and the cultural practices of turfgrass.

4670*
Horticultural Seminar. 1-2 credits, maximum 2. Required of horticulture seniors, except those choosing landscape options. Topics in horticulture, career exploration and job placement.

4990*
Horticultural Problems. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Problems related to pomology, olericulture, nursery production, landscape design, or the culture, sales and arrangement of flowers.

5000*
Research and Thesis. 2-6 credits, maximum 6. Research on thesis problems required of master's degree candidates.

5110*
Advanced Horticultural Problems. 1-12 credits, maximum 20. Selected research problems in horticulture, floriculture, landscape design; nursery production, olericulture, and pomology.

5123*
Horticulture Science. Prerequisites: BOT 3463, BOT 3460 or equivalent or senior standing. The basics of applied physiological responses of plant growth as related to horticulture plants. Includes hormonal, genetic and environmental influences on horticultural plant growth and production.

5233*
Experimental Horticulture. Methods of conducting research with horticultural crops including organization and plans, field plot techniques and analysis of data.

5343*
Advanced Nursery Systems. Physiological, cultural and economic factors affecting nursery plant production. Economic considerations and analysis of current and theoretical nursery systems.

5412*
Mineral Nutrition in Horticultural Crops. Prerequisites: BOT 3463, AGRON 4234. Fertilizer use and plant response in horticultural crops.

5422*
Flowering and Fruiting in Horticultural Crops. Prerequisite: BOT 3463. Environmental, chemical and cultural factors affecting the flowering and fruiting of horticultural crops.

5432*
Postharvest Physiology. Prerequisites: BOT 3463 and 3460. Physiological causes for postharvest changes in horticultural crops (ripening and senescence) and the basis for certain postharvest treatments (precooling at harvest, controlled atmosphere storage, refrigeration, packaging techniques, etc.) Commodity-specific postharvest phenomena.

6000*
Research and Thesis. 1-12 credits, maximum 20. Research on thesis problems required of candidates for the Ph.D. in crop science.

HOTEL AND RESTAURANT ADMINISTRATION (HRAD)

1102
Orientation and Survey of Hotels and Restaurants. Career opportunities and the scope, development and history of the mass feeding and housing industries.

1113
Introduction to Professional Food Preparation. Lab 3. Techniques and theories of food preparation including use and selection of equipment, sanitation and quality controls.

2111
Professional Sanitation in Food Service Industry. Lab 1. Prerequisite: introduction to professional food preparation, chemistry. Sanitation for the hospitality industry. Food preparation and service, equipment, and guest accommodations.

2123
Fundamentals of Dining Room Management. Lab 3. Prerequisite: 1113. Experience in organization and management of table and beverage service in varied food service settings. Same course as FNIA 2123.

2223
Executive Housekeeping. Lab 2. Prerequisite: 2111. Housekeeping management in the hospitality industry. Organization, labor controls, material and equipment costs, customer expectations of today's lodging, food service, and institutional housekeeping departments.

2233
Multi-Unit Food Operations. Lab 4. Prerequisites: 3111 and 3123. Experience in operations of multi-unit food services in a variety of work stations.

3103
Institutional Furnishings. Furnishings other than mechanical equipment: furniture, textiles, rugs, linens, etc.

3111
Preprofessional Experience. Prerequisite: sophomore standing or preprofessional experience. The student's future professional role and responsibilities; business procedures; employer, employee and guest relationships in the hospitality industry. Work procedures and job performance evaluations; job applications and resumes.

3133
(L)Science of Food Preparation. Lab 2. Prerequisites: 1113 or FNIA 2113, organic chemistry. Application of scientific principles on food preparation. Same course as FNIA 3133.

3213
Management in Hospitality and Food Service Systems. Prerequisite: a course in economics. Function and methods of management as related to the hospitality and food service industries. Same course as FNIA 3213.

3363
Hotel-Motel Front Office Procedure. Lab 2. Prerequisites: junior standing, 6 credit hours in accounting. Various jobs in the hotel-motel front office and the procedures involved in registering, accounting for, and checking out guests. The organization, duties and administration of institutional housekeeping as related to the front desk.

3440
Hospitality Work Experience. 1-6 credits, maximum 6. Supervised experience in an approved work situation related to a future career in the hospitality industry.

3473
Mechanical Equipment and Building. Illumination, electric wiring, plumbing, heating, ventilation, air conditioning, food preparation and food service equipment utilized in the hospitality industry will be evaluated. Emphasis on maintenance, repair, how it works and what it does. Energy utilization and conservation stressed.

3553
Purchasing in Hospitality and Food Service Systems. Lab 2. Prerequisite: 3133 or concurrent enrollment. Procurement of food and nonfood materials in hospitality and related industries. Same as FNIA 3553.

4103
Legal Aspects of Hotel and Restaurant Management. Research and problems concerning leasing and the legal responsibilities of innkeepers and restauranteurs. Labor relations, collective bargaining and O.S.H.A. restraints considered in relation to operations.

4213
Hotel and Restaurant Promotion and Sales. Prerequisite: junior standing. Fundamentals of sales promotion, the sales department, publicity types, methods of soliciting group business. Versatility, cost, timing and results of use of the advertising media.

4333
Food, Beverage and Labor Cost Controls. Prerequisites: ACCTG 2203, junior standing. Food, beverage and labor cost control systems associated with hospitality industry operations. Same course as FNIA 4333.

4363
Quantity Food Production Management. Lab 4. Prerequisites: HRAD 2123, 3133, 3553, a course in accounting or mathematics. Organization, purchasing, preparation and service of food for large groups. Same course as FNIA 4363.

4413
Hotel Operation Systems Analysis. Conceptional analysis of hotel operation systems such as food and beverage service, housekeeping, sales, properties management, personnel, accounting and front office. Investigation of inter- and intra-departmental functions.

4473
Institutional Food Service Layouts and Equipment. Prerequisites: 3103, 3473, 4363. Space allocations and equipment arrangements will be studied utilizing time-and-motion efficiency. Specifications for institutional equipment.

4483
Hospitality Facilities Layout. Lab 2. Prerequisites: 4473, GENAD 2103. The use of the AutoCad System in the planning process, space allocation and arrangement of furnishings, equipment and utilities in a hospitality facility.

4573
Institution Organization and Management. Prerequisites: 3553, 4363 or FNIA 3553, 4363. Organization of personnel and resources in a food service institution and the techniques required by the manager. Lab consists of work experiences in Residence Halls Food Services. Same course as FNIA 4573.

4693
Institution Administration. Lab 3. Prerequisite: 4573 or concurrent enrollment. Supervised administrative responsibilities in food services and related institutions such as hotels. Same course as FNIA 4693.

4723
Survey of Beverages in the Hospitality Industry. Prerequisite: senior standing. History, classifications, production techniques and quality factors of beverages such as wines, distilled spirits, beers, and non-alcoholic beverages.

4850
Special Unit Course in Hotel and Restaurant Administration. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special unit of study related to specific problems in the hospitality industry.

4883
Multi-unit Food Service Management. Prerequisites: 4363, MGMT 3313. Study of policy and procedure influencing the human side of hospitality management. Management decisions of multi-unit franchising, finance, menu strategy and marketing.

HOUSING, INTERIOR DESIGN AND CONSUMER STUDIES (HIDCS)

1123
Graphic Design for Interiors. Lab 6. Interior design majors only. Drafting and visual communication techniques related to interiors.

2213
Contemporary Issues in Housing, Interior Design and Consumer Studies. Contemporary issues affecting the near environment of the family ecosystem and its relation to quality of life, consumer rights and responsibilities, government policies, housing and design decisions and satisfactions.

2223
Presentation Techniques for Interior Design. Lab 6. Interior design majors only. Two- and three-dimensional presentation techniques using various media and formats.

2313
Introduction to Interior Design. Lab 2. Basic interior design theory including aesthetic, social and economic aspects of the housing environment in relation to needs, values and goals of individuals and families.

2413
(S)Resource Management for Individual and Family. Principles and procedures of management and their relationships to human and material resources. Emphasis given to the consumer in the marketplace, financial management and time and energy management.

3213
Interior Design Studio I: Residential. Lab 6. Prerequisites: 1123 and 2223. Studio course utilizing the design process in the analysis, space planning and construction techniques involved in the design of residential spaces to achieve efficient use of energy and space.

3233
(H)Heritage of Interiors I. Religious, civic, commercial, and domestic architecture and furnishings prior to and including the 18th Century with emphasis on the periods which have greatly influenced housing and interior design.

3243
Design of Interior Components. Lab 6. Prerequisites: 1123 and 2313. Design, materials, construction and production of interior design components including custom furnishings and interior treatments and modification.

3253
Environmental Design for Interior Spaces. Prerequisite: 3243. Design factors and human performance criteria for lighting, acoustics and thermal/ atmospheric comfort as they relate to the practice of interior design.

3300
Supervised Field Experience. 1-3 credits, maximum 6. Prerequisites: 1123, 2223, 2313. Field experience in specialized residential, commercial and institutional design with both historic and contemporary elements.

3303
Materials and Finishes for Interiors. Prerequisite: 2313. Materials and procedures used in the production and marketing of interior spaces.

3343
Design and Space. Lab 6. Prerequisites: 1123, 2223 and 2313. Creative exploration of three dimensional spaces in interior design.

3353
(S)Socio-economic Aspects of Housing. Family housing needs, present social and economic conditions affecting housing and building processes and the roles of business and government in housing.

3363*
Interior Design Studio II: Contract. Lab 6. Prerequisites: 3213, 3243, 3303, 3333 and 3343. Studio course utilizing the design process in the analysis of office planning including systems and specifications.

3413
(S)Families as Consumers. Prerequisite: junior standing. Economic decision making related to achieving maximum satisfaction from resources spent in the marketplace on housing, food, clothing, transportation, leisure and other dimensions of family-marketplace interaction.

3423
Technology and the Home. Lab 2. Selection, use and application of equipment in the home, including microcomputers and other technologies for management of the home.

3433
Family Finance. Prerequisite: junior standing. Problems faced by consumers in the changing economy; impact of family financial decisions on a consumption-oriented society. Management of family resources including financial planning, credit, insurance, savings, investments, tax and estate planning.

3820
Preprofessional Internship. 1-6 credits, maximum 6. Prerequisite: 3823 and consent of instructor. Participation in a monitored, practical housing, design or consumer-related experience.

3823
Professional Practices for Interior Design. Prerequisites: 2343, 3213 and 3303. Future professional role and responsibilities, business procedures and employer-employee relationships which characterize the employment situation in interior design.

4143*
Housing for Special Groups. Problems and alternative solutions for housing for special groups, e.g., the aging, children, the handicapped, low-income, women heads of families and single-person households. Includes field study or design problem.

4163*
(H,I)Housing in Other Cultures. Housing and interior design and expressions of cultural beliefs, attitudes, family patterns and environmental influences.

4263*
Interior Design Studio III: Commercial & Residential. Lab 6. Prerequisites: 3253, 3363 and 3823. Studio course utilizing the design process in the analysis and planning of commercial, institutional and retail environments with emphasis on materials, codes and accessibility.

4293*
Interior Design Studio IV. Lab 6. Prerequisite: 4263. Studio course developing comprehensive interior design projects in the areas of historical restoration/preservation/adaptive reuse and custom residential planning.

4323
(H)Heritage of Interiors II. Prerequisite: 3233 or consent of instructor. Exploration of the architecture, interiors and furnishings of a variety of structures. Residential, commercial, governmental, institutional, and recreational buildings of different cultures of the 19th and 20th Centuries.

4413*
Work Environments and Human Performance. Planning kitchen and work areas for convenience, comfort and contribution to family living. Analysis of home lighting and utilities for work areas, application of time, motion and work simplification in planning work areas.

4423*
Family Resource Management. 3 credits. Exploration of the time, human, environmental and financial resources of the family. Practical application of management principles to the use of family resources through supervised experiences with attention ot the development of professional competence as well as personal skills.

4443*
Home Equipment Principles and Application. Lab 2. Prerequisite: 3423. Application of physical science principles in a study of selected major and small equipment used in the home. Each individual will complete a project.

4463*
(S)Women in the Economy. Prerequisites: 2413 and ECON 1113. Economic roles of women in American society as consumers and producers in the marketplace and in the home. Exploration of issues raised by the changing economic status of women.

4473*
Economics of Aging. Principle economic elements of aging including employment and retirement decisions, changes in amount and sources of income, consumption patterns and living arrangements.

4810*
Analysis of Current Literature Including Research in Housing, Design and Consumer Resources. 1-2 credits, maximum 2. Analysis of current research in relation to housing, design and consumer resources.

4820
Professional Internship. 1-6 credits, maximum 6. Prerequisite: 3823 and consent of instructor. A supervised internship experience which simulates the responsibilities and duties of a practicing professional.

4850*
Special Unit Course in Housing, Interior Design and Consumer Studies. 1-6 credits, maximum 6. In-depth study of specific areas of housing, design, and consumer resources.

5000*
Master's Thesis. 1-6 credits, maximum 6. Individual research relating to problems and thesis.

5110*
Research Development in HIDCS. Prerequisites: graduate standing and concurrent enrollment in HEC 5102. Current developments and needs in research in HIDCS including application of research methods to HIDCS and research planning.

5233*
Contemporary Interior Design Philosophies. Prerequisite: consent of instructor. Interior design philosophies of contemporary designers and trends in interiors.

5240*
Studio Design Practicum. 1-3 credits, maximum 6. Prerequisite: consent of instructor. An in-depth application of theoretical design models and philosophies to professional practice.

5250*
Historic Interior Design. 1-4 credits, maximum 4. Prerequisite: consent of instructor. Influential periods of architecture and furnishings including historical preservation.

5263*
Professional Practices and Evaluation. Prerequisite: consent of instructor. Analysis and evaluation of design business practices and procedures affecting client relations, marketing, and legal framework, capitalization and other business functions.

5333*
Family and Consumer Policy Issues. Prerequisite: senior or graduate standing. Identification and assessment of the effects of federal and state legislation on families and consumers. Effects of policies in areas of income maintenance, housing, health, education, social services, employment and contract law.

5343*
Housing Environment in Relation to Human Behavior. Prerequisite: consent of instructor. Critical evaluation of selected research dealing with the effects of the housing environment on social, psychological and economic aspects of human behavior.

5360*
Advanced Studies in Housing, Interior Design and Consumer Studies. 1-6 credits, maximum 6. Investigation into special areas in the fields of housing, design and consumer studies. A maximum of 6 hours to be used by graduate students following Plan III for the master's degree.

5363*
Housing and Energy. Prerequisite: consent of instructor. The impact of changing energy supply and cost on housing. Energy and housing policies, alternative energy sources and future implications.

5413*
Human Ecology of the Family. Prerequisite: 4420 or consent of instructor. The family as environment and within environment. Relation of values, goals, standards and decision-making in the management of family resources. The unique role of the family in the social and economic system.

5423*
Family Economics. Prerequisite: senior or graduate standing. Individuals and families interact in the labor market; decision making regarding time allocations among wage earning, household production and leisure. Economic well-being of individuals and families regarding human capital accumulation, poverty programs, two-earner families, one-person-headed households, and distribution of wealth.

5433*
Family Financial Security. Prerequisite: 3433 or consent of instructor. Socioeconomic changes, public policies and programs and management practices related to family financial well-being.

5443*
Contemporary Consumerism: Issues and Action. Prerequisite: consent of instructor. Consumerism and the consumer movement in today's society. Objective analysis of current and emerging consumer issues, claims of advocators and opposition and involvement and/or action by consumers, business and government.

5453*
Graduate Seminar in Interdisciplinary Consumer Education. Prerequisite: consent of instructor. For teachers and professionals who have or expect to have responsibility in consumer education in both formal (school or college) or informal (extension, community, government, business) settings. An intensive study of the purposes, content, materials, methods and evaluation techniques necessary for effective education consumer education programs.

5463*
Consumer Economics. Prerequisite: graduate or senior standing. Application of economic theory and principles toward solution of problems of the individual and family unit using price theory concepts. Means by which scarce resources satisfy competing ends and allocation of limited resources for household purchases with budget restraints.

5473*
Consumer and the Market. Prerequisite: consent of instructor. Social, economic and political implications of traditional, current and emerging marketplace practices from an analysis of consumer behavior. Moral, ethical and social responsibility of business in relation to the profit motive in each segment of the market place.

5810*
Problems in Housing, Interior Design and Consumer Studies. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of instructor. Individual or group study of a definite aspect of one of the subject matter areas in the Department.

5830*
Housing, Interior Design and Consumer Studies Seminar. 1-6 credits, maximum 6. Prerequisite: consent of instructor. A selected group of current issues in housing, design and consumer resources.

6000*
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major professor. Research in home economics for the Ph.D. degree under supervision of a graduate faculty member.

6353*
Housing Market Analysis. Prerequisite: 3353. Mechanisms for allocating resources to the production of housing; supply and demand functions in the housing market, characteristics of the housing industry, the role and responsibilities of the consumer along with interactions among the many participants in the operation of the housing market.

6410*
Independent Study in Housing, Interior Design and Consumer Studies. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Selected areas of housing, design or consumer resources for advanced graduate students working toward the doctorate degree.

6813*
Family Socio-Economic Issues and the Quality of Life. Prerequisite: consent of instructor. An analysis of social and economic trends and policy affecting resource use in household, consumer and leisure activities and the resulting quality of life.

6823*
Economic and Social Foundations of Consumer Studies. Prerequisites: graduate standing, consent of instructor. The lives, times and ideas of great economic and social thinkers and how their influence on the economic and social development of our society affects the economics of family living.

6830*
Housing, Interior Design and Consumer Studies Seminar. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Problems and recent developments in housing, design and consumer resources.

INDUSTRIAL ENGINEERING AND MANAGEMENT (INDEN)

2903
Industrial Systems Engineering. Lab 2. Prerequisites: ENGR 1412; MATH 2265. Industrial engineering techniques in production control, inventory control, quality control, layout, methods engineering, material handling, and engineering economy. Laboratory sessions provide additional learning experiences with these topics.

3302*
Industrial Processes I. Lab 3. Prerequisite: ENGSC 3313. Manufacturing processes used to transform raw materials into finished goods. Near-shape processing and basic metal cutting theory, process selection, and planning. Field trips to manufacturing plants.

3312*
Industrial Processes II—Numerical Control. Lab 3. Prerequisite: 3302. Continuation of 3302. Further study of additional manufacturing processes in joining, finishing, metrology, nontraditional machining, tool design, and numerical control. Includes field trips to manufacturing plants.

3503*
Engineering Economic Analysis. Prerequisite: MATH 2365. Development and use of time value of money interest formulas. Bases for comparison of alternatives, including present worth, annual worth, rate of return and payout period methods. Decision making among independent, dependent, capital-constrained and unequal-lived projects. Replacement, breakeven and minimum cost analyses. Depreciation and depletion methods and their effect on corporate income taxes, leading to after-tax cash flow analysis.

3513*
Economic Decision Analysis. Prerequisite: MATH 2373 or 2713. Quantitative evaluation of investment alternatives for non-engineering majors. The role of interest in economic equivalence and in formulating economic comparisons based on present worth, annual equivalent, rate of return and payout criteria. Accounting, depreciation and income tax considerations. Benefit-cost and cost-effectiveness analysis. Cost estimation and allowance for variance in estimates. Not available for credit in Industrial Engineering curriculum.

3523*
Engineering Cost Information and Control Systems. Prerequisite: MATH 2265. Basic cost measurement and control concepts. How to measure and interpret cost data and define its use in planning, control and estimating. Role of accounting in cost control.

3603*
Industrial Operations Analysis. Prerequisite: sophomore standing. Production management, covering the main aspects of organization, design and control. Decision making within a systems approach. Not available for credit in Industrial Engineering curriculum.

3703*
Engineering Computation and Interactive Modeling. Prerequisites: ENGR 1412 and MATH 2265. Advanced programming techniques using pseudocode and FORTRAN. Using the computer for engineering analysis, design and problem solving.

3802*
Industrial Safety Engineering. The theory of safety engineering with emphasis upon fundamental concepts in the industrial environment.

3813*
Work Measurement and Improvement. Lab 3. Prerequisites: STAT 4033 or equivalent concurrently and INDEN 3822 concurrently. Productivity improvement through job design. Productivity planning, measuring and improvement. Major emphasis on measuring, evaluating and redesigning work processes.

3822
Human Performance. Lab 2. Human characteristics which affect the design of equipment, systems and jobs. Interaction of psychological, physiological, anatomical, social and engineering factors. Improvement of efficiency, safety and operator well-being.

4010*
Industrial Engineering Projects. 1-3 credits, maximum 6. Prerequisite: consent of school head. Special undergraduate projects and independent study in industrial engineering.

4014*
Operations Research. Prerequisites: 3703, MATH 3623, STAT 4033. Fundamental methods, models, and computational techniques of operations research. Linear programming including transportation and assignment models. Network models, dynamic programming, decision theory, and queueing theory.

4023*
Operations Research II. Prerequisites: MATH 2613, STAT 4033 and FORTRAN. Continued study of the fundamental methods of operations research; computational techniques on nonlinear programming, dynamic programming, inventory theory and analysis, queueing theory and analysis and simulation.

4103*
Industrial Quality Control. Prerequisite: STAT 4033. Principles and practice of industrial quality control. Modern quality philosophy. Theory and use of statistical process control (SPC) tools for problem solving and continuing improvement. Variables and attributes control charts for both discrete and continuous flow/batch processes. Process capability analysis, including strengths and weaknesses of process capability indices. Introduction to acceptance sampling, including ANSI/ASQC Z1.4 and Z1.9 standards.

4203*
Facility Location and Layout and Material Handling Systems. Prerequisites: 3813 and senior standing. Design principles and analytical procedures for locating and developing an overall functional relationship plan and the methods for materials receipt, storage and movement for either an industrial or service oriented industry. Product-quantity analysis and material flow, and information routing warehouse design, various layout methodologies, and their measures of merit. Introduction to material handling methods and technologies including automated systems. Case studies and field trips are required.

4323*
Manufacturing Systems Design. Prerequisites: 3312, 3503. Principles and procedures related to the design, implementation, documentation, and control of manufacturing systems. Consideration of transfer lines, numerical control, flexible automation, robotics, and manufacturing support activities such as cost, quality, and materials control. Introduction to basic computer-aided design and computer-aided manufacturing (CAD/CAM).

4413*
Industrial Organization Management. Prerequisites: 3822 and senior standing; graduate standing and consent of instructor. Issues, concepts, theories and insights of management with a focus on productivity. Application of management, emphasizing effective performance.

4613*
Production Control. Prerequisite: 4014. Concepts of planning and control of production environments. Design of operation planning and control systems. Techniques used in demand forecasting, operations planning, inventory control, scheduling, and progress control. A production simulator is used to provide a realistic application experience.

4712*
System Simulation. Prerequisites: 3703, 4014, STAT 4033. Simulation of discrete-event systems. Problem formulation, translation of problem to a computer model, and use of model for problem solution. Use of GPSS and other programming languages.

4723*
Information Systems for Management Decisions and Control. Prerequisite: 3703. Systems engineering methodology applied to the design of information systems for management of all types of organizations. Data base management systems. Distributed and centralized systems. Different phases of system design and implementation.

4913
Senior Design Projects. Lab 6. Prerequisite: limited to students in the final semester of their professional program. Student teams work on professional-level engineering projects selected from a wide range of participating organizations. Projects are equivalent to those normally experienced by beginning professionals, and require both oral and written reports. (Open only to students in Industrial Engineering and Management.)

4923*
Energy and Water Management. Lab 2. Prerequisites: 3503, ENGSC 2213, 3233. Design, implementation and management of energy and water management programs. Energy and water conservation, choice of energy sources, safety and security of fuel storage, contingency planning and use of standby fuels. Philosophy is to improve profits through optimal energy and water utilization. Outside speakers utilized when appropriate. Lab work required on audit equipment.

4931
Industrial Engineering and Management Seminar. Prerequisite: senior standing. Designed to orient seniors to their professional work environment. Topics include placement procedures, resume construction, interviewing skills, professional dress, graduate school, professional societies and registration, personal management of time and money, and job-related expectations. Taught by senior faculty; utilizes outside speakers.

5000*
Research and Thesis 1-6 credits, maximum 6. Prerequisite: approval of major adviser. Research and thesis for master's students.

5003*
Quantitative Foundations for Industrial Engineering. Prerequisite: MATH 2613 or 3623. Fundamental quantitative methods necessary for advanced study in various areas of industrial engineering. Includes matrix algebra, real analysis, calculus of finite variables and transform methods. Application of theorems to industrial engineering and related areas.

5010*
Industrial Engineering Projects. 1-2 credits, maximum 6. Prerequisites: consent of school head and approval of major adviser. Special graduate projects and independent study in industrial engineering.

5013*
Linear Programming. Prerequisites: 4014, or 5003, or MATH 3013; FORTRAN. Simplex algorithm to solve deterministic linear optimization models considering maximization and minimization objectives: Degeneracy, alternative optima and no feasible solutions. Revised simplex procedures. Duality theory, economic interpretations, dual simplexing and complementary pivoting. Sensitivity analysis and parametric programming. Special cases of linear optimization problems and underlying mathematical foundations. Large-scale models including computational considerations. Same course as COMSC 5013.

5030*
Engineering Practice. 1-9 credits, maximum 12. Prerequisite: approval of adviser. Professionally supervised experience in a real-life problem involving authentic projects for which the student assumes a degree of professional responsibility. Activities must be approved in advance by the student's adviser. May consist of full or part-time engineering experience, on-campus or in industry, or both, either individually or as a responsible group member. Periodic reports both oral and written required as specified by the adviser.

5032*
Sequential Decision Processes and Dynamic Programming. Prerequisites: 4014, 5003. The determination of policy that optimally allocates resources to the various stages of a finite-stage system. Deterministic and stochastic systems including serial systems, diverging branch systems, converging branch systems and loop systems.

5103*
Advanced Industrial Quality Control. Prerequisites: 4103, STAT 4033, STAT 4053 or equivalent. Modern quality philosophy and application. Theory and application of traditional and nontraditional control charting techniques. Special emphasis on underlying assumptions such as normality, error-free inspection, etc. Oriented toward economically-based statistical monitoring of processes, including optimization of decision variables such as sample size, frequency, and control limit spread.

5133*
Stochastic Processes. Prerequisites: MATH 2613 and STAT 4113. Definition of stochastic processes, probability structure, mean and covariance function, the set of sample functions. Renewal processes, counting processes, Markov chains, birth and death processes, stationary processes and their spectral analyses. Same course as STAT 5133 and MATH 5133.

5203*
Advanced Facility Location and Layout and Material Handling Systems. Prerequisite: 3503, 4014, 4203. A continuation and expansion of topics covered in 4203 with an emphasis upon model development for predicting and evaluating the effectiveness of production and/or service systems. Advanced analytical and computer techniques.

5303*
Computer Integrated Manufacturing. Prerequisite: 4323. Computer-aided design (CAD) and computer-aided manufacturing (CAM). Design, development, implementation and operation of modern manufacturing systems. Prototype systems design, implementation and testing as well as applicable systems engineering concepts.

5313*
Robotics Application Issues. Lab 3. Prerequisite: graduate standing in engineering or consent of instructor. Role of robotics in modern manufacturing systems. Design and selection of appropriate end effectors and sensors to produce a reliable cost effective robotic application. Comparison of commercial and custom designs of end effectors and a study of industrial applications. Field trips to industry and work in the IE&M CAM/Robotics laboratory.

5350*
Industrial Engineering Problems. 1-6 credits, maximum 6. Prerequisite: approval of major adviser. A detailed investigation into one area of industrial engineering with a required written report.

5403*
Labor Union and Management Processes. Prerequisite: 4413. Contemporary labor/management issues as concerns engineers/managers in organizations. A brief review of labor/management relations; basic theories, relationships, objectives, practices and strategies of both labor and management in modern organizations.

5413*
Theory of Systems Organization I. Prerequisite: 4413 or concurrent enrollment. Advanced study of the engineering organization and management process. Engineering process, activities, roles, and current issues.

5433*
Professional Activity Analysis and Incentive Determination. Prerequisite: 4413. Professional and managerial activities; evaluations of job contents and salary determination. Basic compensation theories and motivation factors including merit/performance rating.

5503*
Advanced Engineering Economic Analysis. Prerequisites: 3503, 4014, STAT 4033. Objectives and functions of the firm. Advanced treatment of interest and equivalence, using discrete and continuous cash flows. Transform techniques in cash flow modeling. Depreciation and corporate taxation. Selecting the MARR. Deterministic and stochastic alternative selection, including decisions under risk and uncertainty. Utility theory. Capital budgeting models. Evaluation of public sector investments and public utilities. Replacement analysis.

5602*
Project Management. Prerequisites: STAT 4033 and FORTRAN. Critical path methodology under conditions of certainty (CPM) and uncertainty (PERT). Network cost accounting and scheduling with limited resources. Modifications and extensions of network models. Extensive use of PERT simulation and PMS IV project management computer programs.

5613*
Advanced Production Control. Prerequisites: 4014, 4613. Manufacturing planning and control philosophies and methods for production. Materials requirements planning, including information integrity, capacity planning, shop floor control, purchasing, master scheduling, production planning, and demand management. Also just-in-time as used in both Japan and the U.S., including total quality control, total cost reduction, and total productive maintenance.

5622*
Forecasting and Time Series Analysis. Prerequisites: 5003, STAT 4033, FORTRAN. Development and use of linear regression, moving averages, exponential smoothing and Box-Jenkins forecasting methods. Procedures for considering seasonal variations. Adaptive-control forecasting methods. Explanation of methods for evaluating and controlling forecasts.

5633*
Inventory Theory. Prerequisites: 4014, 4613. Development and use of inventory models for known and/or stochastic demand. Periodic and continuous review inventory replenishment policies. Determination of an appropriate lot size. Consideration of quantity discounts, price change anticipation and various inventory carrying costs. Comparison of inventory policies.

5643*
Network Modeling and Analysis. Prerequisites: 4014, 5003. Network approach to the modeling and analysis of complex systems. Deterministic and stochastic network topics include PERT, CPM, decision trees, network flows, flowgraphs, and GERT (Graphical Evaluation and Review Technique). Modeling of practical problems. Systems analysis using network techniques and available computer programs.

5703*
Discrete Systems Simulation. Prerequisites: STAT 4033 and FORTRAN. Discrete-event systems via computer simulation models. Model building and the design and analysis of simulation experiments for complex systems. Application to a variety of problem areas. Use of SLAM simulation language.

5733*
Computer Graphics, Microcomputer Systems and Process Control. Lab 2. Prerequisites: 3703; ELEN 3213. Computer graphics systems and their capabilities (hardware and software): graphics programming and use of plotter. Application of graphics and microcomputers in industrial engineering. Microcomputer applications in industrial engineering. Process control fundamentals including digital control algorithms.

5803*
Human Factors Engineering. Prerequisites: 3813, STAT 4013 or STAT 4053. Basic consideration of the human factors in engineering systems with emphasis on the interface of man-machine systems. Development of human abilities and limitations in relation to equipment designs and work environments.

5813*
Productivity Measurement and Improvement. Prerequisite: 3813 and 4413 concurrently. Productivity issues, concepts, theories and insights focusing on job and organizational design are explained, illustrated and discussed. Understanding the productivity improvement process. Development of productivity measurement systems. Designing organizational processes which improve productivity.

5903*
Systems Engineering and Management. Prerequisite: graduate standing. Systems engineering methodology, tools and techniques. The system function, system development cycle, systems analysis and design. Also the system design process and design for feasibility. Case studies to emphasize the systems approach.

5913*
Decision-Making Models for Multi-Objective Analysis. Prerequisite: 4014. Quantitative and qualitative aspects of multiple-criteria decision making. Dynamics of the decision process are examined and the multi-objective nature of most managerial decision problems is illustrated. General concepts and solution methodologies of the multi-objective problem. Multi-objective linear programming, goal programming, and compromise programming. Attribute importance, risk measurement, and utility measurement.

5923*
Advanced Energy and Water Management. Prerequisite: 4923. Continuation of material covered in 4923 with an emphasis on modern management techniques. Cogeneration, energy management control systems, private purchases of gas, energy accounting. Significant case study or term paper required.

5933*
Artificial Intelligence and Expert Systems. Fundamental concepts: search-oriented problem solving, knowledge representation, logical inference, building an expert system, languages and software tools and machine architectures. Applications to planning, computer vision, natural language processing, speech recognition and robotics. Development of a prototype expert system or literature search and report is required. Common lectures with ECEN 5293 and MAE 5793.

5943*
Hazardous Material and Waste. Prerequisites: 3503 or equivalent, CHEM 1515. Management of hazardous materials and waste by the generator to reduce operating costs and protect employees. Emphasis on hazard communication program, reducing volume and toxicity, and management activities.

6000*
Research and Thesis. 1-15 credits, maximum 30. Prerequisites: approval of major adviser and advisory committee. Independent research for Ph.D. dissertation requirement under direction of a member of the graduate faculty.

6023*
Nonlinear Programming. Prerequisites: 5013; FORTRAN. Theoretical and practical aspects of nonlinear optimization. Development and application of optimization techniques used for unconstrained and constrained problems; sequential search procedures, gradient methods. Newton methods and conjugate directions. Lagrange methods, quadratic programming, geometric programming, penalty and barrier methods and projection methods. Same course as COMSC 6023.

6043*
Integer Programming. Prerequisites: 4014 or 5013; 5003. Theoretical and practical aspects of integer and mixed integer optimization including network flows. Various mathematical concepts reviewed and applied to the development and application of integer and mixed integer techniques for solving unconstrained and constrained problems. These concepts include implicit numeration, branch and bound, cutting methods, diophantine equations, pseudo-Boolean methods and the out-of-kilter algorithm.

6110*
Special Problems in Industrial Engineering. 1-6 credits , maximum 12. Prerequisites: consent of school Head and approval of major adviser. Special problems in industrial engineering and management under supervision of a member of the graduate faculty.

6113*
Reliability and Maintainability. Prerequisites: 5003, STAT 4033, FORTRAN. Probabilistic failure models of components and systems. Detailed study of reliability measures, and static and dynamic reliability models. Classical and Bayesian reliability testing for point and interval estimation of exponential and Weibull failures. Realiability optimization through allocation and redundancy. Fundamentals of maintainability.

6123*
Analysis and Design of Queueing Systems. Prerequisites: 5003, STAT 4033, FORTRAN; corequisite: 5703. Modeling, analysis and design of Poisson and nonPoisson queueing systems , including infinite and finite population models, bulk arrivals and networks of queues. Decision models of queueing systems, including cost and aspiration level models. Transient analysis and special topics. Brief review of probability and transform methods.

6423*
Theory of Systems Organization II. Prerequisite: 5413 or consent of instructor. Theory and practice of internal and external engineering consulting. Investigation of the engineering-client interface, effective engineering consultations in relationship to existing organizational cultures and practices, and the engineering practitioner's impact on organizational improvement.

6513*
Analysis of Decision Processes. Prerequisites: 5003, STAT 4113 or 4203, FORTRAN. Bayesian decision theory with application to optimal decision making in industrial engineering and allied fields. Extensive and normal form analysis. Sufficient statistics, noninformative stopping and conjugate prior distributions. Additive utility, opportunity loss (regret) and value of information. Terminal analysis, preposterior analysis and optimal sampling. Applications using Bernoulli, Poisson and normal processes.

6713*
Continuous Systems Simulation and Systems Dynamics. Prerequisite: 5703 or consent of instructor. Continuous systems via simulation, using the DYNAMO and SLAM simulation languages. Concepts of combined discrete and continuous simulation modeling. Simulation of large-scale systems, particularly socio-economic systems.

INDUSTRIAL TECHNOLOGY EDUCATION (ITED)

2442
Industrial Plastics and Ceramics. Lab 3. Production and manufacturing processes common in the plastics and ceramics industry. Information about careers and developing trends in the industry.

3002
Introduction to Industrial Technology Education. Industrial technology education in a modern educational system, including the historical and philosophic bases for such programs. Purposes, objectives and functions of contemporary industrial arts and technology education programs in public schools. Participation in on-site observation experience in the public schools.

3012
Industrial Tools and Equipment. Lab 3. Proper selection, use and care of shop and laboratory tools and equipment. Laboratory exercises in the purchase, maintenance and repair of tools and equipment commonly used in the industrial arts programs of local schools.

3022
Theory and Practice in Home Maintenance. Lab 2. Principles of home maintenance and practice in the use of tools, equipment and materials necessary to maintain properly functioning heating, cooling, plumbing and electrical systems.

3023
Applied Electricity. Lab 2. Fundamentals of electricity and its contribution to technological development. Electrical principles, circuits and systems; exercises in construction, installation, repair and maintenance of electrical equipment and facilities. Emphasis on preparation for teaching electricity in local school industrial arts and technology education programs.

3032*
Industrial Arts and Technology Education for Elementary and Special Education Teachers. Lab 2. Educational projects and activities for stimulating student interest, developing and broadening student abilities, and generally enhancing the school program. Practical aspects of planning and implementing organized industrial arts and technology education activities in elementary and special education curriculums. Instruction in the selection, purchase, use and storage of basic tools and appropriate supplies.

3033
Materials and Processes. Lab 4. Introduces students to the basic properties of metallic, polymeric, wood, ceramic and composite materials and the proper techniques used to convert these materials into products. Special attention is given to the safety and care of industrial equipment.

3043
Constructing Structures. Lab 3. Prerequisite: 3033 or equivalent or consent of instructor. Comprehensive study of the activities involved in preparing to build, building, and completing residential, commercial, industrial, and civil structures.

3103
Architectural Drawing. Lab 3. Prerequisites: GENT 1153 and MECDT 1223 or equivalent or consent of instructor. Architectural drafting skills and presents information based on current drafting standards and trends in the architectural industry. Preparation of a complete set of drawings in residential and/or light commercial drafting. Computer graphics as a drafting tool.

3223
Electronic Communication Fundamentals. Lab 3. Prerequisite: 3023. A general introduction to contemporary electronic communication technology including telecommunications, hard wired, computer, light, and acoustic systems. An overview of the products and impacts of electronic communication systems and the nature of the electronic communication industry.

3301*
Metrics Measurement for Occupational and Adult Education. Practical applications of the International Metric System as it relates to industry and technology. Prefixes, exponents and symbols, weights and mass, length, volume, and temperature with practical exercises in calculations, conversions, and the use of terminology.

3312
Manufacturing Materials and Testing. Lab 3. Physical properties and testing of materials used in industry such as metals, woods, plastics, ceramics, cements, adhesives and fasteners; stresses the use of such materials in industrial arts and technology education programs.

3323
Manufacturing Processes. Lab 4. Prerequisite: 3033 or permission of instructor. Methods and procedures for processing materials used in product manufacturing and development. Laboratory practical experiences in processing materials with implications for industrial arts and technology education programs in public schools.

3333
Industrial Communication Graphics. Lab 4. Methods and techniques for the visual communication of information and ideas. The elements of drafting, design, screen printing and photography into a total concept of modern graphic communication.

3423
Methods for Teaching Technology Education Systems. Lab 3. Prerequisites: 3033 and 3550 or consent of instructor. Unique methods and activities are specifically adapted for and related to the systems of technology education. Fundamental and specific methods preparation for those students planning to teach technology education in the public schools.

3553*
Manufacturing Enterprise. Lab 3. Prerequisite: 3033. The managed activities used to design, engineer, produce, and market manufactured products. Additional emphasis on providing financial and personnel support for these activities.

3653
Fundamentals of Power Technology. Lab 3. The inputs, processes, and outputs associated with energy systems. Emphasis on the sources of energy; methods of controlling, converting, and transmitting energy; and the utilization of energy conversion systems. Practical experience in overhaul and tune-up of small two and four-cycle engines.

3672
Fundamentals of Power Transmission. Lab 2. Basic mechanics of power transmissions including mechanical, hydraulic and pneumatic systems. Design and selection of power sources, piping, filtration, accumulators and actuators for programs of industrial arts and technology education.

4013*
Research and Development in Industrial Technology Education. Lab 3. Prerequisites: 3033 and 3553. The methodology and practices of technical research and development as conducted in an industrial and educational setting. Laboratory activities performing basic tasks associated with product and process research and development.

4212*
Materials Finishing. Lab 3. Materials, tools and techniques for finishing fabricated products. Laboratory experiences in finishing and refinishing with emphasis on instructional applications.

4322*
Industrial Technology. Industrial materials and manufacturing and processing techniques including automation and distribution systems as observed in films, field trips and lectures. Employer-employee relations are studied as the human element in the system.

4343*
Curriculum Development in Industrial Technology Education. Prerequisite: admission to Teacher Education. Principles, practices and problems in construction of industrial arts and technology education curricula.

4440*
Industrial Crafts. 1-2 credits, maximum 6. Development of knowledge and skills in working with materials, tools and equipment used in various industrial crafts. Special emphasis placed on specific crafts that are most applicable to the elementary and special education curriculum.

5020*
Seminar in Industrial Technology Education. 1-3 credits, maximum 3. Oral and written discussion of selected current interest topics concerning industrial arts and technology education. Forum for review of research proposals, student programs, other projects and timely topics having an impact on the industrial arts and technology education profession.

5132*
Advanced Methods of Teaching Technology Education Systems. Prerequisite: 3423 or equivalent or consent of instructor. Advanced methods, techniques, and activities associated with the teaching of technology education systems. Specific emphasis on the incorporation of problem-solving concepts and activities into public school technology education programs.

5233*
Special Problems in Machine Woodworking. Materials, processes, designing and cost accounting in the unit woodworking shop. Selection and use of appropriate machine equipment.

5340*
Special Problems in Technical Content in Industrial Arts and Technology Education. 1-3 credits, maximum 6. Lab 3. Prerequisites: 3033 and 3323 or equivalent or consent of instructor. Problems associated with the technical content areas in industrial arts and technology education. Introduction of new advanced technical systems into the curriculum of public school technology education programs.

5443*
Special Problems in the General Shop. Problems concerning the organization and management of classes and personnel organizations, as well as special teaching methods and class control.

5562*
Critical Problems and Issues in Industrial Arts and Technology Education. Analysis of current trends, issues, directions, and research in industrial arts and technology education. Applications to current classroom and program practices.

5663*
Special Problems in Industrial Drawing. Special problems, techniques and methods applicable to the teaching of mechanical drawing in industrial arts courses. Selection and use of equipment, preparation of course materials and practice in the application of advanced techniques.

INTERDISCIPLINARY STUDIES (IDS)

2023
Studies in the Humanities. The human search for identity and meaning in life; students guided toward broader understandings of themselves and the world through a new appreciation of the humanities and humanistic values. Content of course varies from semester to semester.

3203
(H)Studies in Black American Culture. The cultural role of the black American: history and achievements, as revealed in a study of the black contribution in the fields of literature, music and the visual arts.

3723
(A,H,SpD)The Computer Connection: Arts, Sciences, Humanities. Dialogue between arts and science students using the computer as a common base.

3733*
(H,SpD)Religion: Psychological Interpretations. Recommended REL 1103 or PSYCH 2313. A study of the development theory and research of modern psychological perspectives on the religious experience. Same course as PSYCH 3733 and REL 3733.

4050*
Studies in the Humanities. 1-6 credits, maximum 6. Seminars on selected problems in the fields of humanistic study.

JAPANESE (JAPAN)

1115
(I)Elementary Japanese. Pronunciation, conversation, grammar and reading.

2115
(H,I) Intermediate Japanese I. Prerequisite: 1115 or equivalent. Reading, the writing system, culture, grammar, conversation.

2123
(H,I)Intermediate Japanese II. Prerequisite: 2115 or equivalent proficiency. Oral and written practice of Modern Japanese. A continuation of 2115.

2223
(H,I) Intermediate Japanese III. Prerequisite: 2123 or equivalent proficiency. A continuation of 2123.

JOURNALISM AND BROADCASTING (JB)

1133
(S,SpD)Mass Media in American Society. Growth and development of principal segments of the mass communication industry, including elementary professional concepts and current social and ethical issues.

1393
Mass Media Style and Structure. Elementary writing and editing techniques in print, broadcasting and other media.

2013
Principles of Advertising. Prerequisite: sophomore standing. Elements and purposes of advertising; media functions, economic aspects, budgets, appropriations, rate structures and terminology.

2093
History and Significance of Film. The evolution of motion pictures and examination of film. Film in our society and how it affects the individual. The basis of impact, program evaluation and criteria for intelligent and discriminating listeners and viewers.

2173
History of Journalism. Prerequisite: 1393. Growth and development of mass communication systems in America, with emphasis upon the economic, social and political interaction of the media.

2213
Introduction to Broadcasting. History, growth and development of radio and television; FCC and other federal regulatory agencies; station and network operations and their effect on society.

2393
Newswriting. Lab 3. Prerequisites: 1393 and 30 wpm typing ability. Reporting and writing through enterprise techniques for news coverage.

2413
News Editing I. Lab 3. Prerequisite: 2393. Copy editing and headline writing for newspapers and magazines.

2423
News Editing II. Lab 3. Prerequisite: 2413. Advanced copy editing; ethics and legal considerations from an editor's viewpoint; design techniques for newspapers and magazines including picture editing, introduction to type, makeup and design practices, and special pages.

2873
Radio Production Techniques. Lab 3. Prerequisite: 1393. Theory and practice of communication using electronic media. Students prepare and present materials in a broadcasting situation.

2883
R-TV Announcing and Performance. Lab 3. Prerequisites: 1393 and 2873. The announcer-newscaster's responsibilities as a communicator; analysis of announcing skills; drills in radio and television announcing and the development of an effective on-the-air personality.

3013
Advertising Media and Markets. Prerequisite: 2013. Analysis and evaluation of mass media for advertising; media and market research; media plans, budgets and sales presentations, advertising law and ethics.

3163
Mass Communication Law. Statutes and case decisions in print and broadcast law, including government regulation of broadcasting by the FCC and media relations with other regulatory agencies.

3183
Principles of Public Relations. Prerequisite: 1393. Practice and techniques of public relations as a management function in business, industry, government, education, agriculture, home economics and other fields.

3293
Visual Communication. Use of photographs, charts, graphs and other visual representations in the mass media; the language of pictures; theories of nonverbal communication visual aids in education and other information systems.

3383
Public Relations Management and Strategies. The practice and techniques of public relations as a management function in business, industry, government, education, agriculture, home economics and other fields. Designed for non-majors.

3400
Journalism, Advertising and Public Relations Laboratory. 1-3 credits, maximum 5. Prerequisites: junior standing and completion of 1393, 2393, or 2413 or consent of instructor. Laboratory and/or internship practice for qualified students who wish creative communications experience beyond that available in the classroom.

3413
Public Affairs Reporting. Lab 5. Prerequisites: 2413, POLSC 3613. Coverage of social problems, people and events in fields of government, business, science, sports and entertainment.

3492
Public Relations Media. Lab 4. Prerequisite: 2393 and 3183. Writing, editing and designing materials used in public relations communications.

3553
Radio and Television News Writing. Lab 3. Prerequisite: 2393. Broadcast news writing and reporting techniques with emphasis on radio coverage. Familiarization with news values, news services, broadcast equipment. Lab work in news reporting and writing.

3603
Advertising Copy and Layout. Lab 3. Prerequisites: 2013, 2413. Advertising copy and layout; modern merchandising methods; application emphasizing local and regional problems.

3753
Graphic Communication. Lab 3. Creative and practical aspects of typography, layout and design, and production of printed communication.

3823
Photography I. Lab 3. Taking and processing photographs: cameras, lenses, films, printing, and developing; essentials of good pictorial composition. For students who want an elementary understanding of photography, or to prepare for advanced work in photography or photojournalism.

3900
Radio-Television-Film Laboratory. 1-2 credits, maximum 5. Lab 6. Prerequisites: junior standing and completion of 1393 and 3553, or consent of instructor. Preparation and participation in all phases of radio-television-film, and cable through active internship program.

3913
Television Production. Lab 3. Prerequisite: 2873. Television production techniques including camera, audio, lighting, staging, graphics and on-camera performance.

4033
Cable Communication. Overview of the cable television industry and interacting technologies from the historical, social, economic, philosophical and political perspectives.

4063
Supervision of High School Publications. Essential journalistic forms for high school publications; organizing and administering high school publications; intended to meet the requirements for the State teacher's licensure in language arts.

4123
Broadcast Promotion. Prerequisite: 2873. Nature, tools and techniques of promotion in radio, television and cable; concepts of evaluation of promotion effectiveness; ethics of broad and narrowcast promotion.

4133
Creative Newspaper Promotion. Prerequisite: senior standing. Community newspaper promotional methods; special pages, special editions, contests and self-advertising campaigns; counseling advertisers on merchandising efforts.

4153
Journalistic Management. Prerequisite: senior standing. Business and editorial management of newspapers, magazines, and industrial, business and farm publications.

4183
Advanced Public Relations. Prerequisite: 3183. Public relations publications planning, problem solving, management techniques, policies and case study analysis.

4223
Broadcast Sales. Prerequisites: 1393, 2213, 2873 and junior standing. Sales development, pricing, promotion and other aspects of broadcast sales and sales management.

4243
Programs and Audiences. Audience analysis, proper construction of programs for greatest appeal and use of appeals to attract the desired audience. Program types, rating systems, program selection and audience attention. Design and discussion of programs to reach specific audiences.

4263
Broadcast Management. Prerequisites: 1393, 2213, 2873. Functions, structure and organization of the broadcasting industry; special problems in broadcast station management, including personnel, sales, programming and government regulations.

4360
Special Problems in Journalism and Broadcasting. 1-3 credits, maximum 6. Prerequisites: junior standing and minimum of 3.00 GPA. Independent study and project development to fit the student's major or minor specialization.

4413
Advanced Reporting and Writing. Lab 5. Prerequisite: 2413. Enhancement of writing style and reporting techniques; evaluation of sources and polling practices, and investigative coverage of newsmakers and events.

4433
Feature Writing for Newspapers and Magazines. Prerequisite: 15 semester hours of English or journalism, including 4413 for journalism majors. Newspaper features and special articles for general circulation magazines, business and trade journals; sources, materials, markets and other factors pertinent to nonfiction writing.

4453
Communications in Agriculture. Fundamentals of newswriting and other communication methods; the role of the news media in agriculture and related fields. Same course as AG 4453.

4553
Advanced Radio-TV News Reporting. Lab 3. Prerequisite: 3553 and 3913. Advanced broadcast news writing with emphasis on techniques of feature and in-depth reporting for radio, television and cable TV.

4573
Broadcast Documentary. Lab 3. Prerequisite: 3913. Student written and produced broadcast and cablecast mini-documentaries; analysis of selected programs.

4583
Writing for Radio-Television-Film. Lab 3. Prerequisite: 3913. Relationship of written to spoken language. Commercial continuity and specialized copy. Scripting and adaptation to specific media.

4603
Advanced Advertising Copy and Layout. Lab 3. Prerequisites: 3013, 3603. Creative strategy and execution of advertising for mass media. Problems in idea creation for advertisers; emphasis on both the written and the visual components of advertising policies.

4623
Advertising Campaigns. Lab 3. Prerequisite: 3013, 3603. Preparation and presentation of advertising-promotion-merchandising campaigns for national and local firms; work in teams with agencies and clients.

4653
Television and Radio Advertising. Lab 3. Prerequisite: 3603. Functions and characteristics of broadcast advertising; copywriting, scriptwriting, story boards, marketing plan; film and videotape commercial production.

4823
Photography II. Lab 3. Prerequisite: 3823. Technical and scientific phases of photography; basics of color photography; studio problems; photographic communication theory.

4833
Basic Motion Picture Techniques. Lab 3. Prerequisite: 3823 or consent of instructor. Cameras, lenses, film characteristics and motion pictures and Beta mini-cam techniques, including the film documentary and cinematography for television. Special problems of preparing teaching and public relations films.

4843
Public Relations Programs. Prerequisites: 3492; 4183. Research, preparation and presentation of public relations campaigns. Integration of public relations principles and methods; work in teams in organizational and agency situations.

4923
Television Directing. Lab 3. Prerequisite: 3913. Techniques and aesthetics of television directing in various standard directing formats.

4953
Advanced Television Practices. Lab 3. Prerequisite: 3913. Advanced professional television production. Student produced and directed television programs, including "specials," for distribution on cable or other professional media.

LANDSCAPE ARCHITECTURE (LA)

2002
Landscape Architectural Delineation. Lab 6. Prerequisite: 3 hours credit in freehand drawing or drafting. Drafting and illustration techniques for developing and presenting landscape concepts and designs in black and white media.

3002
Advanced Landscape Architectural Delineation. Lab 4. Prerequisite: 2002. The application of multimedia presentation and delineation techniques to more complex plans, drawings and programs.

3010
Internship in Landscape Architecture and Landscape Contracting. 1-6 credits, maximum 6. Prerequisites: 45 credit hours, consent of internship chairman. Supervised work experience with approved public and private employers in landscape architecture, landscape contracting or related fields. May not be substituted for other required courses.

3673
(I) History and Theory of Landscape Architecture. History and historic styles and approaches to landscape architectural design. Past and present landscape design theory.

3682
Professional Practice and Office Procedure. Ethics, office practice and procedure.Contract documents and specifications relating to landscape architecture.

3773
Landscape Architectural Design I. Lab 4. Prerequisite: 2002. Application of landscape architectural design theory to the planning and design of outdoor spaces and elements for best human use and enjoyment.

3884
Landscape Architectural Construction I. Lab 4. Prerequisite: CIVEN 2613. Site grading, equipment, earthwork calculations, runoff and drainage as they relate to landscape architecture.

3893
Landscape Architectural Construction II. Lab 6. Prerequisite: 3883. Advanced grading, roadway design including horizontal and vertical alignment, site layout and staking plans, advanced stormwater management systems.

4013*
Landscape Architectural Design II. Lab 2. Prerequisite: 3773. A continuation of LA Design I with an emphasis on design methodologies.

4023*
Landscape Architectural Design III. Lab 9. Prerequisites: 4013 and admission to landscape architecture program. Complex site developments with an emphasis on landforms and structures.

4033*
Landscape Planting: Design. Lab 2. Prerequisites: 3773 and HORT 3312 and 3322. Plants in the landscape as esthetic and functional elements. Environmental enhancement by and for plants. Preparation of planting sketches, plans, and specifications.

4134*
Landscape Architectural Design IV. Lab 9. Prerequisite: 4023. Large-scale sites with an emphasis on arrangement and design of landscape elements as they relate to health, safety and welfare as well as functional and esthetic qualities.

4434*
Lanscape Analysis and Use. Lab 4. Prerequisites: 4024 and admission to landscape architecture program. The inventory and analysis of natural and man-made landscape resources and their application to land use.

4573*
Recreation Planning. Lab 6. Prerequisite: consent of instructor. Theory and methods for small and large scale area planning with emphasis on natural resource systems.

4681
Landscape Architecture Assembly. Presentations by faculty members and guest speakers dealing with various aspects of landscape architecture or related fields. Graded on pass-fail basis.

4893*
Landscape Architectural Construction III. Lab 6. Prerequisites: 3893. Materials and methods of construction, strength of materials and statics, preparation of plans and specifications for irrigation, lighting and water features.

4990*
LA Special Problems. 1-6 credits, maximum 6. Prerequisite: consent of appropriate faculty member. Landscape architectural related problems.

5024*
Landscape Architectural Design V. Lab 8. Prerequisites: 4024, 4893. Large-scale sites with an emphasis on arrangement and design of landscape elements as they relate to health, safety and welfare as well as functional and esthetic qualities.

5025*
Advanced Landscape Architectural Projects. Lab 12. Prerequisite: 5024. Investigation of a landscape architectural problem of major significance, preferably involving an interdisciplinary approach with students and/or faculty members from related fields of study.

5110*
Advanced Special Problems. 1-12 credits, maximum 20. Prerequisite: consent of appropriate faculty member. Specific landscape architectural problems.

LATIN (LATIN)

1113
(I)Elementary Latin I. The rudiments of beginning Latin: grammar, vocabulary and elementary readings.

1223
(I)Elementary Latin II. Prerequisite: 1113 or equivalent proficiency. Continuation of 1113. Grammar, vocabulary and readings.

2113
Elementary Latin III. Prerequisite: 1223 or equivalent. A continuation of 1223. Grammar and readings of Latin authors.

2213
(H,I)Intermediate Readings. Prerequisite: 2113 or equivalent proficiency. Prose selections in Latin from a variety of authors.

3330
(I)Advanced Readings in Latin. 1-6 credits, maximum 9. Prerequisite: 2213. Prose authors, poetry, medieval Latin, etc.

LEISURE (LEIS)

1212
Beginning Swimming. Lab 2. Theory and practice of swimming strokes; techniques and basic water safety skills.

1222
Beginning Fencing. Lab 2. Theory and practice of foil fencing; fundamentals of footwork, defense, and attack; tactics and strategy; bouting; officiating and etiquette.

1232
Beginning Golf. Lab 2. Theory and practice of basic skills, rules, terminology and etiquette.

1242
Beginning Tennis and Racketball. Lab 2. Theory and practice of tennis and racketball; basic skills, rules, terminology, and game strategy for singles and doubles play. No credit for students with credit in 1252.

1252
Beginning Tennis. Lab 2. Theory and practice of basic skills, rules, terminology and game strategy for singles and doubles play. No credit for students with credit in 1242.

1262
Rebound Gymnastics. Lab 2. Theory and practice of tumbling, vaulting, trampoline and mini-tramp.

1272
Beginning Wrestling. Lab 2. Theory and practice of basic skills, strategies, training methods, equipment, rules and procedures of wrestling.

1282
Beginning Horseback Riding. Lab 2. Theory and practice of progressive skills for English and Western riding.

1312
Archery and Riflery. Lab 2. Theory and practice of archery and riflery; basic skills of target shooting, scoring, care and selection of equipment, and safety rules.

1322
Bowling. Lab 2. Theory and practice of approaches, deliveries, releases and mechanical principles involved in aiming and follow through.

1332
Body Mechanics. Lab 2. Theory and practice of physical fitness, posture, body mechanics in daily activities; figure improvement, weight control and nutrition, care of the back and feet and relaxation.

1342
Physical Fitness. Lab 2. Theory and practice of aerobic and weight training activities with learning experiences designed to promote physical fitness.

1352
Weight Training. Lab 2. Improvement of muscular strength and endurance in the major muscle groups of the body through progressive resistive exercise. Fundamental anatomy, physiology, mechanical principles, methods and techniques as applied to weight training programs.

1362
Self Defense. Lab 2. Theory and practice of self defense; scientific principles of gravity and body control over opposing forces, and principles of contest judo.

2112
Rock Climbing. Lab 2. Theory and practice in the basics of technical rock climbing, bouldering and spelunking.

2122
Backpacking and Hiking. Lab 2. Theory and practice of outdoor skills and leadership techniques for executing and evaluating a wilderness activity.

2132
Bicycling. Lab 2. Theory and practice in the basics of bicycling, bike touring and bike mechanics.

2142
Canoeing and Kayaking. Lab 2. Prerequisite: 2372 or equivalent. Theory and practice of basic skills and techniques of canoeing and kayaking in open water and whitewater.

2152
Orienteering. Lab 2. Theory and practice in the sport of orienteering skills with emphasis on problem-solving techniques through the use of topographic maps and compass.

2212
Intermediate Golf. Lab 2. Prerequisite: 1232 or equivalent. Development of swing principles, analysis of errors in direction and distance, trouble shots, handicapping, tournament play and rules.

2222
Intermediate Tennis. Lab 2. Prerequisite: 1252 or equivalent. Theory and practice of advanced serves and strokes; strategy for singles and doubles play; rules and competitive tennis.

2242
Scuba and Skin Diving. Lab 2. Prerequisite: advanced swimming skills. Theory and practice of skills and techniques, selection of equipment, safety procedures and physics of SCUBA and skin diving.

2252
Dance Production. Lab 2. Prerequisite: 2312. Advanced technique, composition and staging.

2262
Intermediate Rebound Gymnastics. Lab 2. Prerequisite: 1262 or equivalent. Theory and practice of intermediate skills in tumbling, trampoline and mini-tramp; spotting techniques and safety skills.

2272
Beginning Ballet. Lab 2. Theory and practice of fundamental skills and techniques of ballet.

2282
Beginning Jazz Dance. Lab 2. Theory and practice of fundamental skills and techniques for the contemporary form of jazz dance.

2292
Beginning Tap Dance. Lab 2. Theory and practice of fundamental skills and techniques for tap dance.

2312
Modern Dance. Lab 2. Theory and practice of basic skills and knowledge relating to the creative and technical aspects of modern dance.

2322
Recreational Dance. Lab 2. Theory and practice of traditional social dances and a variety of "free style" dance forms.

2332
Folk, Square and Social Dance. Lab 2. Theory and practice of folk, square and social dance; basic steps, terminology and etiquette.

2352
Apparatus Gymnastics. Lab 2. Prerequisite: 1262. Theory and practice of apparatus gymnastic skills; balance beam, uneven parallel bars, rings, pommel horse, parallel bars and horizontal bars.

2362
Intermediate Fencing. Lab 2. Prerequisite: 1222 or equivalent. Theory and practice of advanced skills and strategy; techniques of electrical foil fencing; officiating.

2372
Intermediate Swimming. Lab 2. Prerequisite: 1212 or ability to swim 50 yards using 2 strokes. Theory and practice of strokes, diving techniques and water safety skills for the intermediate swimming level.

2382
Orienteering, Rappelling and Hunter Safety. Lab 2. Theory and practice of the sport of orienteering, interpretation of topographic maps and use of the compass; use and care of ropes; basic and advanced rappelling; outdoor living equipment selection; hunter safety.

2392
Basic Roller Skating. Lab 2. Theory and practice of fundamental skills and techniques of roller skating as applied to dance or figure skating.

2413
Introduction to Recreation and Leisure. The nature, scope and significance of leisure and recreation. Delivery systems for leisure services, major program areas and the interrelationship of special agencies and institutions which serve the recreation needs of society.

2422
Social Recreation. Lab 2. Methods and materials for planning, organizing and conducting social activities for groups of various sizes and ages in a variety of social situations.

2433
Introduction to Therapeutic Recreation. Theory and application of therapeutic recreation with emphasis on types of illnesses and disabilities, delivery systems, programming and services.

2512
Advanced Swimming and Life Saving. Lab 2. Prerequisite: 2372 or equivalent. Theory and practice of advanced swimming, lifesaving and water safety skills.

3430
Practicum. 1-3 credits, maximum 3. Prerequisites: 2413, 2422. Supervised practical experience with leadership responsibilities for planning, conducting and evaluating activities and programs.

3443
Camp Leadership. Lab 2. Philosophy of camping with emphasis on leadership training for organized camp settings. Principles and concepts of program planning, development of camping and outdoor skills.

3453
Theory of Recreation Leadership. Principles and practical applications of group leadership techniques; problem solving; supervision and evaluation of personnel.

3463
Program Design in Leisure Services. Emphasis on organization, supervision, promotion and evaluation of programs.

3473
Evaluation of Leisure Services. Prerequisite: 3463. Methods, techniques and application of the evaluation process related to a wide variety of leisure service functions: clientele, programs, personnel, facilities and organization.

3483
Principles and Clinical Practices in Therapeutic Recreation. Prerequisite: 2433. Clinical intervention techniques and strategies, including treatment techniques, leisure education and role of recreation in the treatment process.

3491
Pre-Internship Seminar. Prerequisite: completion of 15 hours in LEIS. Preparation for internship in recreation and leisure services.

4213
Methods of Teaching Swimming. Lab 2. Prerequisite: 2512 or equivalent. American Red Cross Water Safety Instructor's Certification.

4222
Swimming Pool Management. Prerequisite: 2512. Design, operation, programming and personnel management. May yield Oklahoma State Health Department Swimming Pool Operation Certificate.

4453*
Outdoor Education. Development of a holistic approach to teaching and learning in the outdoors. Learning in, about, and for the out of doors as a process for acquiring skills with which to enjoy outdoor pursuits.

4463*
Areas and Facilities in Recreation. Prerequisites: 3463; PE 3773 or 4712. Planning, design and development of areas and facilities in recreation and physical education.

4473*
Outdoor Recreation. Theory and practical application of outdoor recreation concepts with emphasis on philosophies, principles, policies, economics, trends and problems.

4483*
Interpretive Services in Recreation. Prerequisite: 4473 or FOR 4553 or concurrent enrollment. Organization and administration of visitor centers and interpretive naturalist programs, philosophic approaches, and methods for interpreting the natural and cultural history of public parks and recreation areas.

4493
Administration of Leisure Services. Decision making, problem solving, personnel policies, legal issues, fiscal policies and budget procedures related to the delivery of leisure services.

4513*
Facilitation Techniques in Leisure Counseling. Prerequisite: 3483. Philosophy, history, trends, models, legal aspects and basic methods of leisure counseling and leisure education.

4523*
Program Design in Therapeutic Recreation. Prerequisite: 3483. Systematic approach to the development, design and evaluation of therapeutic recreation programs.

4563*
Industrial and Commercial Recreation Management. Prerequisite: 3463. Industrial and commercial recreation management: budgeting, facilities, programming and operational procedures.

4573*
Leadership in Experiential Education. An investigation of leadership styles and management models with an application to adventure based education.

4580*
Technical Management in the Wilderness. 1-6 credits, maximum 6. Developing technical competencies in back country navigation, emergency medical care and evaluation, winter nordic mountaineering, technical rock climbing, hazard analysis and expedition planning.

LIBRARY SCIENCE (LIBSC)

1011
The Use of Libraries and Learning Resources Centers. Orientation to the use of libraries and learning resources centers, including the special book and nonbook features of the OSU library, basic materials and services.

3023
Management of School Libraries and Learning Resources Centers. Introduction to practical problems in management of library learning resources centers; state, regional and national standards; understanding of the routines, methods and records necessary for the daily operation and supervision of the elementary or secondary school center; direction and training of student assistants; consideration of established library policy in school and community relationships.

3050
The School Library and Learning Resources Center in the Curriculum. 2-5 credits, maximum 5. Lab 1-3. Designed for teachers. Importance and effective utilization of the centralized school library media center in the teaching-learning process, evaluative selection tools of print and nonprint media, and reading guidance tools. Initial course is 2 credit hours. In addition, storytelling and field experience credits are available for 1-3 credit hours.

4113*
Reference Materials. Selection, evaluation and use of basic reference materials most commonly used in all types of libraries; the organization of reference service; interpretation of reference questions.

4213*
Selection of Book and Nonbook Materials. Selection principles, practices and problems in terms of library and learning resources centers objectives; examination of basic bibliographic aids and reviewing media involved in book and nonbook selection; analysis and practice of annotations; oral and written reviews of books, films, instructional materials and other media.

4313*
Reading Guidance for Young People. Consideration of reading interests and style and content of books suitable for young people of junior high school to junior college age; examination and reading of books for recreational and informational use, practice in preparing book talks, annotations and other means of motivating reading.

4414*
Introduction to Cataloging and Classification. Basic principles of cataloging, with practice based on functional application of current codes and manuals recognized by the profession.

4550*
Special Studies in Libraries and Learning Resources Centers. 1-6 credits, maximum 6. Designed to meet individual and group needs of library educational media specialists, teachers and others, including enrichment tours and workshop or institutes.

5013*
Libraries in the Social Order. Prerequisite: consent of instructor. Libraries and the profession of librarianship; evolution of the library as a social institution; functions of modern library; implications of new media and techniques on library service; survey of professional library literature; professional philosophy and ethics.

5613*
Bibliography of Special Fields. Prerequisite: consent of instructor. Bibliographical literature and data banks in the humanities, sciences, and social sciences; theory and underlying principles, practices, and control of descriptive and systematic bibliography; practice in preparation of subject bibliographies. Print and computer data banks.

5713*
Documents and Pamphlets Material. Introduction to the most-used governmental publications and indexes; selection, acquisition and care of pamphlet materials.

MANAGEMENT (MGMT)

2103
Business Computer Concepts and Applications. Prerequisites: 30 credit hours and MATH 1513. Computer concepts and applications. Introduction to programming, file structures, business software packages and issues in management information systems.

3013
Management. Prerequisites: completion of 50 credit hours and ACCTG 2203, ECON 2013, GENAD 2103, STAT 2023. Management principles and techniques of analysis. Decision making as applied to management systems, organizations, interpersonal relationships and production.

3103
Computer Programming for Business. Prerequisite: 2103 or COMSC 2113 or equivalent. Computer programs for business applications using the COBOL language. File structures, file updating techniques, sorting, report writing, magnetic tape and disk file handling.

3113
Management of the Public Organization. Applications of relevant management theory and tools of analysis to the problems of nonprofit organizations. Systems analysis, planning-programming-budgeting systems and cost-benefit analysis. Problems and examples are drawn from urban, government, military and educational organizations.

3123
Organizational Behavior and Management. Prerequisites: 3013, and SOC 1113 or PSYCH 1113. Behavioral science concepts relevant to the study of organizational and managerial behavior. Provides an understanding of the components and dynamics of organizational behavior essential to any manager. Managerial applications stressed.

3223*
Production and Operations Management. Prerequisite: 3013. Production/operations management utilizing a management science approach. Management decision-making techniques and their application to problems in production and operations management. Examples of applicable techniques include linear programming and decision analysis.

3233
Management Science Methods. Prerequisite: 3223. Deterministic operations research techniques applied to the resource allocation and operational problems encountered in accounting, marketing, finance, economics and management. Linear programming and network models.

3243
Managerial Decision Theory. Prerequisite: 3223. Decision processes under risk and uncertainty. The use of models in business decision making with outcomes governed by probability distributions. Bayesian decision analysis, utility measurements, game theory, Markov chains, queuing, simulation probabilistic forecasting and inventory, network models, and dynamic programming.

3303
Business Systems Analysis. Prerequisites: 2103, 3103, ACCTG 2203. Systems analysis as a profession and role of the systems analyst in the analysis, design, and implementation of computer-based business information systems. Current system documentation through use of classical and structured tools and techniques for describing flows, data flows, data structures, file designs, input and output designs, and program specifications. Information gathering and reporting activities and transition into system analysis and design.

3313
Human Resource Management. Prerequisite: 3013. Policies and practices used in personnel management. Focuses upon the functions of a human resource management department.

4113*
Management of Information Processing. Prerequisite: 2103 or equivalent. Managerial problems related to the acquisition, utilization and control of computerized information-processing systems in business organizations. Conducting feasibility studies, contracting for hardware, software and services; information-processing alternatives for the small businessman.

4123*
Labor Management Relations. Prerequisite: 3013. Labor relations and collective bargaining. Negotiation and administration of labor agreements and employee relations in nonunion organizations. Modes of impasse resolution.

4133*
Compensation Administration. Prerequisites: 3313, STAT 2023. Introductory course. Fundamentals of compensation such as the legislative environment, compensation theories, job analysis, job evaluation, wage structures and indirect compensation programs.

4203*
Advanced Computer Programming for Business. Prerequisite: GENAD 3103. Advanced programming features are examined with an emphasis on the development of computer programs for business application. File processing including magnetic tape sequential files, disk-indexed sequential files, and virtual storage applications are an integral part of the course. Subjects and techniques such as TSO, segmentation, debugging tools and procedures, and pertinent JCL are also studied and applied.

4223*
Management Information Systems. Prerequisites: 3223 and an introductory course in computing. Design, operation and implementation of computer-based information systems for decision making: current developments in management information theory. Value of information, data bases, decision support systems, interactive languages and statistical software; and applications to managerial problems in marketing, manufacturing and finance.

4253*
Data Base Management. Prerequisite: 4223. Theoretical aspects and management applications of data bases, file organization, and data models, with emphasis on hierarchical network and relational structures. Discussion of storage devices, data base administration, and the analysis, design and implementation of data base management systems.

4313*
Organization Theory and Development. Prerequisite: 3123. The design of formal organizations with an emphasis on topics related to organizational and managerial effectiveness. Focus on what is known about managerial and organizational effectiveness and how this knowledge may be applied.

4413*
Management Systems Applications. Prerequisites: 3233 and a course in a scientific programming language. Development and implementation of complex computerized decision models. Projects include data-base utilization, optimization and report generation.

4443*
Computer-Based Simulation Systems. Prerequisites: 3223, completion of lower-division mathematics requirements and a course in a scientific programming language such as FORTRAN, PL/1, or PASCAL. Discrete computer systems simulation using languages such as GPSS, GASP, or SLAM. Cases include queuing, layout planning and evaluation, and financial modeling.

4453*
EDP Auditing. Prerequisite: 50 credit hours, 2103, COMSC 2113 or equivalent, or consent of instructor. EDP auditing as it applies to the business environment. Impact of computer-based systems on control and auditing, total systems control analysis, and specific EDP auditing techniques as they apply to computer-based systems.

4523*
Data Communication Systems. Prerequisite: 4113 or equivalent. Management orientation to decisions necessary in the design, implementation and control of data communications. Transmission service and equipment characteristics, network design principles, data communication software and federal regulatory policy affecting data communication.

4613
International Management. Prerequisite: 3013. Survey of the organization, planning and management of international operations of business firms. Exploration of major cultural, economic and political systems, and their effects on the management function.

4713*
Conflict Resolution in Industry. Prerequisite: 3013. An integrated and interdisciplinary approach to the issues of industrial conflict and conflict resolution. An analytical development stressing both theory and empirical research. Models of conflict; conflict between the individual, the group and the organization; economic conflict and industrial conflict.

4813*
Advanced Human Resource Management. Prerequisite: 3313. Management of human resources at the organization level including employee relations law and human resource planning.

5113*
Management and Organization Theory. Prerequisite: graduate standing. Contemporary theories of organization. Structure and dynamics of organizational goals and environments.

5123*
Organizational Design and Research. Prerequisite: 5113 or 5213. An analysis of research which integrates theory and design of organizations. Reviews empirical research findings and stresses methods of organizational analysis; design and modification of organizations.

5213*
Seminar in Organizational Behavior. Prerequisite: 5113. Current research on group behavior in organizations. Group processes and structural factors affecting the interaction process and intra- and intergroup performance characteristics. Laboratory simulation and/or team research projects used to pursue advanced topics.

5223*
Seminar in Personnel Management. Theory and application of methods used in managing human resources in public and private organizations. Function, methods and characteristics of a personnel program.

5313*
Production Operations Management. Prerequisite: admission to MBA program or approval from MBA director and 5610. The management of operations in manufacturing and service organizations. Production planning, facility location and layouts. Inventory control, waiting line problems and simulation. Project management and quality control. Emphasis is on a management science approach.

5333*
Advanced Decision Theory for Management. Prerequisite: 5313 or equivalent. Case studies and examples involving decision analysis. Studies taken from current literature.

5413*
Advanced Management Science. Prerequisite: 5313 or equivalent. Advanced management science methods, with computer applications. Mathematical programming, simulation, forecasting, queuing, Markov processes.

5513*
Advanced Strategic Management and Business Policy. Prerequisite: MBA core courses. A terminal integrating course with emphasis on formulating and implementing basic policy decisions for business. An analytic approach to strategic decisions pursued through readings, cases and participation in a complex computer game.

5610*
Quantitative Methods in Business. 3 credits, maximum 3. Prerequisites: MATH 2713; MATH 2813 or equivalent is strongly recommended; admission to MBA program or approval from MBA director. Application of quantitative techniques to business problems. Quantitative approaches to economic analysis, input/output analysis, management decision-making; financial analysis, and constrained and unconstrained optimization.

5613*
Advanced Production and Operations Management. Prerequisite: graduate standing, MGMT 5313 or equivalent. Production system, including a synthesis of production and management techniques used by operations managers. A computerized management simulation game provides decision-making experience.

5623*
Advanced Management Information Systems. Prerequisites: 5313, BUSAD 5110, ACCTG 5103, STAT 3013. Design and use of management information systems in businesses and other organizations. Model building, information resource management and decision support systems.

5713*
Labor Relations and Collective Bargaining. A first course in labor relations. The industrial relations system, collective bargaining, labor legislation, the economic effects of unionization and other contemporary labor relations issues.

5813*
Administration and Evaluation of Manpower Programs. Prerequisite: 4813 or ECON 5533. Advanced study of the operation, administration and effectiveness of various manpower programs. Allocation of decision-making process among competing alternative programs and examination of various evaluation techniques as a means of program improvement. Assessment of the long- and short-run effects of manpower programs in both the private and public sectors.

6200*
Advanced Topics in Management Information Systems. 3-6 credits, maximum 6. Prerequisites: doctoral student status and consent of instructor. Special advanced topics in management information systems for doctoral students.

6323*
Advanced Policy and Strategy Formulation. Prerequisites: doctoral student status and consent of instructor. Seminar examining research concerning the content of overall organizational strategy and the process through which it is formulated.

6333*
Advanced Human Resource Management and Industrial Relations. Prerequisites: doctoral student status and consent of instructor. Selected topics in human resource management and industrial relations with emphasis on evaluation of research methods. Development of research proposals.

6343*
Advanced Organization Theory and Strategy Implementation. Prerequisites: doctoral student status and consent of instructor. Administrative task of implementing corporate and business strategies and extent to which organizational structure, technology, culture, leadership, politics, and reward systems affect that process. Developments in organization theory which are relevant to strategy implementation.

6353*
Advanced Methods in Management Research. Prerequisites: doctoral student status and consent of instructor. Course examines issues in theory building and development, strategies for collecting behavioral research. At conclusion of course, student should be able to: develop research questions, develop appropriate measures for constructs to be tested, and design research study using various methodologies.

MANUFACTURING TECHNOLOGY (MFGT)

1432
Welding Processes. Lab 3. Welding processes, their basic principles, and the changes in mechanical properties that occur in welded structures. Application of oxygas, metal arc, inert gas and other welding processes. Problems affecting the strength and other mechanical properties of welded structures.

2334
Machine Tool Processes. Lab 6. Set-up procedures on standard machine tools for turning, milling and grinding. Programming and operation of numerical control machines.

2543
Applied Metallurgy and Heat Treating. Lab 3. Prerequisite: GENT 1103. Mechanical properties of ferrous metals through controlled cooling processes. The nature of metals, methods of microexamination, effect of alloys and principles of heat-treating metals.

2633
Welding Applications. Lab 3. Prerequisite: 1432. The applications of various welding methods to the fabrication of welded structures. Weldability of metals, selection of filler material, surfacing materials and the techniques required to make and test welds.

3303
Advanced Machining Principles. Lab 3. Prerequisites: GENT 1222, 1103, MATH 1613. Primary metal removal operations involving various machine tools. Metrology/quality, process selection, cost evaluation and optimization of cutting parameters; cutting tools used and forces generated.

3343
Physical Metallurgy. Lab 3. Prerequisite: GENT 1103 and CHEM 1314. Ferrous and nonferrous metals including alloy steels and cast irons. Atomic theory, dislocation theory and corrosion. The influence of micro-structure and heat treatment on the mechanical properties of metals. Metallographic specimen preparation, inspection and testing.

3573
Production Processes. Lab 3. Prerequisites: GENT 1103, MATH 1513. Processes used by the manufacturing industries in the production of durable goods. Foundry, plastics, powder metallurgy, hot and cold forming, and welding. Techniques of design, application and selection.

4050
Advanced Manufacturing Problems. 1-4 credits, maximum 4. Prerequisite: junior standing and consent of instructor. Special problems in manufacturing.

4303
Computer Integrated Manufacturing. Lab 3. Prerequisites: GENT 1103, 1222, MATH 1613. Introduction to programming techniques and manufacturing applications of Computer Numerical Control (CNC) and Robotics. Machine capabilities and tooling requirements; with programs being prepared manually and with COMPACT II computer assistance.

4313
Applied Robotics and Automated Manufacturing. Lab 3. Prerequisites: PHYSC 1214 and EET 3103 or EPT 3103. Industrial applications of computer-controlled robotic and automated manufacturing equipment. Emphasis on machine characteristics, techniques of efficient utilization and control, and evaluation criteria.

4453
Physical Metallurgy of Nonferrous Metals. Lab 3. Prerequisite: GENT 1103. Properties and selection of nonferrous metals, ceramics, polymers and composites. Includes aluminum, coppers, titanium, ceramics, refractories, polymers, composite fibers, matrix materials, and metal matric composites.

4554
Advanced Metallurgical Problems. Prerequisites: 3343 and MECDT 4004. Problems in metallurgy; failure analysis, heat-treating problems and selection of metals for structural and environmental conditions.

MARKETING (MKTG)

3213
Marketing. Prerequisite: ECON 2023. Marketing strategy and decision-making. Consumer behavior, marketing institutions, competition and the law.

3323
Consumer and Market Behavior. Prerequisite: 3213. Qualitative and quantitative analyses of the behavior of consumers; a marketing consideration of the contributions of economics and the behavioral disciplines to consumer behavior.

3433
Promotional Strategy. Prerequisite: 3213. Promotional policies and techniques and their application to selling problems of the firm.

3513
Sales Management. Prerequisite: 3213. Sales planning and control, organization of the sales department, developing territories, motivating salesmen and control over sales operations.

3613
Retailing Management. Prerequisite: 3213. Applied marketing knowledge, with attention given to those concepts and methods which provide the necessary foundation for a retailing manager.

4113*
Marketing Decision Analysis. Prerequisite: 3213. Decision making in a variety of marketing applications to include model building, analysis of courses of action, and development of online information systems. Applications with microcomputers to focus on decision areas such as sales forecasting, media selection, sales force allocation and site location.

4223
Business Logistics and Channel Management. Prerequisites: 3213 and MGMT 3223. An economic and operational analysis of the physical flow of goods and materials. A system interpretation of marketing channels.

4333*
Marketing Research. Prerequisites: 3213 and STAT 3013. Basic research concepts and methods. Qualitative and quantitative tools of the market researcher.

4433
Problems in Marketing. Prerequisite: 3213. Problems in marketing. Specific topics vary from semester to semester.

4443*
Social Issues in the Marketing Environment. Prerequisite: 3213. Social and legislative considerations as they relate to the marketplace.

4553*
International Marketing. Prerequisite: 3213. The conceptual framework for marketing into and from foreign countries. The development of action-oriented strategies with emphasis on the uncontrollable factors that affect marketing decisions in an international setting.

4683
Managerial Strategies in Marketing. Prerequisite: 90 credit hours including 9 credit hours of marketing. Analysis of the marketing management decision process; market opportunity analysis, strategy development, planning and integration with corporate strategy.

5133*
Marketing Management. Prerequisite: admission to MBA program. Consideration at an advanced level of the major elements of marketing from the point of view of the marketing executive. Emphasis on problem solving and decision-making, using an interdisciplinary approach. Development of an integrated, comprehensive marketing strategy.

5220*
Seminar in Marketing. 3 credits, maximum 9. Prerequisite: 5133. Selected topics in marketing. Industrial marketing, product management, strategic marketing planning, international marketing, and services marketing.

5313*
Marketing Research Methodology. Prerequisite: 5133. Research methodology applied to marketing problems. Measurement, survey research, experimentation, and statistical analysis of data.

5513*
Seminar in Marketing Theory. Prerequisite: 5133 or consent of instructor. Development of an evaluation of marketing theory.

5613*
Seminar in Consumer Behavior. Prerequisite: 5133 or consent of instructor. Psychological , sociological, and anthropological theories related to consumer decision processes. Special emphasis on current empirical research in consumer behavior.

5713*
Seminar in Promotional Strategy. Prerequisite: 5133. Promotional problems encountered by a firm and approaches to their solution.

5813*
Seminar in Channels of Distribution. Prerequisite: 5133. Development structure and interrelationships among members of marketing channels involving customer service, physical distribution decisions, and operating policies.

MARKETING EDUCATION (MKTED)

2010
Career Exploration in Marketing Education. 1-2 credits, maximum 2. Marketing concepts and occupational information within the framework of career exploration and decision-making. The modular design used to provide a variety of exploratory experiences in career decision-making, self-assessment and environments and skills involved in marketing.

3113*
Foundations of Occupational Education. Occupational education and its development, role and function in a modern educational system. Economic and sociological foundations of occupationally oriented programs plus specific information on serving students with multicultural backgrounds and specific needs. Same course as OAED 3113.

3253*
Curriculum in Marketing Education. Prerequisite: MKTG 3213. The technical competencies in marketing education curriculum design demanded of marketing educators who prepare students for careers in retailing, wholesaling or service-selling fields.

3333*
Marketing Education and Marketing Promotion. The promotional function in marketing education programs; competencies and skills in teaching advertising, display, publicity, public relations, and visual merchandising in all types of businesses.

3453*
Organization and Administration of the Marketing Education Program. Prerequisite: CIED 2113. Designed to develop the competencies needed by the marketing education teacher-coordinator to organize and administer a comprehensive marketing education program, general or specialized, employing the cooperative or project (simulated) plan of instruction.

3543*
Techniques of Teaching Salesmanship Skills. Development of the knowledge and skills to plan, develop and implement a competency-based marketing education salesmanship course.

3901
Seminar in Teacher Education. Procedures for gaining admission to Teacher Education and student teaching. Requirements for certification and graduation and course planning to meet those requirements. Career opportunities and procedures for securing employment. Same course as OAED 3901.

4103*
Methods of Teaching Occupational and Adult Education. Lab 2. Prerequisite: OAED 3113. Applications of teaching and learning principles. Emphasizes the wide variety of instructional planning and delivery strategies available to the instructor, including shop and laboratory instruction, individualized and competency-based instruction and the use of instructional technology. Laboratory component involves course participants in micro-teaching and other actual teaching situations. Same course as OAED 4103. No credit for students with credit in TIED 4103.

4333*
Principles of Teaching Business Management and Ownership. Principles of management and ownership techniques appropriate for teaching these skills at the secondary school level.

4470
Teaching Practicum in Occupational Education. 1-12 credits, maximum 12. Prerequisites: admission to Teacher Education, 3253, 4103, and/or concurrent enrollment in 3453. Organized teaching experiences under the guidance and direction of a local school cooperating teacher and a university teacher educator. Participant is assigned to a cooperating teacher with responsibility for planning, implementing and evaluating the classroom, laboratory or shop. Same course as OAED 4470.

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: consent of department head.

5220*
Seminar. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Designed to develop technical marketing competencies needed by the marketing education teacher-coordinator to direct learning experiences needed in a general or specialized marketing education program such as fashion marketing, recreation and tourism, hotel and lodging or transportation.

5330*
Field Problems in Marketing Education. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of department head. Problems related to marketing education; work conducted off campus; conferences and reports required.

5350*
Problems and Methods in Marketing Education. 1-6 credits, maximum 6. Prerequisite: consent of department. Problems related to the cooperative and simulated project method of instruction.

5660*
Marketing Education Workshop. 1-2 credits, maximum 6. Prerequisite: experience as teacher-coordinator administrator or consent of department head. Intensive study of instructional, supervisory and administrative problems in marketing education.

6153*
Improvement of Instruction in Merchandising. Prerequisite: consent of department head. Designed to develop the instructional competencies needed by a marketing education teacher-coordinator in a general or specialized marketing education program.

MASS COMMUNICATIONS (MC)

5000*
Thesis. 1-6 credits, maximum 6. For mass communication graduate students who are candidates for the master's degree.

5010*
Specialized Mass Communication. 1-3 credits, maximum 3. Lab 4. Advanced message preparation in candidate's field of concentration.

5113*
Methods of Research in Mass Communication. Principles and techniques of research; research planning, design and measurement in mass communication.

5223*
Mass Communication Research Analysis and Intrepretation. Prerequisite: 5113. Single- and multivariate analysis, interpretation and reporting of mass communication research data. Use of computers in research analysis.

5333*
Process and Effects of Mass Communication. Mediating factors that affect interaction of ingredients in the communications process, and how these factors can affect the fidelity of information conveyed.

5663*
Public, Educational and Instructional Television. Uses of non-commercial television in public, educational and instructional applications. Analysis of program types and content.

5733*
Responsibility in Mass Communication. Interaction between mass media and society, with emphasis upon the communicator's ethics and responsibilities.

5770*
Seminar in Communications Media. 1-3 credits, maximum 6. Prerequisite: 5113. International communication, media history, legal research, new technology, women and the media, TV and children, industrial TV, and communication research.

5883*
Advanced Media Management. Prerequisite: JM 4723 or consent of instructor. Trade area surveys; building and plant engineering; management of human, physical and financial assets; labor-management relations; estimating and cost controls.

5913*
General Semantics in Mass Communication. Prerequisite: graduate standing or consent of instructor. Language as it affects thought and action, with special emphasis on writings of Johnson, Korzybski, Hayakawa, Chase and Lee in relation to communication media.

MATHEMATICS (MATH)

0123
Intermediate Algebra. Prerequisite: one year of high school algebra or equivalent. Review of fundamental operations of algebra, rational expressions, exponents and radicals, linear and quadratic equations, inequalities, introduction to analytic geometry. Does not count for college credit.

1314
(A)General College Mathematics. Topics from set theory, logic, and probability. A general education course for non-majors. Not preparatory for subsequent mathematics courses.

1513
(A)College Algebra. Prerequisite: two years of high school algebra or 1213. Quadratic equations, functions and graphs, inequalities, systems of equations, exponential and logarithmic functions, theory of equations, sequences, permutations and combinations. No credit for those with prior credit in 1715 or any mathematics course for which 1513 is a prerequisite.

1613
(A)Trigonometry. Prerequisites: one unit of high school plane geometry, and 1213 or high school equivalent. Trigonometric functions, logarithms, solution of triangles and applications to engineering. No credit for those with prior credit in 1715 or any course for which 1613 is prerequisite.

1715
(A)College Algebra and Trigonometry. Prerequisites: one unit of high school plane geometry, and 1213 or high school equivalent. An integrated course in college algebra and trigonometry. Credit limited to 3 hours for those with prior credit in 1513. No credit for those with prior credit in any course for which 1613 is a prerequisite.

2203
Discrete Mathematics I. Prerequisite: 1513 or 1715. Logic, set theory proof techniques, probability and combinatorics, relations and functions, matrix algebra, graphs, Boolean algebra and lattices. Same course as COMSC 2203.

2265
Calculus I. Prerequisites: 1715, or 1513 and 1613. An introduction to derivatives, integrals and their applications, including introductory analytic geometry.

2365
Calculus II. Prerequisite: 2265. A continuation of 2265 including multivariate calculus, series and applications.

2373
Calculus for Technology Programs I. Prerequisites: 1715 or 1513 and 1613. First semester of a terminal sequence in calculus for students in the School of Technology. Functions and graphs, differentiation and integration with applications.

2383
Calculus for Technology Programs II. Prerequisite: 2373. Second semester of a terminal sequence in calculus for students in the School of Technology. Calculus of trigonometric, exponential and logarithmic functions and applications to physical problems.

2413
(A)Arithmetic for Teachers. Foundations of arithmetic for the elementary teacher.

2513
Structural Concepts for Teachers. Prerequisite: 2413 or equivalent. Structures of the number system; informal geometry. For the elementary teacher.

2613
Differential Equations. Prerequisite: 2365. A brief presentation of classical ordinary differential equation theory, finite difference theory, numerical methods and the Laplace transform theory. Applications.

2713
(A)Elementary Calculus. Prerequisite: 1513. An introduction to differential and integral calculus. For students of business and social sciences.

2813
(A)Finite Mathematics. Prerequisite: 2713. Discrete probability, vectors and matrices and linear programming. For students of business and social sciences.

3013*
Linear Algebra. Prerequisite: 2265. Algebra and geometry of finite-dimensional linear spaces, linear transformations, algebra of matrices, eigenvalues and eigenvectors.

3113*
Introduction to Modern Algebra. Prerequisite: 2365. Modern algebra, including material on set theory and logic.

3203
Discrete Mathematics II. Prerequisite: 2203 or 3113. A continuation of MATH 2203, algebraic structure, coding theory, finite state machines, machine decomposition, computability, formal language theory. Same course as COMSC 3203.

3313*
Essential Mathematics for the Biological and Social Sciences I. Prerequisites: 1213, and 60 credit hours or consent of instructor. Basic mathematics in the biological and social sciences. Selected topics from algebra, trigonometry and analytic geometry. Credit in this course and in 3413 may not be earned by those with credit in calculus.

3413*
Essential Mathematics for the Biological and Social Sciences II. Prerequisite: 3313. Selected topics from analytic geometry, polynomial calculus and matrix algebra. Applications to social and biological sciences.

3623*
Linear Algebra and Analysis I. Prerequisite: 2365. An integrated treatment of linear algebra, differential equations and multivariable calculus. No credit for those with credit in 2613 or 3013.

3633*
Linear Algebra and Analysis II. Prerequisite: 3623. Continuation of integrated treatment of linear algebra, differential equations and multivariable calculus begun in 3623. No credit for those with credit in 2613 or 3013.

3723*
Mathematical Structures. Prerequisite: 1513 or equivalent. Foundations of numbers (set theory, numeration, and the real number system), number theory, algebraic systems, functions and applications, and probability.

3733*
Geometric Structures. Prerequisite: 1513 or equivalent. Fundamentals of plane geometry, geometric motion (translation, rotations, reflections), polyhedra, applications to measurements.

4013*
Engineering Math: Calculus of Several Variables. Prerequisites: 2613 and 3013. Differential and integral calculus of functions of several variables, vector analysis, other basic methods of analysis and applications.

4033*
History of Mathematics. Prerequisite: 2265. Early development of mathematics as a science, contributions of Greek mathematics, mathematical advancements of the 17th and 18th centuries, and the mathematics of the 19th and 20th centuries. The emphasis in the course will be on replicating the setting and techniques of the times to understand the nature of a discovery and its relationship to contemporary thought.

4043*
Geometry I. Prerequisite: 2265 or equivalent. An axiomatic development of Euclidean and nonEuclidean geometries including the following topics: points, lines, angles, measure, betweenness, plane separation, triangles, quadrilaterals, polygons and circles.

4113*
Modern Algebra. Prerequisite: 3113. Basic properties of groups, rings, polynomial rings and fields including homomorphism theorems and quotient structures.

4243*
Theory of Numbers. Prerequisite: 3113. Divisibility of integers, congruences, quadratic residues, distribution of primes, continued fractions and the theory of ideals.

4253*
Numerical Mathematics: Analysis. Prerequisites: 2613, 3013, knowledge of FORTRAN. Computer arithmetic and rounding errors, numerical methods and error analysis associated with interpolation, least square approximation, roots of equations, integration, finite differences and ordinary differential equations, systems of linear algebraic equations. Same course as COMSC 4253.

4273*
Combinatorial Math. Prerequisite: 2265. Counting techniques, generating functions, difference equations and recurrence relations, introduction to graph and network theory.

4353*
Advanced Calculus I. Prerequisite: 2365. Elementary topology of Euclidean spaces. Theoretical treatment of functions, continuity, sequences, series and differentiation.

4363*
Advanced Calculus II. Prerequisite: 4353. Continuation of topics in 4353. A theoretical treatment of integration and of functions of several variables.

4553*
Linear and Nonlinear Programming. Prerequisite: 3013. Linear programming, simplex methods, duality, sensitivity analysis, integer programming and nonlinear programming.

4583*
Introduction to Mathematical Modeling. Prerequisite: 2365. Techniques of problem solving and mathematical models presented by examples and case-studies of real life applications of mathematical modeling from industrial settings.

4653*
Engineering Math: Differential Equations. Prerequisites: 2613 and 3013. Systems of differential equations, series, solutions, special functions, Green's functions, Sturm-Liouville problems and stability. Applications.

4673*
Complex Analysis. Prerequisite: 4013 or 4353. Complex variables for students in engineering and the physical sciences. Analytic functions, power series, residues and poles and conformal mapping. Applications.

4710
Honors Seminar. 1-3 credits, maximum 9. Prerequisite: upper-division standing of honor student. Special subject matter areas and reports on current literature.

4910*
Special Studies. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Special subjects in mathematics.

5000*
Research and Thesis. 1-6 credits, maximum 6. Conferences and guidance in reading and research and in the writing of reports and thesis.

5010*
Seminar in Mathematics. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Topics in mathematics.

5113*
Intermediate Probability Theory. Prerequisites: 4363 and STAT 4113. Measure theoretical presentation of probability, integration and expectation, product spaces and independence, conditioning, different kinds of convergence in probability theory and statistical spaces. Same course as STAT 5113.

5123*
Advanced Linear Algebra. Prerequisite: 3013. Linear transformations; determinants, eigenvalues and similarity transformations; canonical forms; bilinear and quadratic forms; orthogonal and unitary transformations.

5133*
Stochastic Processes. Prerequisites: 2613 and STAT 4113. Definition of stochastic processes, probability structure, mean and covariance function, the set of sample functions, stationary processes and their spectral analysis, renewal processes, counting analysis, renewal processes, counting processes, discrete and continuous Markov chains, birth and death processes, exponential model, queueing theory. Same course as INDEN 5133 and STAT 5133.

5143*
Theory of Functions of a Real Variable I. Prerequisite: 4363. Lebesgue measure theory, sequences of functions and the Lebesgue integral.

5153*
Theory of Functions of a Real Variable II. Prerequisite: 5143. A general theory of measure, measurable functions and integration; introduction to metric and Banach spaces.

5173*
Analytic Number Theory. Prerequisite: 4673 or 5383. Arithmetic functions, Zeta and L functions, distribution of primes, introduction to modular forms.

5183*
Algebraic Number Theory. Prerequisite: 4113. Number fields, ideal theory, units, decomposition of primes, quadratic and cyclotomic fields, introduction to local fields.

5213*
Fourier Analysis. Prerequisite: 4013 or 4353. Orthogonal series expansions, Fourier series and integrals and boundary value problems. Applications.

5243*
Ordinary Differential Equations I. Prerequisite: 4363 or consent of instructor. Existence and uniqueness of solutions, linear systems and their asymptotic behavior, oscillation and comparison and singularities.

5253*
Ordinary Differential Equations II. Prerequisite: 5243. Stability and asymptotic behavior of nonlinear systems, perturbation and the Poincare-Bendixon theory for planar autonomous systems.

5303*
General Topology. Prerequisite: 3113 or consent of instructor. Topological spaces including continuous functions, compactness, separation properties, connectedness and metric spaces.

5313*
Geometric Topology. Prerequisite: 5303. General topological spaces including convergence, product and quotient spaces, metrization, compactness and uniform spaces.

5323*
Algebra I. Prerequisites: 4113, and 5123 or consent of instructor. Group, ring and module theory to include products, co-products and ideal theory. An introduction to homological algebra, hom and tensor functors. Field extensions and Galois theory. Selected topics.

5333*
Algebra II. Prerequisite: 5323. A continuation of 5323.

5383*
Theory of Functions of a Complex Variable I. Prerequisite: 4353. Basic topology of the plane, functions of a complex variable, analytic functions, transformations, infinite series, integration and conformal mapping.

5393*
Theory of Functions of a Complex Variable II. Prerequisite: 5383. A continuation of 5383.

5413*
Differential Geometry. Prerequisite: 4013 or 4353. Differential geometry of curves and surfaces.

5513*
Numerical Analysis I. Prerequisite: 4253 or COMSC 4253. Algorithms and error analysis, solution of equations, interpolation and approximation theory. Same course as COMSC 5513.

5543*
Numerical Analysis II. Prerequisites: 4253 or COMSC 4253, and 4653. Discrete variable methods in ordinary differential equations including single-step and multistep methods. Iterative techniques for numerical solution of partial differential equations. Same course as COMSC 5543.

5553*
Numerical Analysis III. Prerequisites: 3013, and 4253 or COMSC 4253. Theoretical and computational methods associated with matrix algebra, linear algebraic equations and algebraic eigenvalue problems. Same course as COMSC 5553.

5583*
Case Studies in Applied Mathematics I. Prerequisites: 2613 and 3013. Selected mathematical problems from industry. Independent problem-solving, oral presentation of solutions, and technical report writing, seminar-style format.

5593*
Case Studies in Applied Mathematics II. Prerequisite: 5583 or consent of instructor. A continuation of 5583.

5653*
Automata and Finite State Machines. Prerequisites: 3113 or COMSC 5313 or COMSC 5113 and COMSC 5213. Finite state model, state diagrams and flow tables, equivalent states and equivalent machines. Formal grammars, context-free languages and their relation to automata. Turing machines, commutability and recursive function. Same course as COMSC 5653.

5663*
Computability and Decidability. Effectiveness, primitive recursivity, general recursibility, recursive functions, equivalence of computability, definitions, decidability, recursive algorithms. Same course as COMSC 5663.

5683*
Partial Differential Equations I. Prerequisite: 4013 or 4353. Theory of partial differential equations of the first and second orders.

5693*
Partial Differential Equations II. Prerequisite: 5683. A continuation of 5683.

5733*
Algebraic Topology I. Prerequisites: 4113, 5123 and 5303; or 4113, 5303. An introduction to the homological algebra of geometric structures, including homotopy, homology and cohomology theory.

5743*
Algebraic Topology II. Prerequisite: 5733. A continuation of 5733.

5813*
Homological Algebra I. Prerequisite: 5333. Relative homological algebra including closed and projective classes, resolution and derived functors, adjoint theorem, construction of projective classes in the categories of groups, rings and modules; categories, Abelian categories.

5823*
Homological Algebra II. Prerequisite: 5813. Continuation of 5813.

5883*
The Calculus of Variations. Prerequisite: 4363. Determination of functions, curves and surfaces with maximum or minimum properties, fields of extremals, the Hamilton-Jacobi partial differential equation. Applications to geometry and physics.

6000*
Research and Thesis. 1-9 credits, maximum 24. Prerequisite: consent of advisory committee. Directed research culminating in the Ph.D. thesis.

6013*
Functional Analysis I. Prerequisites: 5123, 5143 and 5303. Theory of normed linear spaces.

6113*
Functional Analysis II. Prerequisite: 6013. A continuation of 6013.

6123*
Advanced Probability Theory. Prerequisites: 4673 and 5113 or STAT 5113. Sequences of random variables, convergence of sequences, and their measure theoretical foundations. Different kinds of convergence in probability theory. Characteristic functions and their applications. Laws of large numbers and central limit theorems. Conditioning. Introduction to stochastic processes. Same course as STAT 6123.

6313*
Potential Theory. Prerequisite: 4363. The force of gravity, fields of force, potential, the divergence theorem, properties of Newtonian potentials at points of free space and at points occupied by masses, Green's functions, the logarithmic potential and existence theorems.

6410*
Seminar and Research in Applied Mathematics. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

6510*
Seminar and Research in Analysis. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

6610*
Seminar and Research in Geometry. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

6710*
Seminar and Research in Topology. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

6810*
Seminar and Research in Algebra. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

6910*
Seminar and Research in Number Theory. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

MECHANICAL AND AEROSPACE ENGINEERING (MAE)

3033*
Mechanism Design. Prerequisite: ENGSC 2122. Motion programming and analysis of machines. Kinematics of cams, gear trains, and plane mechanisms. Introduction to symbolic logic.

3043*
Intermediate Dynamics. Prerequisites: ENGSC 2122 and MATH 2613. A comprehensive treatment of the kinematics and kinetics of particles, systems of particles, and rigid bodies from a Newtonian viewpoint, utilizing rigorous vector techniques. An introduction to transient vibrations of mechanical systems and Lagrange's equations applied to mechanical systems.

3112*
(L)Measurements and Instrumentation. Lab 2. Prerequisite: 3723. Theory and laboratory in the measurement of electrical quantities, strain, force, velocity, frequency, temperature and flow rate. Report writing including the use of charts, graphs, diagrams and uncertainty analysis.

3223*
Thermodynamics II. Prerequisite: ENGSC 2213. A continuation of ENGSC 2213. Irreversibility and availability, power cycles, refrigeration cycles, mixtures and solutions, chemical reactions, phase and chemical equilibrium, and introduction to compressible flow.

3323*
Design Stress Analysis. Prerequisite: ENGSC 2114. Mechanics of deformable bodies with emphasis on the design of machine and structural members: general theories of stress and strain; stress-strain relations; theories of failure; reliability and safety factors in design; fatigue considerations.

3403*
Computer Methods in Analysis and Design. Lab 3. Prerequisite: FORTRAN programming. Application of digital computer methods in the design, analysis, and simulation of mechanical, thermal, and fluid systems. Interactive computer graphics in conceptual design and presentation of design analysis results.

3613*
Petroleum Production and Phase Behavior. Prerequisites: ENGSC 2213 and 3233. Properties of petroleum fluids. Gas-liquid equilibria. Operations of producing wells, including surface treatment of oil and gas.

3723*
Introduction to Dynamic Systems. Prerequisites: MATH 2613, ENGSC 2122 and 2613. Physical and mathematical modeling of electrical and mechanical dynamic systems. Transient response of first- and second-order systems. Laplace transform technique for solving differential equations; transfer functions, frequency response and resonance.

3733*
(L)System Modeling, Simulation, and Design. Lab 3. Prerequisite: 3723 or ECEN 3723. Advanced modeling of mechanical engineering systems (mechanical, electromechanical, fluid and thermal). Numerical techniques for simulating system response. Model verification and identification, not-ideal elements and nonlinear effects. Correlation of experimental results (laboratory studies of mechanical engineering systems) with simulation and analytic response predictions. Use of system modeling, analysis and simulation as a design technique.

4010*
Mechanical Engineering Projects. 1-6 credits, maximum 6. Lab variable. Prerequisite: consent of instructor. Special projects and independent study in mechanical engineering.

4053*
Introduction to Control Systems. Prerequisites: 3723, 3733; or ECEN 3723. Properties of feedback control systems, mathematical models of basic components, state-variable models of feedback systems, time-domain analysis, stability, transform analysis, frequency-domain techniques, root-locus, design of single-input-single-output systems and simple compensation techniques.

4063*
Elementary Vibrations. Prerequisites: 3043 and 3723. Linear analysis of vibrating machines. Theory of balancing and vibration isolation. Multimode analysis by conventional matrix methods. Energy methods. Introduction to nonlinear dynamic analysis.

4133*
Mechanical Engineering Applications. Lab 6. Prerequisites: 3112 and consent of instructor. Application of mechanical engineering laboratory techniques to the solution of experimental or design problems. Provides outstanding senior students with the opportunity to do research under close faculty supervision. Projects selected in consultation with the instructor.

4223*
Experimental Aerodynamics. Lab 3. Prerequisites: 3112, 4253. Experimental study of fundamental aerodynamic principles. Aerodynamic characteristics of airfoils and the finite wing. Application of low-speed wind tunnel testing techniques. Also experimental evaluation of performance, stability and control of aircraft in flight.

4233*
Heat Transfer and Fluid Flow. Prerequisite: ENGSC 3233. Conservation equation and boundary layer theory. Applications to forced and free convection, multiphase behavior, compressible flow, and mass transfer.

4243*
Gas Power Systems. Prerequisites: 3223 and ENGSC 3233. Power and propulsion engines utilizing a gas as the working substance. Basic thermodynamic and dynamic equations of one-dimensional compressible flow, including isentropic flow and normal shock waves. Applications to both transportation and stationary systems.

4253*
Applied Aerodynamics and Performance. Prerequisites: MATH 2613, ENGSC 3233. History of flight, gliders, and man-powered aircraft. Mathematical models of fluid flow about bodies. Characteristic parameters of airfoils and wings. Thin airfoil theory and flow about finite wings. Aerodynamics stall and the effects of flaps and slots. Drag polars; rate of climb; maximum range and maximum endurance.

4263*
Vapor Power Systems. Prerequisites: 3223, ENGSC 3233. Combustion processes and vapor power cycles for power production. Power system economics and load analysis. Design techniques for thermal system.

4273*
(L)Experimental Fluid Dynamics. Lab 3. Prerequisites: 3112 and ENGSC 3233. Experimental study of fundamental processes in aerodynamics and fluid dynamics using advanced measurement techniques.

4283*
Airplane Stability and Control. Prerequisites: 3043 and 4253. Rigid-body airplane equations of motion. Aerodynamic stability derivatives. Steady-state flight and maneuvers. Static and dynamic stability; transfer functions; handling qualities criteria; design applications.

4293*
Compressible Fluid Flow. Prerequisites: ENGSC 3233 and MATH 2613. Gas flows in one and two dimensions; basic thermodynamic and dynamic equations, nozzle and duct flows, plane shock waves, frictional high-velocity flows and heat addition effects.

4323*
Design for Manufacturability. Lab 3. Prerequisites: 3323, ENGSC 3313. Integration of concepts of product design with manufacturing principles, including behavior and properties of material, stress analysis, heat transfer and lubrication. Processing techniques and economics. Emphasis on analysis requirements and applications of processing parameters and design variables, in CAD/CAM.

4333*
Mechanical Metallurgy. Lab 2. Prerequisite: ENGSC 3313. Mechanical deformation processes and strengthening mechanisms in engineering materials. Material failure modes including creep, fatigue, stress corrosion, ductile and brittle fractures.

4343*
Industrial Projects. Lab 1. Prerequisites: 3033, 3043, 3112 and 3733. Student teams work on professional-level engineering projects sponsored by participating industries. Projects are selected from a broad range of technical areas such as mechanical design, thermal analysis, instrumentation, controls, fluid mechanics and energy production.

4353*
Mechanical Design Analysis. Prerequisite: 3323. Analysis and synthesis of machine components such as fasteners, springs, gears, brakes, bearings; lubrication; analytical methods for the study of impact, dynamic loading and fatigue; comprehensive treatment of failure, safety and reliability.

4363*
(L)Experimental Analysis. Prerequisites: 3112 and 3323. Laboratory techniques for the experimental analysis of vibration, stress, force and motion. Projects involve the use of strain gages, brittle lacquer techniques, reflection and transmission polariscopes, load cells and accelerometers.

4373*
Aircraft Design. Prerequisites: 4243, 4253 and 4513. Solution of problems arising in the design of aerospace systems. Prediction of the aerodynamic, structural, propulsive and control characteristics.

4401
Seminar. Prerequisite: senior standing. Group discussions on professional aspects of engineering including ethics and legal concerns. Preparation of written and oral reports on selected and assigned topics.

4513*
Aerospace Structures I. Prerequisite: 3323. Structural analysis of flight structures. Dynamic loading in aircraft, missiles and spacecraft. Stress and deflection analysis of thin-skinned stiffened structures.

4523*
Aerospace Structures II. Prerequisite: 4513. Deflection analysis of thin-skin structures. Classical methods of structural analysis. Indeterminate aircraft structures.

4613*
Fundamentals of Reservoir Engineering. Prerequisites: MATH 2613, CHENG 3473 or MAE 3613. Properties of porous media, properties and phase behavior of reservoir fluids. Computational schemes, including numerical methods, for predicting and optimizing production rates and establishing reserves.

4703*
Indoor Environmental Systems. Prerequisites: ENGSC 2213, ENGSC 3233. Study of heating, cooling and air-moving systems including moisture control. Calculation of heating and cooling loads. Design of air distribution systems and selection of components.

5000*
Thesis. 1-6 credits, maximum 6. A student studying for a master's degree who elects to write a thesis must enroll in this course.

5010*
Mechanical Engineering Projects. 1-12 credits, maximum 12. Project in research or design selected by the student, or assigned by the instructor. A student who wishes to complete a master's degree under Plan III must enroll in this course.

5030*
Engineering Practice. 1-12 credits, maximum 12. Prerequisites: senior or graduate standing and consent of instructor. Solution of real-life engineering design and development problems in an actual or simulated industrial environment. Activities include application of design and testing procedures, economic evaluation and periodic oral and written reporting on one or more assigned problems. Activities must be approved in advance by the adviser.

5043*
Advanced Dynamics. Prerequisites: 3043, MATH 3013. Advanced treatment of analytical methods for rigid body motion with emphasis on multi-dimensional motion. Newtonian formulations, LaGrange's equations, Euler's equations, the Poinscot construction, Hamilton's equations, Canonical transformations, spin stabilization, the rotation matrix, and Kane's formulations. Applications to engineering problems.

5073*
Mechanical Vibrations. Prerequisite: 4063. Analysis of nonlinear vibrations, classical analysis of continuous systems and numerical methods.

5083*
Engineering Acoustics. Acoustical analysis and measurement techniques, with emphasis on design applications for noise and vibration control in machinery and in buildings.

5093*
Numerical Engineering Analysis. Prerequisite: basic FORTRAN programming. Practical digital methods for obtaining steady-state and transient solutions to lumped and distributed mechanical, fluid and thermal problems.

5203*
Inviscid Fluid Mechanics. Prerequisite: ENGSC 3233. Basic principles and analytical methods underlying the theory of the motion of an inviscid and incompressible fluid.

5233*
Viscous Fluid Dynamics. Prerequisite: 4233 or equivalent. The dynamics of viscous flow over external surfaces, inside channels, and in free shear layers. Boundary layer solutions. Theory of similarity. Approximation methods.

5263*
Combustion. Prerequisite: 4233. Theory, design and performance of combustion systems. Fundamentals of aerothermochemistry fluid dynamics, heat transfer and combustion. Laminar and turbulent flows. Diffusion and premixed flames. Pollutant reduction. Numerical simulation and solution.

5293*
Gas Dynamics I. Prerequisite: 4293. Fluid dynamics of compressible flows at subsonic and supersonic speeds for two-dimensional and axisymmetric geometries. Comprehensive treatment of linear aerodynamic theories and the generation and propagation of aerodynamic noise.

5323*
Plasticity and Metal Forming. Prerequisite: ENGSC 2114 or equivalent. Basic theory of plasticity and its applications to metal-forming problems. Application of computer-aided design (CAD) and computer-aided manufacturing (CAM) techniques in part and tool design and manufacture.

5333*
Advanced Manufacturing Processes. Prerequisite: ENGSC 3313. Mechanical and thermal processing of materials-theory and applications. Solid-liquid transformation, solid deformation, microstructural control by process modeling. Recent advances in processing including RSP, HIP and near net shape for traditional and new materials.

5373*
Instrumentation. Lab 2. Analysis and design of instrumentation systems, laboratory experiences with electronic instrumentation and transducers, application of digital and analog integrated circuit components to measurement problems.

5403*
Computer-Aided Analysis and Design. Prerequisite: basic FORTRAN programming. Theory, application and implementation of digital-computer-oriented algorithms for the synthesis, simulation, analysis and design of engineering systems. Advanced FORTRAN methods for optimization, simulation and data analysis. Implementation of these methods uses program libraries, batch processing, remote terminals and graphic display units.

5413*
Motion Programming of Planar Mechanisms. Prerequisite: 3033. An advanced course in the synthesis and analysis of plane mechanisms. Application of inversion techniques, pole triangles, Robert's law, overlay technique, Euler-Savary equation, Freudenstein's equation and Kutzbach's criterion.

5423*
Dynamics of Mechanisms. Static and dynamic force analysis of plane and space mechanisms using vector, matrix and dual quaternion approaches. Simulation of mechanical systems. Study of transient effects. Vibration analysis and balancing of linkages.

5433*
Robotics: Kinematics, Dynamics and Control. Design and performance analysis of robots and manipulators as applied in flexible manufacturing and automation. Structural synthesis, kinematic and dynamic analysis, dexterity analysis, motion programming, and control system analysis and synthesis.

5443*
Lubrication, Friction and Wear. Prerequisite: ENGSC 3233. Theories of lubrication, friction and wear; fundamentals of viscous fluid flow; the Navier-Stokes equations; Reynolds equations; hydrodynamic theory and applications to fixed, pivoted and thrust plane-slider bearings, journal bearings, disks, gears; optimization of bearing performance; hydrodynamic squeeze theory and applications; analysis of hydrostatic bearings; gas lubrication; solid friction and theories of adhesion and deformations; wear and theories of adhesion and abrasion.

5453*
Fluid Power Control I. Prerequisite: 4053 or concurrent enrollment. Static and dynamic modeling of hydraulic and pneumatic control systems and components. Energy and power transfer and impedance matching concepts. Dynamic performance and stability of open- and closed-loop servodrives. Introduction to system design.

5463*
Fluid Logic. Fundamentals of Boolean algebra and switching circuit design. Implementation of circuit equations with fluid and mechanical logic elements. Analysis and synthesis of fluid logic systems.

5473*
Automatic Control I. Prerequisite: 4053 or ECEN 4413. Input-output and state space representations of linear continuous and discrete time dynamic systems. Controllability, observability, and stability. Design and analysis of single- and multi-variable feedback control systems. Introduction to identification, adaptive, and optimal control.

5483*
Digital Data Acquisition and Control. Lab 2. Prerequisite: undergraduate course in programming. Use of microcomputers operating in real-time applied to engineering systems for data acquisition and control, use of analog to digital, digital to analog, and digital input/output, synchronous and asynchronous programming. Competence in the engineering use of microcomputers through lectures and laboratory applications.

5523*
Photoelastic Stress Analysis. Prerequisite: 4363. Application of photoelastic methods to the stress analysis of machine parts and redundant structures. Techniques of casting, annealing and stress freezing. Use of transmission and reflecting types of polariscopes.

5533*
Analysis of Structural Systems. Prerequisite: 4513. Computer-oriented matrix methods in the analysis of linear structural systems; energy principles; matrix equations for static and dynamic analyses of elastic systems; stability.

5543*
Modern Materials. Prerequisite: ENGSC 3313. Properties, applications and recent innovations of structural engineering materials. Metals, ceramics, polymers and composites considered.

5553*
Fatigue and Fracture Mechanics. Prerequisite: 4333. Fracture processes in engineering materials including design considerations, failure avoidance and predictability. Fatigue processes and high-strength, toughness-limited materials emphasized.

5563*
Finite Element Methods. Introduction to the finite element method in mechanical engineering. Numerical and mathematical formulations including an introduction to variational methods. Computer applications in solid mechanics, heat transfer and fluid mechanics.

5583*
Corrosion Engineering. Lab 2. Prerequisite: ENGSC 3313. Modern theory of corrosion and its applications in preventing or controlling corrosion damage economically and safely in service.

5613*
Fluid Flow in Porous Media. Single- and two-phase fluid flow through porous media. Applications to underground oil and gas flow, production of water from aquifers for irrigation, atomic waste disposal and gas storage.

5623*
Energy Conversion Systems. Prerequisites: ENGSC 2213 and 3233. A comparative study of conventional and alternative energy conversion systems, including economic and environmental concerns.

5633*
Applied Thermodynamics. First and Second Law analysis. Prediction of properties of nonideal fluids, including mixtures. Engineering applications to power system design, solar systems , HVAC systems, waste heat recovery and underground petroleum reservoirs.

5643*
Advanced Energy Resources Engineering. Application of new methods and concepts to the development of present and future energy sources. Diverse topics ranging from utilization of heat in production of oil to extraction of fusional materials from sea water.

5663*
Solar Energy. Solar space-and-water heating systems including economic considerations.

5723*
Nonlinear Systems Analysis I. Prerequisite: 4053 or ECEN 4413. Failure of superposition; phase plane and phase space techniques; method of perturbations; asymptotic, orbital and structural stability; subharmonic generation; generalized approaches to nonlinear systems analysis.

5793*
Artificial Intelligence and Expert Systems. Fundamental concepts: search-oriented problem solving, knowledge representation, logical inference, building an expert system, languages and software tools and machine architectures. Applications to planning, computer vision, natural language processing, speech recognition and robotics. Development of a prototype expert system or literature search and report is required. Common lectures with INDEN 5933 and ECEN 5293.

5803*
Advanced Thermodynamics I. Prerequisite: 3223. A rigorous examination of the fundamental principles of engineering thermodynamics; the First Law, the pure substance, flow processes, Second Law availability, properties of substances, thermochemistry, mixtures and equilibrum.

5823*
Radiation Heat Transfer. The mechanism of the transfer of energy by thermal radiation; radiant properties of materials, energy transfer prediction methods and solar energy topics.

5843*
Conduction Heat Transfer. Prerequisite: ENGSC 3233. Advanced heat transfer analysis and design, with primary emphasis on conduction.

5873*
Advanced Indoor Environmental System. Prerequisite: 4703. Heating, cooling, and ventilating systems. System and component design, building thermal simulation and energy calculation procedures.

5923*
Guidance and Control of Aerospace Vehicles. Prerequisite: 4053 or ECEN 4413 or equivalent. Navigation, gudance and attitude control of aircraft, launch vehicles and spacecraft. Inertial navigation mechanizations and error analysis. Stability augmentation systems.

5933*
Aeroelasticity. Prerequisites: 4063, 4283, 4523. Interaction between aerodynamic, inertial and elastic forces. Influence coefficients of modern wings. Calculations of the normal modes and frequencies of flexible airplane and missile structures. Deformation s of structures under dynamic loads by rigorous and approximate methods of analysis.

5943*
Jet and Rocket Propulsion. Prerequisite: 4243. Thermodynamic and aerodynamic principles applied to turbojet, turbofan, ramjet and rocket engines for aircraft and missile propulsion. Component matching for turbojets; design of ramjet inlets; solid and liquid rocket fuels; rocket components and controls; rocket energy requirements for orbital and interplanetary flight.

6000*
Research and Thesis. 1-15 credits, maximum 30. Prerequisites: consent of the head or the graduate committee of the School and approval by the student's advisory committee. Independent research under the direct supervision of a member of the graduate faculty. For students pursuing study beyond the level of the M.S. degree.

6010*
Advanced Study. 1-12 credits. Prerequisite: approval of the student's advisory committee. Study and investigation under the supervision of a member of the faculty along lines of interest well advanced of and supported by the 5000-series courses.

6063*
Stochastic Processes in Physical Systems. Prerequisite: 4063. Application of probability theory to the analysis of physical systems. Introductory probability theory and random processes.

6233*
Turbulent Fluid Dynamics. Prerequisite: 5233. Isotropic turbulence, turbulent wakes and jets, bound turbulent shear flows, transition, hydrodynamic stability and integral calculation methods for turbulent boundary layers.

6263*
Computational Fluid Dynamics. Prerequisite: 5233. Steamfunction-vorticity and pressure-velocity simulations of incompressible and compressible flows. Temperature and concentration solutions. Applications to various external and internal flow problems.

6333*
Advanced Topics in Materials Processing. Lab 3. Prerequisite: 5333. Modeling of non-linear problems in solidification heat transfer, thermo-mechanical deformation and material removal plasticity and fracture. The simulations by computer methods including finite difference and finite element techniques. Experimental verification and processing parametric studies conducted in the materials processing lab. Tours of industry to provide additional processing background.

6423*
Motion Programming of Space Mechanisms. Prerequisite: MATH 3013. Advanced techniques for the analysis of two- and three-dimensional mechanisms.

6453*
Fluidics. Prerequisites: 5453 and 5463. Static and dynamic modeling of fluidic components for sensing, signal processing and transmission and control. Component interconnection and impedance matching problems. Synthesis of proportional, digital and A-C fluid systems for a wide variety of applications.

6463*
Fluid Power Control II. Prerequisite: 5453. Computer-aided analysis and design of fluid control systems; effect of system parameters on dynamic performance and stability. Distributed parameter analysis of signal and power transmission lines. Case studies of feedback control systems used in transportation, aircraft and missiles, machine tools and power plants.

6483*
Automatic Control II. Prerequisite: 5473 or ECEN 5413. Methods of formulation and solution of engineering system control problems based on optimal dynamic behavior, advanced techniques for model identification, computational solution of dynamic optimization problems. Applications include mechanical, electrical, fluid and thermal systems.

6543*
Advanced Aerospace Structures. Prerequisites: 4523 and 5533. Modern methods for the design and stress analysis of complex flight structures. Analysis of thin-walled plate and shell structures by exact and approximate analytical methods.

6563*
Advanced Solid Mechanics. General nonlinear problems of elasticity including thermal, dynamic and anisotropy effects; stresswave propagation; consideration of plasticity.

6723*
Nonlinear Systems Analysis II. Prerequisite: 5723 or ECEN 5723. Advanced topics of nonlinear systems theory selected from the current literature. Topics may include nonlinear stability theory, multi-input describing functions, nonlinear feedback control theory, the problem of Lure and Popov's criterion and multiparameter perturbation theory.

6813*
Advanced Thermodynamics II. Prerequisite: 5803. Development of statistical models to predict the behavior of ideal solids and gases. Fundamental treatment of probability, combinatorial analysis, statistical mechanics and quantum theory. Comparisons to show the superiority of statistical thermodynamics for predicting low-temperature behavior.

6843*
Convection Heat Transfer. Prerequisite: 5233 or equivalent. Advanced convective heat transfer in laminar and turbulent flows over external surfaces and inside channels. Heat transfer at high velocities, free convection boundary layers, and mass transfer.

6963*
Dynamics of Space Flights. Prerequisite: MATH 2613. Power requirements and dynamics for flight in space. Development of the laws of Kepler for orbiting bodies, transfer trajectories between orbits; launch, ascent and re-entry problems.

MECHANICAL DESIGN TECHNOLOGY (MECDT)

1223
Computer-aided Drafting and Design. Lab 4. Prerequisite: GENT 1153 or equivalent. Computer-aided drafting and design for creation of mechanical and electronic drawings. BASIC language, programming, spreadsheets, and data base use.

1843
Descriptive Geometry. Lab 6. The graphical analysis of points, lines and planes in space with practical applications to engineering working drawings.

2053
Pipe Drafting. Lab 6. Prerequisite: GENT 1153 or equivalent. Design and layout of piping systems.

2113
Technical Illustration. Lab 6. Prerequisite: 2213 or consent of instructor. Pictorial drawing with applications to industrial production work.

2213
Machine Drafting. Lab 6. Prerequisites: 1223, GENT 1153 or equivalent. Detail and assembly drawings of machines and products using drafting machines and computer-aided drafting techniques.

2743
Electronics and Electrical Drafting. Lab 6. Prerequisite: MATH 1513 or equivalent. Conventional preparation of graphical illustrations in the design and construction of electronic equipment.

3003
Dynamics. Prerequisites: GENT 2323 and MATH 2373. Plane motion of particles and rigid bodies. Force-acceleration, work-energy, and impulse-momentum principles. Graphical analysis, mechanisms, and vibrations.

3102
(L)Materials Testing. Lab 6. Prerequisite: 3323. Standard test techniques for the determination of the mechanical properties of various materials. Testing of structural components and structures.

3123
Product Design. Lab 5. Prerequisites: 1843 and GENT 1222. Industrial design functions and techniques, the creative process in product design innovations and improvements, human factors (man/machine interface) and techniques in graphic and model presentations of design concepts.

3152
Structural Fabrication Design. Lab 3. Prerequisites: GENT 1153 and PHYSC 1114. The application of standards for detailing and fabrication of structural materials.

3323
Strength of Materials. Prerequisites: GENT 2323 and MATH 2373. Stress and strain and their relation to loads. Axial, torsional and bending loads, beam deflection, columns and combined stresses. Applications emphasized.

3563
Production Planning. Lab 3. Prerequisites: GENT 1103, 1153, and 1222. Basic forecasting, planning and control of industrial production.

3883
Tool Design. Lab 3. Prerequisites: 2213, GENT 1222. Basic design and development of special tools for processing engineering materials.

4003
Machine Design I. Prerequisites: 3323, COMSC 2113, and MATH 2383: Applications of statics and strength to the design of machine components. Problems of choosing materials, impact and fatigue loading.

4013
Computer-Aided Design. Lab 2. Prerequisites: 2213, COMSC 2113, GENT 2323. Advanced computer-aided drafting and design for 2d and 3d geometric construction, dimensioning, design, and analysis. Application of CAD in mechanical, electronic and manufacturing problems.

4050
Advanced Mechanical Design Problems. 1-4 credits, maximum 4. Prerequisite: junior standing and consent of instructor. Special problems in mechanical design.

4123
Senior Design Projects. Lab 6. Prerequisites: 3123, 4003 and ENGL 3323. Selected problems in design integrating principles of drafting, analysis, materials and manufacturing. Design projects are typically supplied by industry.

4203
Machine Design II. Lab 6. Prerequisites: 3323, COMSC 2113, and MATH 2383. A continuation of 4003 emphasizing the design of machine components such as gears, bearings, fasteners, springs, and weldments.

4213
Kinematics and Mechanisms. Lab 6. Prerequisites: 3003, COMSC 2113, GENT 1153. Analysis and design of mechanisms such as the 4-bar linkage, slidercrank, cam and gear. Graphical techniques are emphasized.

MECHANICAL POWER TECHNOLOGY (MPT)

1103
(L)Introduction to Prime Movers. Lab 2. Prime movers as used in the industrial world. Basic principles of design, construction, and operation of internal combustion engines, turbines, electric and hydraulic motors. Laboratory practices in inspection, measurement, and comparisons of characteristics.

2113
Power Transmission Systems. Lab 2. Prerequisite: GENT 1502. Power trains and transmission of power from internal combustion engines by mechanical, hydraulic and electrical means. Manual and automatic transmission, fluid couplings, torque converters, industrial transmissions, electrical systems. Special problems assigned.

2133
Diesel Engines and Injection Systems. Lab 2. Prerequisite: 1105. Compression ignition engines and fuel injection systems. Laboratory practice in inspection, adjustment, timing and testing of fuel injection systems. Diesel and spark ignition compared.

2313
Fundamentals of Hydraulic Fluid Power. Lab 3. Prerequisite: MATH 1513. Basic fluid power concepts. Standard hydraulic symbols, component design and application, fluid power system considerations, design and operation.

3114
Basic Instrumentation. Lab 4. Prerequisite: MATH 2373. Data analysis. Theory, operational characteristics and application of transducers for measurement of strain, force, velocity, acceleration, displacement, time, frequency, temperature, pressure, fluid flow, vibrations and constituent analysis.

3123
Thermodynamics and Heat Transfer for Electronics. Lab 3. Prerequisites: MATH 2383 and junior standing. Principles of thermodynamics and heat transfer important to the design, construction and operation of electronic systems. Basic heat transfer by conduction, convection, and radiation. Heat removal from electronic systems by heat-sinking, free air-convection, forced-air convection and combinations. Identification of specific over-heating problems in electronics systems and the design of appropriate heat removal techniques.

3202
Transportation Problems. Prerequisite: 2133. An economic study of the transportation industry; selecting and operating commercial vehicles. Federal and state regulations of commercial transportation. Highway financing.

3313
Applied Fluid Mechanics. Prerequisites: 2313, MATH 2373, and PHYSC 1214. Fluid mechanical principles applied to fluid power systems and general fluid systems. Fluid system analysis using Bernoulli and general energy equations, laminar and turbulent flows, flow and pressure measurement, flow forces, lift and drag.

3322
Fuels and Lubricants. Lab 3. Prerequisite: 1105. Chemical structure; recognized tests and practical applications of petroleum-based fuels and lubricants. Combustion problems in spark-ignition and compression-ignition engines and auxiliary industrial equipment.

3433
Basic Thermodynamics. Prerequisite: concurrent enrollment in MATH 2373. Basic scientific principles of energy and the behavior of substances as related to engines and systems. Gas laws, vapors and engine cycles.

3553
Gas Turbine Powerplant. Lab 3. Prerequisite: 3433. Major engine sections including accessories and systems. Student participation in engine disassembly, inspection, assembly, operation and testing.

4050
Advanced Technology Problems. 1-4 credits, maximum 6. Prerequisites: junior standing and consent of department head. Special technical problems in a mechanical power area.

4313*
Electrohydraulic Control Systems. Lab 2. Prerequisites: 4213, EET 3101. Principles of electronics and fluid power. Trends in modern fluid power systems. Solenoid systems, pulse-width modulation, proportional control, servosystems, and programmable controllers. Lab involves design, fabrication, and operation of practical systems.

4433
Heat Transfer. Prerequisites: 3433 and MATH 2383 or equivalent. Conduction, convection, radiation, condensation and boiling heat transfer. Analysis and sizing of heat exchangers. Methods of enhancing exchange of heat.

4443
Power Station Technology and Design. Prerequisite: 3433. Steam, hydro and internal combustion power plants; technical design, energy balance and economic evaluation.

4453
Advanced Internal Combustion Engines. Prerequisites: 3114 and 3433. Advanced internal combustion engine theory; real cycles, mixtures, combustion, balancing and associated engine systems.

4463
Thermodynamics Laboratory. Lab 6. Prerequisite: 3433. Application of thermodynamic principles to vapor power cycles and gas power cycles.

4473
Senior Design Project. Lab 6. Prerequisite: senior standing. Selected problems in design, combining principles of drafting; analysis, materials and fabrication methods. Design projects typically supplied by industry.

MECHANIZED AGRICULTURE (MECAG)

1413
Introduction to Engineering in Agriculture. Prerequisite: MATH 1513 or concurrent enrollment. Application of the physical and engineering sciences to agricultural problems. Energy; energy conversion; thermal, electrical, mechanical and fluid systems; equipment calibration; environmental control of agriculture buildings and irrigation system requirements.

2202
Conservation Surveys and Technology. Lab 2. Use of the farm level; mechanical methods of erosion control including terracing and farm-pond planning.

3152*
Electricity in Agriculture. Lab 2. Prerequisite: MATH 1513. Electricity applied to the farm and rural home including farmstead distribution and use and National Electric Code requirements. Laboratory activities include simple circuits, practical wiring, home wiring planning, electric motors and controls.

3173*
Buildings for Agriculture. Lab 2. Prerequisite: MATH 1213. Planning and selection of buildings and equipment for agriculture, including functional, environmental and structural requirements. Laboratory activities include materials selection, materials testing, wind and solar effects and farmstead planning.

3213
Metal and Woodworking Skills. Lab 3. Machine nomenclature and maintenance, workshop planning, operations including welding, metal working, wood working and framing, and concrete.

3223
Metals and Welding. Lab 3. Prerequisite: 1413. Essential knowledge and theory necessary for understanding the principles of hot and cold metals and welding. Laboratory provides opportunity to apply and develop associated skills.

3233*
Tractor Power Principles. Lab 2. Prerequisite: MATH 1513. The principles, operation, performance, maintenance and management of agricultural tractors. Two-stroke and four-stroke cycle gasoline and diesel engines. Laboratory activities involve engines, power trains, hydraulic systems, electrical systems and tractor performance.

3313
Introduction to Soil and Water Conservation Engineering. Lab 3. Prerequisite: MATH 1513. Topographic and construction surveying. Planning, analysis and layout of soil and water conservation facilities including waterways, terraces, ponds, drainage systems, erosion control facilities and water wells.

3342*
Field Machinery. Prerequisites: MATH 1513, PHYSC 1214. Machine elements and machine performance as related to crop production. Selection of farm machinery for crop production systems.

4123*
Principles of Food Engineering. Prerequisite: MATH 1513. For non-engineers. Application of the engineering approach to solving heat and mass transfer problems in food processing. An introduction to the basic concepts of the conservation laws, fluid flow, heat transfer, refrigeration, freezing, psychrometrics, and energy conservation.

4200*
Topics in Mechanized Agriculture. 1-4 credits, maximum 4. Investigations in specialized areas of mechanized agriculture.

4203*
Irrigation Principles. Prerequisite: MATH 1513. Sources, measurement and efficient use of irrigation water. Selection of pumping plants and power units. Layout and management of surface and sprinkler systems.

4220*
Advanced Methods in Agricultural Mechanics. 1-6 credits, maximum 6. Prerequisite: 4222. Developing agricultural mechanics programs for vocational agriculture and technical schools. Application of agricultural mechanics methods, practices and skills to advanced projects.

4222*
Farm Mechanics: Organization and Methods. Lab 2. Prerequisite: 3223. Required of agricultural education majors. Organizing the farm mechanics program and methods used in teaching farm mechanics. Shop skills and project work.

4303*
Equipment Management and Systems Planning. Prerequisites: 3173 and 3233. Identification of variables in agricultural production systems. Determination of optimum size and combination of equipment. Layout and selection of equipment for efficient production.

MEDICAL TECHNOLOGY (MTCL)

4117
Clinical Microbiology. Lab 12. Prerequisites: concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory study of pathogenic bacteria, viruses, rickettsiae, fungi, and parasites. Includes isolation, identification, antimicrobial susceptibility testing, and medical significance.

4125
Clinical Chemistry I. Lab 9. Prerequisites: concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory methodology of analytical biochemistry, clinical microscopy, routine and special procedures, and medical significance.

4236
Clinical Hematology. Lab 12. Prerequisites: concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. Systematized study of diseases, cell maturation and function, principles of hemostasis; methodology used in routine and special hematology studies; and correlation of hematological findings with physiological conditions.

4246
Clinical Immunology. Lab 12. Prerequisites: concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. Immunologic responses and procedures used in serological determinations; immunohematology, fundamentals of antigen-antibody reactions, blood groups and types, compatibility testing, blood components, and the lab methods used as they relate to the medical significance of immunology and infectious diseases.

4325
Clinical Chemistry II. Lab 9. Prerequisites: concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory methodology of analytical biochemistry, instrumentation, lab mathematics, routine and special procedures and medical significance.

4351
Topics in Medical Technology. Prerequisites: concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. Principles and practices of the medical laboratory including basic management, quality assurance, education methodology, computer applications, laboratory safety, and special projects in selected areas.

MICROBIOLOGY (MICRO)

2124
(L)Introduction to Microbiology. Lab 4. Prerequisites: one year of chemistry; and BISC 1304, and 1403 or 1603. General principles of microbiology.

3124*
Microbial Ecology. Lab 4. Prerequisites: 2124 and one semester of organic chemistry. Roles of microbes in biogeochemical cycles and energy transfers.

3133*
Genetics of Microorganisms. Prerequisites: 2124 and one semester of organic chemistry. Molecular and genetic approaches to the study of microorganisms.

3134*
Pathogenic Microbiology. Lab 3. Prerequisite: 2124. Examination of pathogenic bacteria as they relate to humans; other animals, plants and insects. Same course as PLP 3134.

3143
Medical Mycology. Lab 4. Prerequisite: 2124. Examination of fungi as animal pathogens; laboratory techniques used in the identification of human and animal pathogens, and differentiation from common contaminants.

3153
Medical Parasitology. Lab 2. Prerequisite: introductory biology. Human and parasitological problems including endemic, exotic and zoonotic organisms. Life cycles, diagnosis and control procedures. Principles applicable to all areas of zoology, medicine, veterinary medicine and medical technology.

3154*
Food Microbiology. Lab 4. Prerequisites: 2124 and organic chemistry. Relationship of microorganisms to food manufacture and preservation, to food spoilage and microbial food poisoning and to various aspects of primary food production.

3254*
Immunology. Lab 3. Prerequisite: 2124. Vertebrate host's ability to defend itself against foreign intrusion. Chemistry and biology of the acquired immune response.

3264*
Industrial Microbiology. Lab 4. Prerequisite: 3124. Production of solvents, vitamins, amino acids, antibiotics, flavored products, etc. Biodegradation of industrial wastes, pesticides, and herbicides. Microbial aspects of energy production, including petroleum microbiology.

4000
Honors in Microbiology. 1-4 credits, maximum 10. Prerequisite: permission of departmental honors committee. Supervised study and research in microbiology.

4113*
Microbiology of Soil. Lab 6. Prerequisite: 2124. Microorganisms of the soil and their relationship to soil fertility.

4124*
Virology. Lab 4. Prerequisites: BISC 3014 or one course in biochemistry and one upper division MICRO course. Theory and practice of virus host interactions including structure-function of animal, plant, and bacterial viruses. Same course as PLP 4124.

4133*
Current Topics in Microbiology. Lab 2. Prerequisite: permission of instructor. Subject matter may vary from year to year as new knowledge and techniques develop. Inquire as to current subject offering.

4144*
Laboratory Techniques. Lab 6. Prerequisites: 3124, one semester of organic chemistry. Theory and current techniques employed in diagnostic and research laboratories.

4990*
Special Problems. 1-4 credits, maximum 4. Prerequisite: consent of instructor. Minor investigations in the field of microbiology.

5000*
Thesis or Report. 2-6 credits, maximum 6. Prerequisite: permission of major professor. A student studying for the M.S. degree enrolls in this course for 6 hours credit for the thesis option or 2 hours credit for the report option.

5103*
Bioenergetics and Metabolic Pathways. The energetics of metabolic pathways and their regulatory mechanisms.

5114*
Advanced Immunology and Immunochemistry. Lab 6. Prerequisite: 3254 and BIOCH 3653; or consent of instructor. Laboratory activities, in immunochemistry. Topics may include: preparation of antigens, conjugation of haptens to carriers, production of antibodies, characterization of antibodies, antibody structure and function, antibody fragmentation, antigen/antibody reactions, radioimmunoassay, antibody labelling, ummunocytochemistry, and chemical modulation of the immune response.

5124*
Advanced Immunology: Immunobiology. Lab 6. Prerequisites: 3255 and BIOCH 3653, or consent of instructor. Advanced studies, with an emphasis on laboratory activities, in immunobiology. Topics include: organs of the immune system, cells of the immune system, lymphocyte activation, phagocytosis, lymphokine production and function, hypersensitivity reactions, major histocompatibility complex and its modulation of immune responsiveness, transplantation immunology, tumor immunology, immunopathology, autoimmunity, and immunopharmacology.

5130*
Current Topics in Immunology. 1 credit, maximum 6. Prerequisites: 3255 and consent of instructor. Discussion or current immunologic literature, with emphasis on critical analysis of research papers.

5153*
Advanced Microbial Genetics. Prerequisites: 3124, 3134 or 4113, BISC 3024 and BISC 3014 or BIOCH 3653. Heredity in yeasts, molds, bacteria and viruses with emphasis on recent developments. Biochemical and molecular genetics, nucleic acids as genetic determinants and genetic control of metabolic function.

5160*
Seminar. 1 credit, maximum 2. Required of all graduate students majoring in microbiology.

5243*
Fungal Metabolism. Prerequisites: one course in biochemistry, consent of instructor. Water relations, transport, overflow metabolism and other aspects of catabolism and biosynthesis in the fungi in relation to fungal problems of growth and differentiation, which are unlike those normally encountered in other organisms. Same as PLP 5243.

5990*
Special Problems. 1-4 credits, maximum 10. Prerequisite: permission of instructor. Investigations in the field of microbiology.

6000*
Thesis. 1-15 credits, maximum 45. Prerequisite: permission of major adviser. Research in microbiology for the Ph.D. degree.

6113*
Advanced Virology. Lab 6. Prerequisite: 4123. Advanced techniques in the study of viruses.

6120*
Recent Advances in Microbiology. 1-3 credits, maximum 6. Prerequisite: one graduate course in biochemistry. Discussion and evaluation of recent scientific contributions in terms of the living organism.

6143*
Microbial Physiology. Lab 3. Prerequisite: one graduate course in biochemistry. The chemistry and integrated functioning of microbial structures and macromolecules.

6253*
Microbial Evolution. Prerequisites: 2124, BIOCH 3653, BISC 3024. The mechanisms and results of microbial evolution in nature and in the laboratory, with emphasis on microbes as model evolutionary systems, molecular evolution, classification and phylogeny, and discussion of protobiology and the probable fate of engineered microbes.

MILITARY SCIENCE (MILSC)

1000
Land Navigation and Orienteering. 1 credit, maximum 1. Lab 1. Land navigation through interpretation of maps, use of compass and terrain association. Introduction to the olympic sport of orienteering through practical exercise and classroom training.

1111
Survey of Military Science. History and organization of the Army and Reserve Forces and their role in the National Defense policy. Legal, moral, and ethical responsibilities of the military officer. Reserve Officers Training Program and methods of commissioning. Exposure to military skills such as rappelling and first aid.

1211
Leadership. Leadership theories, leader and follower roles, principles and traits of leadership, communications, problem solving, motivation, and self development. Taught through group discussion and practical exercises in leadership skills.

2000
Rappelling and Survival. 1 credit, maximum 1. Lab 1. Rappelling and survival techniques for outdoor living in a military environment. Outdoor practical exercises are required.

2131
Military-political Issues. Role of the United States in the world as seen from a military/political perspective with emphasis on national security policy, US global military commitments, and current areas of international conflict.

2230
Leadership and Military Skills I. 2-3 credits, maximum 3. Lab 2. Leadership and individual military skill development. Theory and tactics for military operations; individual skill training in rappelling, communications, physical fitness, and leadership. Taught through a combination of classroom instruction and outdoor practical application exercises. Some laboratories will be on selected weekends by arrangement.

2310
Leadership and Military Skills II. 1-3 credits, maximum 3. Lab 2. Prerequisite: 2230. Leadership, management and military skill development. Theory and tactics for military operations; individual skill training in management and problem solving, land navigation, first aid, rappelling and partolling. Taught through a combination of classroom instruction and outdoor practical application exercises. Some laboratories will be on selected weekends by arrangement.

2330
Fundamentals of Military Operations. 1-3 credits, maximum 3. Lab 2. Prerequisite: 1111 or advanced placement by department head. Course geared for leadership and individual military skill development. Taken in lieu of 2230 and 2310 with department head approval. Theory and tactics for military operations taught through classroom lecture and outdoor practical application exercises. Some laboratories will be on selected weekends by arrangement.

3112
The Platoon Leader I. Lab 2. Prerequisites: completion of lower-division ROTC program or basic ROTC summer camp or equivalent, qualification by physical and aptitude standards set by Department of the Army and approval of PMS. The functional role of the platoon leader with practical work in leadership and decision making, introduction to small-unit tactics in platoon offensive operations. Some laboratories will be on Saturdays by arrangement.

3223
The Platoon Leader II. Lab 2. Prerequisites: completion of lower-division ROTC program or basic ROTC summer camp or equivalent, qualification by physical and aptitude standards set by Department of the Army and approval of PMS. Platoon defensive operations, patrolling, communications, land navigation and map reading, branches of the Army and the officer personnel management system. Some laboratories will be on Saturdays by arrangement.

4014
Advanced Summer Camp. Lab. Prerequisites: 3112 and 3223. Military training and performance as leaders for six weeks.

4123
Contemporary Command Issues and Management. Lab 2. Prerequisites: 3112 and 3223. Staff organization and procedures, preparing and conducting military training, effective speaking and presentation. Discussion of other contemporary issues critical to integration of newly commissioned officers.

4222
Military Ethics and Professionalism. Lab 2. Prerequisites: 3112 and 3223. Special obligations and responsibilities of the military profession. In-depth study of military justice as it relates to the new officer. Discussion of military ethics with case studies.

MUSIC (MUSIC)

0501
Concert and Recital Attendance. Graduation requirement for music degree or certificate candidates.

1001
Percussion Techniques. Lab 2. Methods for playing and teaching percussion instruments.

1011
Piano Class Lessons. For students with no previous experience.

1021
Piano Class Lessons.

1031
Voice Class Lessons.

1041
Voice Class Lessons.

1051
Organ Class Lessons.

1071
Single Reed Techniques. Lab 2. Methods for playing and teaching the clarinet and saxophone.

1081
Double Reed Techniques. Lab 2. Methods for playing and teaching the oboe and bassoon.

1091
High Brass Techniques. Lab 2. Methods for playing and teaching the trumpet and French horn.

1110
Elective Organ. 1-4 credits, maximum 8.

1120
Elective Piano. 1-4 credits, maximum 8.

1130
Elective Voice. 1-4 credits, maximum 8.

1140
Elective Brass. 1-4 credits, maximum 8.

1150
Elective Strings. 1-4 credits, maximum 8.

1160
Elective Woodwinds. 1-4 credits, maximum 8.

1170
Elective Percussion. 1-4 credits, maximum 8.

1180
Secondary Organ. 1-2 credits, maximum 8.

1190
Secondary Piano. 1-2 credits, maximum 8.

1200
Secondary Voice. 1-2 credits, maximum 8.

1210
Secondary Brass. 1-4 credits, maximum 8.

1220
Secondary String. 1-2 credits, maximum 8.

1230
Secondary Woodwind. 1-2 credits, maximum 8.

1240
Secondary Percussion. 1-2 credits, maximum 8.

1250
Major Organ. 1-4 credits, maximum 8.

1260
Major Piano. 1-4 credits, maximum 8.

1270
Major Voice. 1-4 credits, maximum 8.

1280
Major Violin. 1-4 credits, maximum 8.

1290
Major Viola. 1-4 credits, maximum 8.

1300
Major Cello. 1-4 credits, maximum 8

1310
Major Double Bass. 1-4 credits, maximum 8.

1320
Major Guitar. 1-4 credits, maximum 8.

1330
Major Harp. 1-4 credits, maximum 8.

1340
Major Flute. 1-4 credits, maximum 8.

1350
Major Oboe. 1-4 credits, maximum 8.

1360
Major Clarinet. 1-4 credits, maximum 8.

1370
Major Saxophone. 1-4 credits, maximum 8.

1380
Major Bassoon. 1-4 credits, maximum 8.

1390
Major Trumpet. 1-4 credits, maximum 8.

1400
Major French Horn. 1-4 credits, maximum 8.

1410
Major Trombone. 1-4 credits, maximum 8.

1420
Major Euphonium. 1-4 credits, maximum 8.

1430
Major Tuba. 1-4 credits, maximum 8.

1440
Major Percussion. 1-4 credits, maximum 8.

1513
Music Literature. Music of the Baroque, Classical, Romantic, and Contemporary periods, with emphasis on style analysis.

1531
Sightsinging and Eartraining I. Prerequisites: 2672 or successful completion of Music Theory Placement Examination. Development of skills in sightsinging and aural perception. Taken concurrently with MUSIC 1533.

1533
Theory of Music I. Prerequisite: Successful completion of Music Theory Placement Examination. Choral and instrumental writing and analysis correlated with keyboard skills. Taken concurrently with MUSIC 1531.

1541
Sightsinging and Eartraining II. Prerequisites: 1533 and 1531. A continuation of 1531. Taken concurrently with 1543.

1543
Theory of Music II. Prerequisites: 1533 and 1531. A continuation of 1533, taken concurrently with 1541.

1592
Introduction to Reading and Writing Music. Scales, keys, intervals and triads with introductory sight singing, dictation and keyboard skills. No credit for students with prior credit in 2672.

1621
Introduction to Music Business. A survey of music business procedures, opportunities, and trends.

2011
Piano Class Lessons. Prerequisites: 1021 and music major status. Class lessons for music majors (non-keyboard concentration) preparing for the piano proficiency examination.

2021
Piano Class Lessons. Prerequisites: 2011 and music major status. Successful completion of the course fulfills piano proficiency examination requirement for music majors (non-keyboard concentration).

2041
Vocal Techniques. Prerequisite: 1031. Assists non-vocal majors in understanding the physical and psychological processes required for correct singing tone production.

2051
High String Techniques. Lab 2. Methods for playing and teaching the violin and viola.

2061
Low Strings Techniques. Lab 2. Methods for playing and teaching the cello and double bass.

2071
Flute Techniques. Lab 2. Methods for playing and teaching the flute.

2091
Low Brass Techniques. Lab 2. Methods for playing and teaching the trombone, euphonium, and tuba.

2250
Major Organ. 1-6 credits, maximum 12. Prerequisite: 1250.

2260
Major Piano. 1-6 credits, maximum 12. Prerequisite: 1260.

2270
Major Voice. 1-6 credits, maximum 12. Prerequisite: 1270.

2280
Major Violin. 1-6 credits, maximum 12. Prerequisite: 1280.

2290
Major Viola. 1-6 credits, maximum 12. Prerequisite: 1290.

2300
Major Cello. 1-6 credits, maximum 12. Prerequisite: 1300.

2310
Major Double Bass. 1-6 credits, maximum 12. Prerequisite: 1310.

2320
Major Guitar. 1-6 credits, maximum 12. Prerequisite: 1320.

2330
Major Harp. 1-6 credits, maximum 12. Prerequisite: 1330.

2340
Major Flute. 1-6 credits, maximum 12. Prerequisite: 1340.

2350
Major Oboe. 1-6 credits, maximum 12. Prerequisite: 1350.

2360
Major Clarinet. 1-6 credits, maximum 12. Prerequisite: 1360.

2370
Major Saxophone. 1-6 credits, maximum 12. Prerequisite: 1370.

2380
Major Bassoon. 1-6 credits, maximum 12. Prerequisite: 1380.

2390
Major Trumpet. 1-6 credits, maximum 12. Prerequisite: 1390.

2400
Major French Horn. 1-4 credits, maximum 8. Prerequisite: 1400.

2410
Major Trombone. 1-6 credits, maximum 12. Prerequisite: 1410.

2420
Major Euphonium. 1-4 credits, maximum 8. Prerequisite: 1420.

2430
Major Tuba. 1-6 credits, maximum 12. Prerequisite: 1430.

2440
Major Percussion. 1-6 credits, maximum 12. Prerequisite: 1440.

2551
Sightsinging and Eartraining III. Prerequisites: 1541 and 1543. Further development of skills in sightsinging and aural perception. Taken concurrently with 2553.

2553
Theory of Music III. Lab 1/2. Prerequisites: 1541 and 1543. Choral and instrumental writing correlated with sight singing, melodic and harmonic dictation and keyboard skills. Taken concurrently with 2551.

2561
Sightsinging and Eartraining IV. Prerequisites: 2551 and 2553. A continuation of 2551. Taken concurrently with 2563.

2563
Theory of Music IV. Lab 1/2. Prerequisites: 2551 and 2553. A continuation of 2553. Taken concurrently with 2561.

2573
(H,I,SpD)Introduction to Music. Instruments, musical forms and styles, and major composers from the 16th Century to the present. For non-majors; no prior musical experience required.

2580
Music in Life: Selected Topics. 2-6 credits, maximum 6. Acquaints general University students with the forms and composers of 20th Century art music, jazz, and music in the United States in three separate sections.

2600
Chamber Ensembles. 1 credit, maximum 8. Lab 2. Combination of voices, keyboard, and orchestral instruments for performing chamber music, music theater and duo piano repertoire.

2610
University Bands I. 1-2 credits, maximum 6. Lab 3-5.

2620
Symphony Orchestra I. 1-2 credits, maximum 6.

2630
University Choral Ensembles I. 1-4 credits, maximum 6.

2672
Fundamentals of Music. Accepted for certificate/license in elementary education. Fundamentals of music, sight, singing, and piano keyboard. No credit for students with prior credit in 1592.

2682
Music Education. Prerequisite: 2672. For certificate/licensure in elementary education. Methods of teaching music in grades K-6.

2713
Music and the Arts. Dominant themes of human self-expression as discovered through study of music and its integration with art and culture from the late Middle Ages to the early 20th Century with emphasis on the humanistic ideas they embody.

3110
Elective Organ. 1-4 credits, maximum 8. Prerequisite: 1110.

3120
Elective Piano. 1-4 credits, maximum 8. Prerequisite: 1120.

3130
Elective Voice. 1-4 credits, maximum 8. Prerequisite: 1130.

3140
Elective Brass. 1-4 credits, maximum 8. Prerequisite: 1140.

3150
Elective String. 1-4 credits, maximum 8. Prerequisite: 1150.

3160
Elective Woodwind. 1-4 credits, maximum 8. Prerequisite: 1160.

3170
Elective Percussion. 1-4 credits, maximum 8. Prerequisite: 1170.

3180
Secondary Organ. 1-2 credits, maximum 8. Prerequisite: 1180.

3190
Secondary Piano. 1-2 credits, maximum 8. Prerequisite: 1190.

3200
Secondary Voice. 1-2 credits, maximum 8. Prerequisite: 1200.

3210
Secondary Brass. 1-2 credits, maximum 8. Prerequisite: 1210.

3220
Secondary String. 1-2 credits, maximum 8. Prerequisite: 1220.

3230
Secondary Woodwind. 1-2 credits, maximum 8. Prerequisite: 1230.

3240
Secondary Percussion. 1-2 credits, maximum 8. Prerequisite: 1240.

3250
Major Organ. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2250.

3260
Major Piano. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2260.

3270
Major Voice. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2270.

3280
Major Violin. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2280.

3290
Major Viola. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2290.

3300
Major Cello. 1-4 credits, maximum 8. Prerequisites: upper-division examination. 2300.

3310
Major Double Bass. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2310.

3320
Major Guitar. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2320.

3330
Major Harp. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2330.

3340
Major Flute. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2340.

3350
Major Oboe. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2350.

3360
Major Clarinet. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2360.

3370
Major Saxophone. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2370.

3380
Major Bassoon. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2380.

3390
Major Trumpet. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2390.

3400
Major French Horn. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2400.

3410
Major Trombone. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2410.

3420
Major Euphonium. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2420.

3430
Major Tuba. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2430.

3440
Major Percussion. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2440.

3501
Pre-clinical and Laboratory Experiences in Music. Prerequisites: declared intent to pursue Teacher Education program. Observation and micro-teaching in music.

3610
University Bands II. Lab 3-5. 1-2 credits, maximum 6. Prerequisite: 4 hours of 2610.

3620
Symphony Orchestra II. Lab 4. 1-2 credits, maximum 6.

3630
University Choral Ensembles II. 1-4 credits, maximum 6. Prerequisite: 4 hours of 2630.

3712
Basic Conducting. Principles of conducting choral and instrumental groups.

3722
Evaluation Techniques for the Ensemble Conductor. Prerequisite: 3712. Studies in diagnostic, and achievement evaluation techniques appropriate for the school musicians in ensemble situations.

3731
Introduction to Elementary Music Education. Orientation to methods (including Orff, Kodaly, Dalcroze, and Manhattanville Music Curriculum Project) appropriate for teaching music in the elementary school.

3743
Foundations of Music Education. Interdisciplinary approach including aspects of philosophy, aesthetics, sociology and psychology as they are applied in music in post-elementary public schools.

3753
(H,I)History of Music To 1750. Prerequisites: 1513 and 1533, or equivalent. Aids music majors and other qualified students in understanding the musical styles, forms, schools, composers and instruments that developed in Western civilization from antiquity through the Baroque period.

3763
(H,I)History of Music From 1750. Prerequisite: 1513, 1533 or equivalent. Aids music majors and other qualified students in understanding the musical styles, forms, schools, composers and instruments that developed in Western civilization from the pre-classical period to the 20th Century.

3772
Counterpoint. Prerequisites: 2563 and satisfactory upper-division examination. Analysis and application of contrapuntal techniques of the 18th century.

3782
Form and Analysis. Prerequisites: 2563 and satisfactory upper-division examination. Simple song forms, development forms, formal and harmonic analysis.

3832
Elementary Music Methods K-6. Prerequisite: 3731. Current elementary music trends, techniques, and materials. For those who will be involved with teaching elementary music grades K-6.

3842
Marching Band Methods. Prerequisite: 3731. Organizational responsibilities and charting for public school marching bands.

3901
Junior Recital. Prerequisites: junior standing and consent of major applied music teacher.

4021
Piano Class Lessons. Prerequisite: senior music major status.

4032
Voice Class Lessons. Prerequisite: senior music major status.

4100
Music Industry Internship. 1-6 credits, maximum 8. Lab 8. Prerequisites: 90 credit hours and minimum 2.50 GPA in all music and business courses. Directed practical experiences in an approved retail store or in a work situation related to the music industry.

4250
Major Organ. 1-6 credits, maximum 12. Prerequisite: 3250.

4260
Major Piano. 1-6 credits, maximum 12. Prerequisite: 3260.

4270
Major Voice. 1-6 credits, maximum 12. Prerequisite: 3270.

4280
Major Violin. 1-6 credits, maximum 12. Prerequisite: 3280.

4290
Major Viola. 1-6 credits, maximum 12. Prerequisite: 3290.

4300
Major Cello. 1-6 credits, maximum 12. Prerequisite: 3300.

4310
Major Double Bass. 1-6 credits, maximum 12. Prerequisite: 3310.

4320
Major Guitar. 1-6 credits, maximum 12. Prerequisite: 3320.

4330
Major Harp. 1-6 credits, maximum 12. Prerequisite: 3330.

4340
Major Flute. 1-6 credits, maximum 12. Prerequisite: 3340.

4350
Major Oboe. 1-6 credits, maximum 12. Preresuisite: 3350.

4360
Major Clarinet. 1-6, maximum 12. Prerequisite: 3360.

4370
Major Saxophone. 1-6 credits, maximum 12. Prerequisite: 3370.

4380
Major Bassoon. 1-6 credits, maximum 12. Prerequisite: 3380.

4390
Major Trumpet. 1-6 credits, maximum 12. Prerequisite: 3390.

4400
Major French Horn. 1-6 credits, maximum 12. Prerequisite: 3400.

4410
Major Trombone. 1-6 credits, maximum 12. Prerequisite: 3410.

4420
Major Euphonium. 1-4 credits, maximum 8. Prerequisite: 3420.

4430
Major Tuba. 1-6 credits, maximum 12. Prerequisite: 3430.

4440
Major Percussion. 1-6 credits, maximum 12. Prerequisite: 3440.

4480*
Lessons in Applied Music (Minor Field). 1-4 credits, maximum 4. Prerequisite: completion of basic applied minor field(s) in bachelor's degree, or equivalent performance level. Minor applied music field(s).

4490*
Lessons in Applied Music (Major Field). 1-4 credits, maximum 4. Prerequisite: bachelor's degree or equivalent performing level in applied major field. Major applied music field.

4600*
Chamber Ensembles. 1 credit, maximum 8. Lab 2. Prerequisite: 2600 (4 hrs.) or equivalent. Combinations of voices, keyboard, and orchestral instruments for performing chamber music, music theater and duo piano repertoire.

4753*
Advanced Music History and Literature. Prerequisite: two semesters of music history. Advanced music history and literature. Historical and stylistic analyses of musical forms and composers' techniques. Open to graduate students and advanced undergraduate students.

4810*
Problems in Musical Composition. 1-2 credits, maximum 2. Prerequisites: 1543 and consent of instructor. Practical experiences in musical composition.

4840*
Special Studies in Music Literature. 1-2 credits, maximum 4. Prerequisite: junior standing or consent of instructor. Survey of music literature suitable for teaching various levels in applied music.

4890*
Special Studies in Music Pedagogy. 1-2 credits, maximum 4. Prerequisite: junior standing or consent of instructor. Survey of music pedagogical methods suitable for various levels and types of applied music.

4901
Senior Recital. Prerequisites: senior standing and permission of major applied music teacher.

4912
Orchestration and Arranging. Prerequisite: upper-division standing as a music major or consent of instructor. Orchestrating for instrumental ensembles and arranging for choral ensembles.

4940
Student Teaching in Public School Music. Prerequisite: 3501. Directed observation, seminars, and supervised student teaching in selected elementary and secondary music programs.

4952*
Music in the School Curriculum. Aims, content and motivation of the music education program in elementary and secondary schools from the standpoint of the classroom teacher, music specialist and administrator.

4962*
Music Education Seminar. Research into latest developments of public school choral and instrumental music.

4972
Twentieth Century Music Theory and Literature. Prerequisites: 2563, 3762. Melodic, harmonic and rhythmic techniques in 20th Century music.

4990*
Selected Studies in Music and Music Education. 1-3 credits, maximum 8. Short-term area studies in music and music education.

NATURAL SCIENCE (NATSC)

5050
Report. 1-2 credits, maximum 2. Prerequisite: enrollment in program leading to M.S. in natural science. Guidance in reading and research required for M.S. in natural science degree.

OCCUPATIONAL AND ADULT EDUCATION (OAED)

3012*
Analysis and Assessment of Training Needs. Prerequisite: 3113 or TECED 3103 or TIED 3203. Techniques and procedures used in determining needs for, and content of, instructional programs. Emphasizes needs-assessment techniques and methods for identifying and analyzing the knowledge, skills and competencies require d for satisfactory job performance. Procedures for translating such information into instructional programs. No credit for students with credit in TIED 4344.

3113*
Foundations of Occupational Education. Characteristics of occupational education and its development, role and function in a modern educational system. Economic and sociological foundations of occupationally oriented programs plus specific information on serving students with multicultural backgrounds and specific needs. Same course as MKTED 3113.

3143*
Career Education: An Introduction. Introduce current and prospective teachers to the fundamental concepts and operational practices of career education. Historical development, needs assessment, goals, implementation strategies, evaluation, developmental concepts, curriculum planning and articulation.

3901
Seminar in Teacher Education. Procedures for gaining admission to Teacher Education and student teaching. Requirements for certification and graduation and course planning to meet those requirements. Career opportunities and procedures for securing employment. Same course as MKTED 3901.

4010*
Occupational and Adult Education Workshop. 1-3 credits, maximum 6. Professional workshops of various topics and lengths. Each workshop focused on a particular topic from such areas as the development, use and evaluation of instructional methods and materials.

4103*
Methods of Teaching Occupational and Adult Education. Lab 2. Prerequisite: 3113. Applications of teaching and learning principles. Instructional planning and delivery strategies available to the instructor, including shop and laboratory instruction, individualized and competency-based instruction and the use of instructional technology. Laboratory component involves course participants in micro-teaching and other actual situations. Same course as MKTED 4103. No credit for students with credit in TIED 4103.

4223*
Program Planning and Development in Occupational and Adult Education. Prerequisites: 3113 and 4103. Planning and designing programs for the development of human resources. Program goals and objectives, curriculum, facilities, teaching-learning theories, materials development, program resources and program and instructional evaluation.

4333*
(I)International Occupational Education. Comparison and analysis of international occupational education.

4470
Teaching Practicum in Occupational Education. 1-12 credits, maximum 12. Prerequisites: admission to Teacher Education, MKTED 3253, 4103, and/or concurrent enrollment in MKTED 3453. Organized teaching experiences under the guidance and direction of a local school cooperating teacher and university teacher educator. Participant assigned to a cooperating teacher with responsibility for planning, implementing and evaluating the classroom, laboratory or shop. Same course as MKTED 4470.

5000*
Master's Thesis or Report. 2-6 credits, maximum 6. Students studying for a master's degree and writing a report enroll in this course for two credit hours. Enrollment is for six credit hours if a thesis is written.

5010*
Seminar. 1-3 credits, maximum 6. Graduate student seminars focusing on current and critical issues and common problems relevant to occupational and adult education.

5113*
Principles of Occupational and Adult Education. Underlying principles and evolving concepts in occupational and adult education. Critical analysis of educational programs and service areas and the resulting implications for leadership personnel at all levels of program responsibility.

5123*
Program Evaluation in Occupational and Adult Education. Prerequisite: background in a vocational area. The purpose of evaluation in occupational and adult education programs with specific attention given to the evaluation of program development in laboratory and shop instruction.

5153*
Curriculum Planning in Occupational and Adult Education. Principles and procedures for curriculum planning, development and management in occupational and adult education with analyses of current trends and practices and their implications for program quality.

5203*
Foundations of Adult and Continuing Education. Societal trends, issues and institutions which have influenced the development and current status of adult and continuing education. Analyses and critiques of contemporary adult and continuing education activities, materials and clientele groups served and their implications for new and existing programs in the field.

5213*
Characteristics of Adult Learners. Learning patterns, interests and participation patterns among adults in a variety of educational settings. Theories of learning and behavior modification for adults, with implications for adult and continuing education programs. Particular attention given to learners in occupational, adult basic, community junior college, extension and proprietary program settings.

5223*
Organization and Administration of Adult Education. Prerequisites: 5203 and 5213. Organizational procedures and administrative practices for effective planning, implementation and management of adult and continuing education programs. Analyses of legislation, finances and community groups that influence and impact upon adult and continuing education programs.

5233*
Needs Analysis. Techniques of conducting organizational analyses of human performance problems, including surveys, interviews, records analysis, group interaction, and task analysis.

5333*
Administration and Supervision of Local Occupational Education Programs. The duties of administrative and supervisory personnel responsible for the development, coordination and promotion of occupational education programs.

5340*
Special Problems. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed independent study of special topics involving assigned readings, library research, field work or a combination of these.

5443*
Interpreting Research in Occupational and Adult Education. Prerequisite: elementary statistics. Seminar on the methods of research, review, synthesis and interpretation with application to particular fields of occupational and adult education.

5480*
Modern Technology in Occupational Education. 1-6 credits, maximum 6. Technical developments in specialized occupational areas examined and analyzed for educational curriculum and program implications.

5533*
Human Resource Development. Prerequisite: admission to the master's degree program. Introduction to training and development, including history and nature of the field, trainer roles, needs analysis, program development, evaluation, and techniques of conducting training.

5553*
Occupational Education for Students with Special Needs. Techniques and procedures by which occupational education may serve individuals with special needs. Field experiences an integral part of the course.

5720*
Workshop. 1-3 credits, maximum 10. Professional workshops of various topics and lengths. Each workshop designed to meet unique or special needs of individuals concerned with occupational and adult education.

5880*
Internship. 3-6 credits, maximum 6. Prerequisite: consent of instructor. Supervised experience working in business, industry, human service, or education settings.

5912*
Organization and Administration of Adult Basic Education Programs. Prerequisites: 5203 and 5213. Organizing and administering adult basic education for occupational programs.

6000*
Doctoral Thesis. 2-10 credits, maximum 15. Required of all candidates for the Doctor of Education degree in occupational and adult education.

6103*
Philosophy of Occupational and Adult Education. Prerequisites: graduate course in philosophy or philosophy of education. Alternative perspectives for developing a philosophic position in occupational and adult education.

6213*
Aging, Learning and Work. Prerequisite: graduate standing. An analysis of the nature of adult learning and work performance and their relationships to the aging process.

6333*
Strategic Planning and Policy Development. Prerequisites: 5123, 5223 or 5333, master's degree. Theoretical and practical aspects of the concepts and implementation processes. Articulation among various public and private sector organizations involved with human resource development.

6533*
Critical Issues in Human Resource Development. 3 credits. Prerequisites: 5222 or 5533. Issues of concern to training directors and other human resource development (HRD) practitioners are researched, including managing HRD, consulting, organization, development, productivity, and managing change.

6870*
Doctoral Seminar. 1-2 credits, maximum 2. Seminar required for students admitted to the OAED doctoral program. Professional ethics, responsibilities, research expectations, and departmental procedures.

6880*
Internship in Occupational and Adult Education. 1-8 credits, maximum 8. Prerequisite: consent of instructor. Directed field experiences related to the participant's area of concentration. Provides opportunities for an individual to put into practice and test ideas, theories and concepts learned in graduate study.

OFFICE MANAGEMENT (OFFMG)

3753
Executive Secretarial Transcription. Lab 2. Prerequisites: 2334 or equivalent and BUSPR 3523 (or concurrent enrollment). Transcription of executive-level dictation with exacting standards covering English usage, vocabulary, proofreading and accuracy and speed of transcription.

3863
Office Procedures. Prerequisite: BUSPR 2630. Theory of and applied practice in performing secretarial and managerial operations. Human relations in business as well as decision making and problem solving.

PETROLEUM TECHNOLOGY (PET)

1113
Introduction to Petroleum Industry. Lab 2. Prerequisite: MATH 1113 or one unit of high school algebra. Exploration, drilling, production, transportation and marketing.

1234
Petroleum Fluid Properties. Lab 2. Prerequisites: MATH 1513 or 1715; CHEM 1215 or 1314. Chemical and physical properties of petroleum, petroleum products, natural gas, coal and drilling fluids. Introduction to reservoir engineering.

2234
Petroleum Industry Pipeline Transportation and Storage. Lab 2. Prerequisite: 1234; COMSC 2113 (pre or corequisite. Sizing, construction, operation and maintenance of petroleum and gas pipeline transportation and storage systems. Liquid, gas and two-phase systems. Pumps and compressors. Corrosion control.

2333
Basic Petroleum Production. Lab 2. Prerequisites: 1234; GENT 2323 (pre or corequisite). Original completion of oil and gas wells. Design, sizing and selection of production equipment. Performance and interpretation of basic testing connected with oil and gas production. Solutions to routine production problems.

3114
Petroleum Drilling Practices. Lab 2. Prerequisites: 2234, GENT 2323 and 2333 (pre or co-requisite). Basic well planning. Casing setting depths. Casing design and costs. Drill string design. Bit selection. Mud and mud circulation system requirements. Drilling and cementing practices. Well control. Specification and selection of rig components and power requirements. Drilling cost estimates.

3223
Oil Property Evaluation. Prerequisites: 2333, 3114. Forecasting revenues and expenses associated with petroleum properties. Discounted and nondiscounted measures of investment worth. Decline curve analysis. Oil field deals. Windfall profit and federal income tax considerations. AFE project economics, sensitivity analysis, computer applications. Concludes with a comprehensive lease evaluation project.

3234
Petroleum and Natural Gas Processing Fundamentals. Lab 2. Prerequisites: 2234; MATH 2373; COMSC 2113; MPT 3433 (pre or corequisite). Material balances, energy balances, PVT relations, and phase behavior relations applied to petroleum and natural gas processing.

3454
Petroleum and Natural Gas Unit Operations. Lab 2. Prerequisites: 3234; MATH 2383. Petroleum and natural gas operations are studied qualitatively and quantitatively. Distillation, absorption, dehydration, sweetening, refinery processes, instrumentation and controls.

4050
Advanced Technology Problems. 1-4 hours credit, maximum 6. Prerequisites: junior standing and consent of head of department. Special technical problems in a petroleum area.

4122
Advanced Petroleum Problems. Lab 3. Prerequisites: 4224; senior standing. Individually selected topics in advanced petroleum drilling, production (primary, secondary or tertiary), recovery, transportation and storage.

4224
Petroleum Reservoir Engineering. Lab 3. Prerequisites: 3234; MATH 2383; or consent of instructor. Reservoir mechanics, reservoir fluids, flow through porous media. Petroleum and gas reservoir measurements, analyses, evaluations and predictions.

4323
Enhanced Oil Recovery. Prerequisite: 4224. Secondary and tertiary recovery methods. Miscible and immisicible displacement of oil and gas reserves. Reserve calculations. Fractional flow, frontal advance and displacement theory. Production and injection well behavior. Production techniques. Emphasis on practical applications and case analysis. Computer applications included.

4334
Advanced Petroleum Production. Lab 3. Prerequisites: 2333, 4224, and MECDT 3323. Remedial and workover operations on producing oil and gas wells. Analysis and design of artificial lift techniques. Well testing and problem well evaluation.

PHILOSOPHY (PHILO)

1013
(H,SpD)Philosophical Classics. Basic works by great thinkers, including Plato, Descartes and Hume.

1213
(H)Philosophies of Life. Introductory ethics and social philosophy. Moral decision-making, the good life, social values, freedom and responsibility.

1313
(A)Critical Thinking. Informal and formal reasoning; explanation, definition and fallacies. Emphasis on the critique, evaluation and development of arguments in everyday discourse. Practical applications.

2113
(H)Introduction to Philosophy. Selected philosophical problems: the nature of reality, knowledge, value, social ideals and religion.

3113*
(H,I)Ancient and Medieval Philosophy. Main systems of Western thought from the Greeks to 15th Century Europe. Emphasis on Plato, Aristotle, Augustine and Aquinas.

3213*
(H,I)Modern Philosophy. Major philosophers and problems in Western thought from the 16th through the 19th Century. Emphasis on Descartes, Hume and Kant.

3300
(H)Philosophy and the Quality of Life. 1-3 credits, maximum 6. Series of self-paced, one-credit modules dealing with the arguments and values in controversial issues affecting the quality of life of persons and societies.

3413
(H)Ethics. Contemporary and classical views on the nature of moral judgements, moral value, relativity and objectivity, freedom and responsibility.

3513*
(H,I)Social Philosophy. Major social thinkers and contemporary issues. Social authority, human rights, political forms and justice. Emphasis on Aristotle, Locke, Mill and Marx.

3533
(H,I)Philosophical Study of Marxism. Prerequisites: 12 semester credit hours in HIST, POLSC, and/or PHILO. The work of Marx and Engels and of selected later writers such as Kautsky, Lenin, and Gramsci.

3613
(H)Philosophy of Religion. Nature of religion, religious experience and religious language. God-concepts, theistic arguments, God and evil, God and immortality.

3713
(H)Philosophy of Education. Traditional and contemporary American educational theories. Educational conservatism, humanism in education, moral education, vocationalism and radical reform movements.

3803
(H)Moral Issues in Business. Ethical issues in business, such as employer-employee duties and loyalties, advertising uses, preferential treatment practices. Analytic grounding in basic theories of ethics.

3813*
(H)Recent American Philosophy. Dominant trends in American philosophy during the last 100 years, with emphasis on pragmatism.

3823
(H)Engineering Ethics. Philosophical analysis of moral issues in engineering practice, such as whistleblowing, conflicts of interest and product liability. Professional codes of ethics.

3833*
(H)Ethical Issues in Biology and Medicine. Moral problems brought about by recent developments in scientific research and medical technology. Abortion, euthanasia, genetic engineering, and human experimentation. Same course as REL 3833.

3913*
(H)Existentialism. Selected writings and themes in the development of existentialism and related intellectual movements. Subjectivity, phenomenological description, hermeneutics, freedom and value; and such writers as Kierkegaard, Nietzsche, Heidegger, Sartre, Marcel and Buber.

3923
(H)Contemporary Issues in Philosophy. Selected current controversies and recent trends in philosophy.

3943*
(H,I)Oriental Philosophy. Three main streams of Asian thought: Indian, Chinese and Buddhist. How various thinkers in the three traditions have dealt with questions of being and becoming, knowledge, ethics and society.

4013*
(H)Perspectives on Death and Dying. Issues that arise as individuals confront the fact of mortality. Dying patients, the ethical issues of euthanasia and suicide, the process of grief, death in literature and the arts, and philosophical and religious views on immortality. Same course as REL 4013.

4113*
(H)Philosophy of Art and Literature. Nature of aesthetic objects and experiences; form, meaning and value in the arts; the function of art in society; criteria of criticism of the arts.

4303*
(A) Principles of Symbolic Logic. Prerequisite: 1313 or consent of instructor. Symbolic analysis and calculus of propositions. Applications in various fields.

4313*
(H)Philosophy of Mind. Problems in philosophical psychology. Mind and body, freedom and determinism, personal identity and survival, self-knowledge, analysis of mental concepts.

4453*
(H)Philosophy in Literature. Selected literary works examined for philosophical ideas and themes. Attention to the interrelation of form and content. Thematic approach.

4613*
(H)Scientific Method. Fundamentals of scientific explanation, including nature of evidence, definitions, classification, probability and models.

4713*
(H)Philosophy of Science. Philosophical issues related to science and its role in society. Topics include science and common sense, laws and theories, causality, nature of scientific progress.

4990*
Special Studies in Philosophy. 1-3 credits, maximum 10. Selected philosophical topics or works.

5000*
Thesis in Philosophy. 1-6 credits, maximum 6. Supervised individual work on a thesis for a master's degree.

5210*
Seminar on a Major Philosopher. 3 credits, maximum 9. Prerequisite: three courses in philosophy. The writings of a major philosopher and related material.

5310*
Seminar on a Field of Philosophy. 3 credits, maximum 9. Prerequisite: three courses in philosophy. Selected topics in one field of philosophy.

5513*
History of Educational Philosophy. Outstanding western educational theories. Emphasis on Plato, Aristotle, Quintilian, Comenius, Locke, Rousseau and Dewey.

5610*
Philosophical Issues in Education. 2-3 credits, maximum 3. Contemporary issues in educational theory and practice. The relation of education to political thought, religion, public law and culture.

5713*
Contemporary Philosophies of Education. Analysis of contemporary educational philosophies, with attention to recommended aims, curricula and methods.

5910*
Research Problems in Philosophy. 1-3 credits, maximum 10. Prerequisite: consent of instructor and department head. Individual or group research on specific philosophical problems.

PHYSICAL EDUCATION (PE)

1753
Introduction to Physical Education. The nature, scope and significance of physical education. Historical and philosophical foundations, major sub-disciplines and their interrelationships, and career opportunities.

1812
Movement Activities I. Theory and practice of selected sport and movement activities such as soccer, golf, volleyball, and aquatics; analysis and practice of respective critical skills in each area; basic rules and strategies.

1822
Movement Activities II. Theory and practice of selected sport and movement activities such as basketball, stunts and tumbling, softball, and archery; analysis and practice of critical skills in each area; basic rules and strategies.

1832
Movement Activities III. Theory and practice of selected sport and movement activities such as track and field; gymnastics apparatus; weight training, and social dance; analysis and practice of critical skills in each area; basic rules and strategies.

1842
Movement Activities IV. Theory and practice of selected sport and movement activities such as badminton, racquetball, folk and square dance, tennis, and rhythmical aerobics; analysis and practice of critical skills in each area; basic rules and strategies.

2052
Sports Officiating. Lab 1. Current rules and techniques. Students who perform satisfactorily receive official ratings.

2712
Creative Movement for Pre-school and Primary Age Children. Lab 2. Prerequisite: 1753 or concurrent enrollment. Utilization of movement activities to enhance motor, intellectual, and social development of pre-school and primary age children.

3663
Kinesiology and Biomechanics. Prerequisites: 1812, 1822, 1832, or 1842; HLTH 2653. A systematic approach to analysis of human movement through anatomical, mechanical, and kinesiological concepts. Quantitative and qualitative analysis related to kinematic and kinetic principles.

3753
Methods in Teaching Elementary Physical Education. Prerequisites: 1753, 2712. Theory and practical experience of physical education in the elementary school. Teaching styles and activities needed to meet the needs of children from kindergarten through grade five.

3763
Physical Education for Elementary Age Children. Lab 2. For non-physical education majors. Physical education and its place in the educational system. Programming for children from nursery/preschool through grade six. Methods of teaching children activities and ways to enhance conceptual development of movement principles and motor functioning.

3773
Methods in Teaching Secondary Physical Education. Lab 2. Prerequisites: 1812, 1822, 1832, 1842, 3663, and 3753; or consent of department head. Instructional styles, implementation of behavioral goals and objectives through unit and lesson preparation, teaching methods, and classroom management.

3822
Coaching Wrestling. Prerequisite: junior standing. Methods and techniques of coaching wrestling.

3832
Coaching Track and Field. Prerequisite: junior standing. Methods and techniques of coaching track and field.

3842
Coaching Baseball. Prerequisite: junior standing. Coaching baseball with emphasis on skill development, organization and development of offenses and defensive play, safety mechanics, budgeting, pre- and post-season training, organization and administration of competition.

4623*
Motor Development of Children. Prerequisite: 3753 or 3763. Task analysis of motor patterns, assessment tools, and teaching techniques that can be applied to the motor development of children.

4723
Tests and Measurement in Health and Physical Education. Evaluation techniques commonly used by physical educators and health professionals to measure knowledge, attitudes, sport skill proficiency, and physical fitness.

4733
Administration of Physical Education. Prerequisite: 3773 or concurrent enrollment. Design, implementation and management of physical education programs, K-12.

4753
Movement Activities for the Developmentally Disabled. Nature of mental retardation and perceptual-motor handicaps; characteristics of children with learning disabilities and with mental retardation; selection of appropriate gross motor activities for the TMR, EMR, and CDL; methods of teaching.

4793*
Adapted Physical Education. Lab 2. Prerequisites: 3663, 3753; or consent of department head. Characteristics of various handicapping conditions; adapting the physical education program to meet the needs of atypical students.

4813
Organization and Administration of Interscholastic Athletics. Organization and management of competitive athletics, including public relations, staff functions, contracts, legal considerations, facilities and equipment.

4842
Coaching Football. Prerequisite: junior standing. Methods and techniques of coaching football.

4852
Coaching Basketball. Prerequisite: junior standing. Methods and techniques of coaching basketball.

4862
Coaching Gymnastics. Lab 2. Prerequisite: junior standing. Methods and techniques of coaching gymnastics.

4972
Methods and Techniques of Teaching Adapted Aquatics. Prerequisite: LEIS 2512. Mechanical principles, skill analysis, evaluation techniques, lesson and unit planning, and practical experience in teaching swimming to persons with mental and/or physical impairments.

PHYSICS (PHYSC)

1014
(N)Descriptive Physics. A survey course presenting the basic concepts and principles of physics with a minimum of mathematics. Motion, waves, temperature, electricity, magnetism, optics, atomic structure, and nuclear energy. No credit for students with credit in 1114.

1114
(N,L)General Physics. Lab 2. Prerequisite: high school algebra and trigonometry, or MATH 1715. Algebra-based introductory course covering the basic concepts of physics. Practical examples of the role of physics in other disciplines. Newtonian mechanics, fluids, heat, thermodynamics, waves, sound. No credit for students with credit in 1014.

1214
(N,L)General Physics. Lab 2. Prerequisite: 1114. Continuation of 1114; electricity, magnetism, optics, quantum physics, atomic and nuclear structure.

2014
(L)General Physics. Lab 2. Prerequisite: MATH 2265 or concurrent enrollment. Calculus-based introductory course for science, math and engineering majors. Mechanics, waves, heat, and thermodynamics.

2114
(L)General Physics. Lab 2. Prerequisite: 2014. Continuation of 2014. Electricity, magnetism and optics.

2413
Electronics. Prerequisite: 2114 or consent of instructor. AC circuits, vacuum tube and transistor amplifiers, oscillators and power supplies. Pulse and digital circuits.

2520
(L)Electronics Laboratory. 1-3 credits, maximum 3. Lab 3. Prerequisite: 2413 or concurrent enrollment. Special projects. Construction and testing of circuits studied in 2413.

3013*
Mechanics I. Prerequisites: 2114 or equivalent, and MATH 2613 or concurrent enrollment. Mechanics of particles, systems of particles and rigid bodies.

3113*
Heat. Prerequisites: 1214 or 2114, and calculus. Thermometry, heat transfer, elementary theory of specific heat and the three laws of thermodynamics.

3213*
Optics. Prerequisite: 1214 or 2114. Geometrical optics; illumination and photometry; interference, diffraction, dispersion, absorption and polarization of light.

3313*
Modern Physics for Engineers. Prerequisite: 2114 or equivalent. Emphasis on nuclear, molecular and solid state physics with engineering applications.

3321*
(L)Laboratory I. Lab 3. Use of lasers, lens systems, spectroscopy, interferometry, interaction of light with matter, thermal physics, and wave propagation.

3513*
Mathematical Physics. Prerequisites: 1214 or 2114, and MATH 2365. Physical applications of vectors, vector calculus and differential equations. Fourier analysis. Orbit geometry, coordinate systems and transformation of coordinates. Matrices and determinants.

3522*
(L)Radioactivity and Nuclear Physics Laboratory. Lab 6. Prerequisite: 4663 or 4213 or concurrent enrollment. Basic measurement techniques in nuclear physics.

3621
(L)Laboratory II. Lab 3. Laboratory experiments on atomic physics, electron interference, gamma ray spectroscopy, the photoelectric effect, and nuclear resonance.

3713
Modern Physics I. Prerequisite: 2114. Atomic physics, special theory of relativity, and introduction to solid state and nuclear physics.

4010*
Special Problems. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Individual laboratory work of an advanced nature.

4113*
Electricity and Magnetism. Prerequisites: 2114 and MATH 2613, or their equivalents. Electrostatic fields, magnetic fields of steady currents, induced EMFs, Maxwell's equations and introduction to electromagnetic wave theory. Vector analysis used.

4163*
Statistical Thermodynamics and Kinetic Theory. Prerequisite: 3113. Fundamental concepts of thermodynamics, first, second and third laws, thermodynamic potentials and statistical physics. Maxwellian velocity distribution; ideal gas law; Van der Waals law; transport phenomena; Boltzmann H-theorem and thermodynamic equilibrium.

4213*
Introduction to Nuclear Physics. Prerequisites: 8 hours of physics and 8 hours of chemistry. For non-physics majors. Fundamentals of nuclear physics with applications to chemistry, engineering and biology.

4253*
Lasers and Modern Optics. Prerequisite: 3213. Electromagnetic wave propagation. Effect of cavities and optical elements. Semi-classical description of the absorption and emission of light by atoms. Theory of lasers—gas, liquid, solid state and semi-conductors. Electro-optics and acousto-optics. Techniques of mode-locking, Q-switching and picosecond pulse generation. Holography, phase conjugation and fourier transform optics. Non-linear optics.

4263*
Introduction to Solid State Physics. Structure, specific heat, dielectric properties, lattice vibrations, free electron theory, band structure and superconductivity of solids.

4313*
Biophysics. Prerequisites: 1214 or 2114; BISC 1403 or 1603; CHEM 3015. Application of physical concepts to biological structures and processes. Interaction of light with biological materials, effects and radiation on living systems, electrical processes of biological systems, thermodynamics, nature of biological materials and the application of physical concepts in biological instrumentation. Same course as BISC 4313.

4413*
Modern Physics II. Prerequisites: 3013 and 3713. Atomic and X-ray spectra; one-dimensional Schroedinger equation; nuclear structure; introduction to statistical mechanics and elementary quantum statistics.

4423*
Mechanics II. Prerequisite: 3013. Coupled oscillators, propagation of waves in discrete and continuous media, mechanics of discrete and continuous media and acoustics.

4513*
Introductory Quantum Mechanics. Prerequisite: 4423 or equivalent. Uncertainty principle, setting up Schroedinger equation (time dependent as well as time independent) and solving it for linear oscillator, hydrogen atom, periodic and other potentials.

4613*
Advanced Electronics. Lab 3. Prerequisites: 2413 and 2520. Transmission lines, servomechanisms, operational amplifiers, solid state switching devices, measurement and control circuits.

4663*
Radioactivity and Nuclear Physics. Prerequisite: 3313. Natural and artificial radioactivity, decay laws; absorption, detection and measurement of radiations; nuclear transformations.

4712*
(L)Laboratory III. Lab 3. Laboratory experiments on electrical measurements and microcomputer applications to analysis and control of measurements. Advanced individual research projects.

4812*
(L)Laboratory IV. Lab 3. Continuation of advanced projects from 4712.

5000*
M.S. Thesis Research. 1-9 credits, maximum 9. Prerequisite: consent of major professor.

5110*
Seminar. 1-3 credits, maximum 6. Prerequisite: graduate standing in physics. Special topics in physics.

5133*
Theory of Spectra. Line spectra, hyperfine structure, Lamb shift, band spectra, NMR spectra and ESR spectra.

5213*
Statistical Mechanics. Prerequisite: 5113. Maxwell-Boltzmann distribution; partition function and its connection with classical thermodynamics; phase space and the Liouville theorem; Planck's radiation law; quantum statistics; ensemble theory; application to real gases, specific heats, paramagnetism, condensation phenomena and Wiedmann-Franz law.

5263*
Nuclear Physics. Prerequisites: 5453 and 5613. Nuclear forces, structure of nuclei and nuclear models.

5313*
Electromagnetic Theory. Prerequisite: 5453. Electric and magnetic fields in free space and in matter. Boundary value problems, Green's functions, stress tensors, multipole expansions, thermodynamics; electromagnetic waves.

5350*
Special Problems. 1-3 credits, maximum 3. Prerequisite: graduate standing in physics. Special problems of experimental or theoretical nature. Largely individual work with written report required.

5353*
Membrane Biophysics and Bioenergetics. Prerequisites: 1214 and BISC 3014 or BIOCH 4113 or CHEM 3354 or PHYSC 3313. Application of biophysical, biochemical and biological techniques to the study of the structure and function of membranes and membrane components, kinetic measurements, spectroscopic techniques and diffractive techniques. Application of these illustrated with current research problems. Same course as ZOOL 5223.

5413*
Classical Mechanics. Prerequisites: 3013 and 3413 or equivalent. Generalized coordinates and advanced dynamics; coupled systems, wave motion; theory of elasticity.

5453*
Methods of Theoretical Physics. Prerequisite: 3513. Introduction to the various methods and techniques used in theoretical physics.

5513*
Selected Topics in Acoustics. Prerequisites: 4423, 5453. Radiation, transmission and absorption of acoustic waves, acoustic impedance; high-intensity effects; ultrasonics.

5613*
Quantum Mechanics I. Prerequisite: 5453. Postulates of quantum mechanics. Operators, commutation relations, eigenfunctions. Schroedinger, Heisenberg and interaction formalisms, angular momentum and central field problems; nondegenerate perturbation theory.

5663*
Solid State Physics I. Prerequisite: 4263. Crystal structure, cohesive energy of ionic crystals and metals, specific heats, free electron theory of metals, band theory, Brillouin zones, insulators and alloys; magnetic properties, optical properties and thermal and electrical conductivity of solids.

5713*
Solid State Physics II. Prerequisite: 5663 or equivalent. Symmetry, dielectric properties, ferroelectrics, magnetic properties, mechanical properties and defects of solids.

5913*
Selected Topics in Astrophysics. Prerequisites: ASTRO 2023 and 3023 desired but not mandatory. Derivation of fundamental equations and application to problems in astronomical spectroscopy, stellar atmospheres, stellar interiors, interstellar matter and radio astronomy.

5960*
Problems in Chemical Physics. 3-6 credits, maximum 6. Prerequisite: consent of instructor. Intermolecular forces, interaction of radiation with matter in bulk form, dielectric properties of matter, polymer physics and quantum theory of biopolymers.

6000*
Doctoral Dissertation Research. 1-15 credits, maximum 60. Prerequisites: admission to candidacy and permission of major professor.

6010*
Advanced Graduate Seminar. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Special topics of an advanced nature in physics.

6113*
Advanced Theory of Solids. Prerequisite: 5663. Many-body techniques, transport processes, band theoretical techniques, superconductivity, dynamics of electrons in a magnetic field, and alloys.

6213*
Group Theory and Crystal Structure. Prerequisite: 5663. Group theory and imperfections in crystals. Dislocation theory and color centers.

6313*
Quantum Mechanics II. Prerequisite: 5613. Scattering theory, many-particle quantum mechanics and application to atomic and molecular systems; degenerate and time-dependent perturbation theory.

6513*
Advanced Topics in Solid State Physics. Prerequisite: 5663 or equivalent. Interaction of radiation and matter, neutron scattering, phase transitions, magnetic resonance and cooperative phenomena.

6613*
Advanced Nuclear and Particle Physics. Prerequisites: 5263, 6313. Nuclear and elementary particle interactions, resonances, and models; relativistic quantum mechanics and quantum field theory.

6713*
Classical Theory of Fields. Prerequisite: 5313. Radiation theory, waveguides, scattering and dispersion relations; relativity.

PHYSIOLOGICAL SCIENCE (PHSI)

3113
(L)Physiology of Exercise. Lab 2. Prerequisite: ZOOL 3204. Physiological effects of exercise.

5000*
Research and Thesis. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Research problems to meet the requirements of the M.S. degree.

5110*
Problems in Physiology. 1-5 credits, maximum 20. Prerequisite: approval of instructor. Investigations in physiology for graduate and advanced undergraduate students. Same course as ZOOL 5110.

5113*
Basic Reproductive Physiology. Prerequisite: ZOOL 3204. Female and male reproductive processes, the influences of environmental factors upon these processes and the application of reproductive physiology to animal production. Same course as ANSI 5113.

5116*
Veterinary Gross and Developmental Anatomy I. Lab 7. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Embryology and anatomy of domestic mammals using the dog as the primary model. Emphasis on the integration of developmental gross, radiographic and applied aspects of veterinarian anatomy as they relate to a topographical appreciation of the living individual. Integrated lecture-dissection laboratory format. An overview of domestic bird and laboratory animal anatomy.

5125*
Veterinary Histology and Cytology. Lab 5. Prerequisite: 1st-year standing in College of Veterinary Medicine. Organization and structure of cells and tissues of domestic animals.

5134*
Veterinary Physiology I. Lab, 4 hours per semester. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Medical physiology of basic control mechanisms, including the autonomic nervous system, blood and cardiovascular system and respiratory and renal physiology of domestic animals.

5213*
Comparative Physiology. Prerequisites: ZOOL 4264; BISC 3014 or BIOCH 3653. Comparison of circulation, digestive, excretory, and sensory systems of vertebrates and invertebrates. Same course as ZOOL 5213.

5221*
Cellular and Comparative Physiology Laboratory. Lab 3. Prerequisite: 5115. Advanced research techniques. Students design and carry out a research project.

5234*
Veterinary Physiology II. Lab 2. Prerequisite: 5134 or consent of instructor. Veterinary medical physiology of the renal, digestive, and neurological systems of domestic animals. Aspects of connective tissue and integumentary physiology. Behavioral traits of animals.

5245*
Veterinary Metabolism and Nutrition. Lab 2. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Functional metabolism in domestic animals. Metabolic disorders using certain diseases as models. Veterinary nutrition and the application of these principles in the prevention and treatment of diseases of animals.

5333*
Veterinary Endocrinology and Reproduction. Two 2-hour labs and one 4-hour lab. Prerequisite: second-year standing in the College of Veterinary Medicine. Functions of the endocrine and reproductive systems of domestic animals.

5353*
Veterinary Pharmacology I. Four 4-hour labs. Prerequisite: 5235. Introduces the principles of absorption, distribution, metabolism and elimination of therapeutic drugs as well as the mode of action, contraindications and toxicities of antimicrobial agents and general anesthetics.

5434*
Veterinary Pharmacology II. Lab, 8 hours per semester. Prerequisite: 5353 or consent of instructor. A continuation of PHSI 5353 that includes the mode of action, toxicities and contraindications of corticosteroids, antacids, antispasmodics, sedatives, tranquilizers, anticonvulsants, analgesics, antiinflammatory drugs, diuretics, cardiotonics, autocoids, bronchodilators, local anesthetics and antihypertensive agents. In-depth focus on the problems associated with the application of pharmacological principles in the clinical setting including consideration of dose, dose form, dosing interval, route of administration, drug interactions and toxic manifestations of chemotherapeutic agents.

5225*
Veterinary Gross and Developmental Anatomy II. Lab 8. Comparative and functional gross anatomy and developmental anatomy of domestic mammals. Emphasis on the integration of developmental gross, radiographic, and applied aspects of veterinary anatomy as they relate to a topographical appreciation of the living individual. Integrated lecture-dissection laboratory format.

5742*
Rumen Physiology. Prerequisite: ANSI 3653. Physiology and development of the ruminant digestive tract. Same course as ANSI 5742.

6000*
Research and Thesis. 1-15 credits, maximum 50. Prerequisite: consent of instructor. Independent research for the doctoral dissertation under the supervision of a graduate faculty member.

6110*
Advanced Physiology of Selected Systems. 2-10 credits, maximum 10. Prerequisites: 5125 or ZOOL 4215. Advanced studies in gastrointestinal, cardiovascular, respiratory, excretory and neuroendocrine physiology. Each part of this sequential course may be taken for two hours credit. Student should ascertain the topics before registering for this course a second time. Same course as ZOOL 6110.

6132*
Theory of Electron Microscopy. Theory of the preparation of specimens for and the operation of the electron microscope. Methods of evaluation of electron micrographs and special electron microscopical techniques.

6200*
Topics in Advanced Pharmacology and Toxicology. 1-5 credits, maximum 15. Prerequisite: consent of instructor. Selected topics in advanced pharmacology and toxicology such as cardiopulmonary, gastrointestinal or neuro-pharmacology; chemotherapeutics; heavy metal, chemical or plant toxicology or biotoxicology. Repeatable; re-enrollment permits study of additional topics.

6220*
Veterinary Surgical Anatomy. 1-3 hours credit, maximum 6. Lab 3-9. Gross anatomy of special areas related to surgical diagnosis and treatment.

6223*
Advanced Physiology of Reproduction. Lab 3. Prerequisite: 5113 or 5253 or equivalent. Selected aspects of the physiology of reproduction of domestic and laboratory animals; consideration of infertility. Emphasis placed on current literature.

6233*
Laboratory in Electron Microscopy. Lab 12. Prerequisite: consent of instructor. Student learns to prepare specimens for and to operate the electron microscope, and techniques for printing and preparation of electron micrographs for publication.

6273*
Comparative Neurophysiology. Lab 2. Prerequisite: 5263. Physiology of mammalian nervous systems.

6330*
Veterinary Neuroanatomy. 1-3 hours credit, maximum 6. Lab 3-9. Gross and microscopic anatomy of the central and peripheral parts of the nervous system of domestic animals, including the special sense organs.

6415*
Endocrinology. Lab 6. Prerequisite: ZOOL 4215. Structure, function and interrelationships of the endocrine glands.

6440*
Applied Veterinary Agronomics. 1-3 credits, maximum 6. Lab 2-6. Applications of soil-plant-animal interrelationships to the practice of veterinary medicine.

6550*
Veterinary Anatomical Problems. 1-3 hours credit, maximum 12. Lab 3-9. Prerequisite: consent of instructor. Problems in gross, developmental or histologic anatomy.

6564*
Veterinary Toxicology. Lab 2. Prerequisite: third-year standing in the College of Veterinary Medicine or consent of instructor. Veterinary toxicological problems and therapeutics. Identification of selected poisonous plants and discussions of their toxicity.

6570*
Seminar. 1-6 credits, maximum 6. Consideration of literature and research problems pertaining to physiology and pharmacology.

6701*
Veterinary Physiological Science Topics. Lab 1. Prerequisites: 4th-year standing in College of Veterinary Medicine. Elective topics in physiological sciences related to veterinary medicine. Course can fulfill one of elective options of fourth-year veterinary medical students.

6720*
Comparative Regional Anatomy. 1-3 hours credit, maximum 12. Lab 3-9. Comparative study of limited parts or regions of the bodies of animals.

6810*
Veterinary Special Anatomy. 1-3 hours credit, maximum 9. Lab 3-9. Detailed study of the anatomy of a selected animal species.

PLANT PATHOLOGY (PLP)

3134*
Pathogenic Microbiology. Lab 3. Prerequisite: MICRO 2124. Pathogenic bacteria as they relate to humans, other animals, plant and insects. Same course as MICRO 3134.

3344
(N,L)Plant Pathology. Lab 4. Prerequisite: BISC 1403. Concepts of disease development, spread and control of fungal, bacterial, viral, nematode, and environmental diseases.

4013*
Plant Disease Control. Lab 3. Prerequisite: 3344 or concurrent enrollment. Disease-control theory and practices. Control practices and economics are considered in relation to principles and research results in the areas of quarantines, eradication, cultural practices, biological control, physical factors and chemicals.

4124*
Virology. Lab 4. Prerequisites: BISC 3014 or one course in biochemistry; and one upper-division MICRO course. Theory and practice of virus host interactions including structure-function of animal, plant and bacterial viruses. Same as MICRO 4124.

4400
Undergraduate Research. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Undergraduate research problems in plant pathology.

4913*
Pesticides in the Environment. Prerequisites: BISC 1403, CHEM 1225. A discussion of pesticides (fungicides, insecticides, herbicides and nematocides), including potential movement, degradation, fate and significance in the environment. Same course as AGRON 4913 and ENTO 4913.

5000*
Research. 1-6 credits, maximum 6. Research for the M.S. degree.

5004*
Plant Nematology. Lab 3. Prerequisite: 3344 or concurrent enrollment. General morphology, taxonomy and bionomics of nonparasitic and plant parasitic nematodes. Plant parasitic nematode assay techniques, subfamily identification, symptomology, pathogenicity and control.

5014*
Plant Virology. Lab 4. Prerequisites: 3344 and one course in physiology or biochemistry. Transmission, characterization, differentiation, replication and control of plant viruses. Methods of investigating plant viruses.

5043*
Plant Pathology. Lab 4. Prerequisite: BISC 1403. Principles of plant pathology: disease development, spread and control of fungal, bacterial, viral, nematode and environmental diseases. For advanced, special, and non-plant pathology graduate students.

5104*
Mycology. Lab 6. A systematic study of the fungi. Same as BOT 5104.

5243*
Fungal Metabolism. Prerequisites: one course in biochemistry, consent of instructor. Water relations, transport, overflow metabolism and other aspects of catabolism and biosynthesis in the fungi in relation to fungal problems of growth and differentiation, which are unlike those normally encountered in other organisms. Same as MICRO 5243.

5304*
Phytobacteriology. Lab 4. Prerequisite: 3344. Bacteria as plant pathogens, with examination of the taxonomy, genetics, ecology, physiology, host-parasite interaction and control of phytobacteria.

5413*
Plant Disease Epidemiology. Lab 3. Prerequisites: 3344 or 5043. Introduction to methodology and technical equipment used in epidemiological research and application of epidemiological principles in plant disease control.

5560*
Problems in Plant Pathology. 1-5 credits, maximum 10. Prerequisite: consent of instructor.

5604*
Fungal Plant Pathogens. Lab 4. Prerequisite: 3344. Fungi as plant pathogens: taxonomy, identification, isolation techniques, disease expression, ecology, control, historical, and economic impact.

5724*
Physiology of Host-Pathogen Interactions. Lab 4. Prerequisites: 3344 and BIOCH 3653. Physiology of the interactions between plants and pathogens. Mechanisms by which pathogens infect and by which plants resist infection.

5850*
Plant Pathology Seminar. 1 credit maximum per semester. 2 credits for M.S. and 4 credits for Ph.D. required.

5860*
Colloquium. 2 credits, maximum 2. Prerequisite: 3344. Concepts and principles of plant pathology through discussions of pertinent literature.

6000*
Research. 1-12 credits, maximum 36. Research for the Ph.D. degree.

6102*
Genetics of Plant Disease. Lab 4. Prerequisites: 3344 or equivalent and a course in general genetics. Genetics of host plants, plant pathogens and the interaction between the two. Flor's gene-for-gene hypothesis and its implications in breeding for disease resistance.

6202*
Genetics of Fungi. Lab 4. Prerequisites: 5104 or BOT 5104 or equivalent and a general course in genetics. Mating systems, parasexuality, mutagenesis, and gene mapping of fungi. Involvement of these topics in plant pathology.

6303*
Soilborne Diseases of Plants. Lab 3. Prerequisite: 3344. Soilborne diseases, their reception and importance, the pathogens involved, rhizoplane and rhizosphere influences, inoculum potential, specialization of pathogens, suppressive soil effects and disease management. Lecture and discussion sessions will emphasize in-depth understanding of problems and complexities associated with studies of soilborne pathogens.

6403*
Advanced Plant Nematology. Lab 4. Prerequisite: 5004. Techniques for: generic and specific identification, morphometric determination, in vitro observation, biological illustration, photomicrography, and specialized manipulations in taxonomy.

POLITICAL SCIENCE (POLSC)

1010
Studies in American Government. 1-2 credits, maximum 2. Special study in American government to allow transfer students to fulfill general education requirements as established by Regents' policy.

1013
American Government. Organization, processes and functions of the national government of the United States.

2023
(S)Public Law and Private Rights. For any student interested in the American legal system. Constitutional rights, remedies for governmental wrongs, small claims court operations, legal education and topical issues of American public law.

2033
(S)Introduction to Public Administration. Public administration, including administration, administrative organization, decision making, governmental public relations, and administrative responsibilities.

2043
(I,S)Introduction to International Politics. Structure and function of the international system focusing on the interrelationships among states, international bodies and critical issues.

2111
Parliamentary Procedure. Rules of procedure which permit assemblies of all kinds to deliberate rationally on proposals put before them and to arrive at reasonable decisions.

2113
(S)Essentials of Political Science. Political processes and institutions of contemporary societies and introduction to the concepts and methods of political science.

2993
Honors Tutorial in Political Science. Prerequisites: 1013, honors standing, and invitation by head of department. For the special needs of the sophomore-level honors student majoring in political science who wishes to study individualized topics at an accelerated pace in a tutorial format. After mastering basic principles in an area of interest the student will conduct independent research under close faculty supervision and prepare a report or reports.

3003
(I,S)The Soviet Union: History, Society and Culture. A comprehensive view of the Soviet Union, stressing those issues in the political economic, technological, geographical and cultural spheres which are most relevant to the current situation. Accessible to beginning undergraduates. Same course as HIST 3003 and RUSS 3003.

3013*
(I,S)International Relations. Political dynamics and machinery of international relations with emphasis on nationalism, imperialism, self-help, collective security and foreign policy formulation and execution.

3023*
(I)International Communications and Foreign Affairs. Theory and practice of international communications. The role of information media in the foreign policy of domestic, totalitarian and emerging states; the United Nations information service.

3033*
International Law. The nature and scope of public international law, with emphasis on problems related to the recognition of states and governments, jurisdiction over nationals and aliens, and state responsibility in cases of expropriation and revolutionary damage.

3113*
(I)Governments of Germany and Italy. Political processes and governmental institutions of major European states, with emphasis on Germany and Italy.

3123*
(I)Politics and Governments of the U.S.S.R. and Eastern Europe. Political processes and governmental institutions of the Soviet Union and selected Eastern Europe countries.

3153*
(I)Governments of Great Britain and France. Political processes and governmental institutions of major European states, with emphasis on Great Britain and France.

3173*
(I)Politics and Administration in Mexico, Central America and the Caribbean. Governmental institutions, administrative processes and contemporary trends in the politics of Mexico, Central America and the Caribbean.

3183*
(I)Politics and Administration in South America. Governmental institutions, administrative processes and contemporary trends in the politics of selected South American states, with special emphasis given to Argentina, Brazil and Chile.

3213*
(I)Politics and Administration in South Asia. Political processes, governmental institutions and administration in India, Pakistan, Bangladesh, Ceylon and Nepal. Primary attention given to India.

3223*
(I)Politics and Administration in East Asia. Political processes, governmental institutions and administration in China, Japan and Korea.

3253*
(I)Politics and Governments of Africa. Political processes and governmental institutions of selected African countries.

3313*
(I)Governments and Politics in the Middle East. Analysis of political institutions and processes with emphasis on selected countries of the Middle East; the social and economic basis of politics; nationalism, political development and factors of instability and change.

3353*
Parties and Interest Groups. Political parties and interest groups as institutions; their role in elections and government.

3413*
Political Opinion and Propaganda. Political implications of public opinion and the use of surveys and polls in politics. Formation and nature of political attitudes and their impact on public policy. Application of survey research to political analysis. Functions and analyses of political propaganda, stressing propaganda techniques and devices for measurement and identification.

3423
Voting and Elections. Electoral systems and their relationship to political development, political socialization, issue emergence, voting patterns, and electoral cycles.

3453*
(S)The Legislative Process. The process of legislation at both the national and state levels of government in the United States and in other nations. Special attention paid to legislative leadership, organization and the role of the legislature in the political system.

3483*
(S)The American Presidency. The politics of presidential selection, removal and succession; formal and informal powers of the President; relations with Congress, the national judiciary and national executive branch; proposed reforms and the vice-presidency.

3493*
Public Policy. Prerequisite: any one of 1013, 2033, 2113, ECON 1113, 2123, SOC 1113, PHILO 2113. Identification of policy options open to policy makers and examination of measurements and rationales underlying governmental programs.

3613*
State and Local Government. Political processes, government and administration of American states, cities and counties; special emphasis on Oklahoma.

3663*
(H)Political Thought. The teachings of the three lasting traditions of Western political thought: classical, Christian and modern.

3983*
(S)The Judicial Process: Courts, Judges and Politics. The American judiciary and legal process from a political perspective with particular emphasis on judicial organization and powers, recruitment, fact-finding, decision-making impact of decisions, the legal profession and relations among courts. Oklahoma judicial organization.

4003*
(L)Political Analysis. Prerequisite: 60 credit hours, or 45 hours with GPA of 3.25, including 2113. Logic and techniques of modern political analysis, including the logic of political analysis, the collection and analysis of political information, and data processing and computer applications to the study of politics.

4013*
(I)American Foreign Policy. Major problems and policies of American foreign relations since World War II and description of foreign formulation and aid administration.

4053*
(I)World Politics. Foreign policies of major powers, areas of tension and sources of international conflict.

4100*
Problems of Government, Politics and Public Policy. 1-6 credits, maximum 6. Prerequisite: 60 credit hours, or 45 hours with GPA of 3.25, including 1013. Special problem areas of government, politics and public policy concentrating on topics not covered in other Departmental course offerings.

4113*
(I)International Institutions. The organization, procedures, functions and role of international institutions, with emphasis on the United Nations and related agencies.

4213*
Legal Problems of the International Environment. A case survey of diverse areas in which international law finds applicability; problems of territorial jurisdiction, continental shelves, straits, canals and international river systems, maritime law, national and outer space law and the international law of pollution.

4313*
Jurisprudence and Criminal Justice. An introduction to theoretical issues of public law and law enforcement, with emphasis upon criminal justice.

4323*
Criminal Justice Administration and Organization. Organizational design and structure of criminal justice systems. Problems and innovation concepts of administration with respect to design, implementation, planning, information needs and managerial perspectives in control of crime.

4353*
Administrative Law. Legal powers, limits, and procedures of administrative agencies with emphasis on federal and state administrative procedure acts.

4363*
Environmental Law and Administration. Statutory law, case law, and administrative practices relating to regulation of the environment including environmental impact statements, pollution, public lands, and preservation law.

4403*
Urban Politics. Problems of governing American metropolitan areas.

4413*
Government Budgeting. The politics, planning and administration of government budgets.

4453*
Public Personnel Administration. Problems, processes and procedures of public personnel administration.

4473*
Comparative Public Administration. The nature and context of comparative administration. Theories concerning the political, social and cultural settings of administration and the study of specific administrative systems.

4513*
(S)American Politics. Significant developments and issues in American politics, including American political behavior and political leadership.

4553*
(H)American Political Thought. A survey of the major developments in American political thought from the Colonial period to the present, followed by a topical analysis of important recent theoretical developments in political science.

4593*
Natural Resources and Environmental Policy. Current issues in the law, politics and administration of energy, land, water, mineral and other natural resources policy with particular emphasis on relations to environmental policies and law.

4653*
(H)Contemporary Political Thought. An analysis of 19th and 20th Century political ideas examining the major ideologies and theoretical innovations of modern times.

4663
Empirical Political Theory. Empirical theories about political behavior with emphasis on post-behavioral developments including social choice and game theory.

4693*
Women in Politics. Changing role of women in American government and politics. Voting behavior, public opinion, women in government and the women's movement.

4963*
American Constitutional Law: Equal Protection of the Laws. Prerequisites: 2023 or 3983 recommended. Development of principles of constitutional law by the Supreme Court concerning individual and group rights, with particular emphasis on equal protection of the laws concepts in matters of race, gender, wealth, citizenship, legislative reapportionment and voting rights, government employment and affirmative action programs. Legal research techniques.

4973*
American Constitutional Law: The Division of Governmental Powers. Prerequisite: 2023 or 3983 recommended. Development of principles of constitutional law by the Supreme Court concerning federalism and separation of powers with particular emphasis on political and doctrinal developments surrounding judicial review, regulation of commerce, taxing and spending and presidential power. Introduction to legal research methods.

4983*
American Constitutional Law: Due Process of Law. Prerequisites: 2023 or 3983 recommended. Development of principles of constitutional law by the Supreme Court concerning 5th and 14th Amendment due process concepts, with particular emphasis on suspect's rights, search and seizure, free speech and press, religious liberty, property rights and procedural requirements at national and state level. Legal research techniques.

4993
Political Science Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in political science.

5000*
Thesis. 1-6 credits, maximum 6.

5003*
Readings in Politics, Public Policy or Public Administration. Prerequisite: consent of supervising professor. Readings in the student's major area of study. For advanced students.

5010*
Quantitative Methods of Political Analysis. 1-6 credits, maximum 6. Required of all graduate students. Fundamental methodological issues in the scientific study of politics. Logic of science, principles of research design and computer data manipulation and analysis.

5020*
Research in Public Administration, Public Policy and Politics. 1-6 credits, maximum 6. Individually supervised research.

5030*
Internship in Public Administration and Government. 1-6 credits, maximum 6. Individually supervised internships in administrative and governmental career areas. Paper required.

5100*
Advanced Problems in Government, Politics, and Public Policy. 1-6 credits, maximum 6. Public policy process including formulation, implementation and evaluation. Various approaches to public policy analysis including systems, rationalism, incrementalism and bounded rationality, institutionalism, technology assessment and impact analysis.

5113*
Seminar in Public Program Evaluation. Methodology of evaluation research in public programs. Emphasis will be placed on designing and interpreting evaluative studies rather than the mastery of particular mathematical, statistical or computer skills.

5210*
Seminar in International Relations. 3 credits, maximum 6. Research on the dynamics and institutions of international politics.

5310*
Seminar in Public Administration. 3 credits, maximum 6.Administration in the public sector, stressing traditional and emerging organization structures. Emphasis on awareness of administrative processes and environment that include program design and implementation and administrative accountability.

5313*
Intergovernmental Relations. Problems of American federal system necessitating new forms of local-state-federal relationships.

5320*
Seminar in Public Budgeting and Finance. 3 credit hours, maximum 6. Major processes and practices involved in governmental budgeting in the United States at national, state, and local level.

5330*
Seminar in Public Personnel Administration. 3 credits, maximum 6. Current practices, problems, and issues in public sector personnel administration, including merit system, civil service reform, collective bargaining, and equal opportunity and affirmative action.

5410*
Seminar in Comparative Politics and Government. 3 credits, maximum 6. Research in the political processes and governmental institutions of foreign countries.

5510*
Seminar in Political Behavior. 1-3 credits, maximum 6. Examination of contemporary theories of political behavior with emphasis on empirical studies.

5610*
Seminar in Government Regulation. 1-3 credits, maximum 6. Types of governmental rules and regulation, their implementation, their consequences and their utility as appraised by different standards.

PSYCHOLOGY (PSYCH)

1113
(S)Introductory Psychology. Principles, theories, vocabulary and applications of the science of psychology.

1123
Introduction to Research and Quantitative Methods in Psychology. Lab 2. Prerequisite: 1113. Survey of psychological research methods. Introduction to quantitative methods.

2313
(S)Psychology and Human Problems. Prerequisite: 1113. Personality dynamics and their application to personal, cultural and vocational experience.

2593
(S)Psychology of Human Sexuality. Prerequisite: 1113. Survey of behavioral, personality and psychophysiological components of human sexuality, with special emphasis on the delineation of facts from sexual myths.

2663
Computer-Assisted Instruction. Lab 1. Prerequisite: 1113. Computer-assisted instruction (CAI) methods and theory surveyed. Learning process and learning technology reviewed within the CAI context. Laboratory activities include use of the microcomputer as an instructional device.

3013*
Psychology of Motivation. Prerequisite: 1113. Selected review of experimental literature and theory in area of human motivation with special stress on theories of emotion, hostility, curiosity and aesthetics.

3073
(N)Physiological Psychology. Prerequisite: 1113. Neural bases of human experience and behavior including "split-brain" research, physiology of stress and of meditation, and biofeedback and biorhythm research.

3113
(N)Comparative Psychology. Prerequisite: 1113. Comparative study of behavior characteristics of selected samples of the animal kingdom from protozoa to man.

3213
Quantitative Methods in Psychology. Prerequisites: 1113, 1123 or consent of instructor. Design and evaluation of research in psychology including scales of measurement, basic research designs, and quantitative procedures for data analysis, with emphasis on problems encountered in psychological research.

3223*
(S)The Psychology of Work and Industrial Behavior. Prerequisite: 1113. Experimental literature in area of employee motivation. Techniques useful in measurement of employee attitudes and opinions.

3333*
Industrial and Organizational Psychology. Prerequisite: 1113. Behavior in task group and organizational context with emphasis on management, leadership and human relations.

3413*
Psychology of Social Behaviors. Lab 1. Prerequisites: 1113, 3213. Contemporary theoretical and methodological issues in social psychology with special emphasis on the social psychology of the experiment and experimentation with the social aspects of human behavior.

3443
(S)Abnormal Psychology. Prerequisites: 1113, and 60 credit hours or 45 hours with GPA of 3.25. Review of major approaches to conceptualizing abnormal behavior including dynamic, social and learning-based theories. Discussion and illustration of the major forms of mental illness such as neuroses, psychoses and character disorders.

3513*
Psychology of Learning. Prerequisites: 1113, 3213. Behavior change as a function of experience from relatively simple learning processes such as classical and instrumental conditioning to relatively complex processes such as verbal learning and concept identification.

3583
(S)Developmental Psychology. Prerequisites: 1113, and 60 credit hours or 45 hours with GPA of 3.25. The nature of pertinent studies, causes and theories of human developmental phenomena.

3643
Applied Community Psychology. Prerequisite: 1113. Psychological principles for prevention, intervention and rehabilitation in the community model.

3651
Experience in Applied Community Psychology. Lab 3. Prerequisite: 3643 or concurrent enrollment. A field-experience-based application of psychological principles for prevention, intervention and rehabilitation in the community model.

3733*
(H,SpD)Religion: Psychological Interpretations. Recommended: 2313 or REL 1103. A study of the development, theory and research of modern psychological perspectives on the religious experience. Same course as IDS 3733 and REL 3733.

3743
(S)Social Psychology. Prerequisite: 60 credit hours or 45 hours with GPA of 3.25. Human behavior as affected by social stimuli.

3753
Freud's Psychoanalytic Theories. Prerequisite: consent of instructor. A genetic approach to Freud's system of psychoanalysis as a theory of personality and as an historically important method of psychotherapy.

3772
Careers and Professionalism in Psychology. Lab 1. Prerequisite: psychology major/minor. Current career options in psychology are reviewed and career skills developed. Skills and information that a professional psychologist needs in a work setting stressed.

3823
Cognitive Psychology. Prerequisites: 1113, 3213 or equivalent. Cognitive processes. Thinking, problem solving, visual imagery, attention and memory search. Both theory and application emphasized.

3914
(L)Experimental Psychology. Lab 4. Prerequisites: 1113, 1123, 3213 or equivalent and five additional hours in psychology. Problems, methods and applications of experimental psychology.

3990
Undergraduate Seminar. 1-6 credits, 6 maximum. Prerequisite: consent of instructor. For honors students and other outstanding students. Special topics in psychology.

4123*
(S)Psychology of Women. Lab 1. Prerequisite: 1113. Sex differences and the development of sex role behavior. Encompasses the psychological dynamics of developmental and social issues for women.

4133
(S)Psychology of Minorities. Prerequisite: 1113. Personality and behavior engendered by minority group status. Review of pertinent psychological theories and research.

4143
(S)Psychology and Law. Lab 1. The new psycholegal literature reviewed with emphasis on the psychological basis of voir dire, eyewitness behavior, courtroom persuasion, and reactions to victims. Laboratory exercises conducted in a courtroom.

4183*
Current Issues in Clinical Psychology. Prerequisites: 1113, 3443 and three additional credit hours in psychology. Problems of the individual in contemporary society and various clinical approaches that have been proposed as possible solutions to these problems.

4213*
Conflict Resolution. Prerequisite: 1113. Interpersonal conflict studied from psychological perspectives. Types and uses of conflict, and conditions for constructive dispute settlement.

4333*
(S)Personality. Prerequisites: 1113, 3443, or 2313, or consent of instructor. Major personality theories and their application to behavioral change, behavioral assessment and research.

4483*
Psychology of Parent Behavior. Prerequisite: 1113. Parental techniques are examined in light of the personalities of parents, society's view of children and the American judicial-legal system.

4493*
(S)History of Psychology. Prerequisite: 1113. History of psychology as an aspect of European intellectual history. Psychological thought from early philosophical roots to modern conceptions of psychology as a science.

4813*
Psychological Testing. Prerequisites: 1113, 1123, 3213. Quantitative aspects of measurement and testing, with emphasis on scaling, standardization, reliability and validity. Basic principles of construction and the ethics of use.

4990*
Special Problems. 1-6 credits, 6 maximum. Prerequisites: 1113, 3213 and consent of instructor. For honors students and other outstanding students. Experimental or library research.

5000*
Thesis. 1-6 credits, 6 maximum. Required of all graduate students majoring in psychology and writing a thesis.

5054*
Proseminar in General Psychology I. Prerequisites: graduate standing in the Department of Psychology and consent of instructor. Major theories, methodologies, and substantive issues in psychology. In addition to topics of current relevance, the historical background of psychology will be explored, and the significance of psychological work will be explored relative to the scientific status of the discipline.

5064*
Proseminar in General Psychology II. Prerequisites: 5054, graduate standing in the Department of Psychology and consent of instructor. Continuation of PSYCH 5054.

5083*
Principles of Behavior Therapy. Prerequisite: graduate standing in the clinical program of the Department of Psychology or consent of instructor. Principles and procedures of behavior therapy and modification.

5113*
Psychopathology. Prerequisites: 15 credit hours of psychology, graduate standing in the Department of Psychology or consent of instructor. Principles of diagnosis and treatment of major disorders.

5120*
Psychology Workshop. 2-6 credits, 6 maximum. Provides an opportunity to study specific psychological problems, both applied and theoretical.

5133*
Minority Issues. Prerequisite: six credit hours of psychology and consent of instructor. Social issues related to pluralism with emphasis on community and social psychology.

5143*
The Psychology of Substance Abuse. Prerequisite: consent of instructor. Introduction to psychological classification of psychoactive substance (alcohol and drug) use disorders. Theory and research on psychological, biological, and environmental factors that are concomitants of substance abuse. Overview of major research techniques and treatment modalities in this area.

5153*
Individual Mental Tests. Prerequisites: 3443, 4813; graduate standing in clinical psychology, counseling psychology, school psychology, or the master's program in psychometry; or consent of instructor. Practice in understanding, administering and interpreting the Stanford-Binet, WAIS, WISC-R and other mental tests.

5173*
Child Psychopathology and Treatment. Prerequisites: 3443, 3583 or equivalent; graduate standing in the clinical program of the Department of Psychology, the doctorate school psychology program or the psychometry program, or consent of instructor. Theoretical positions and issues in child psychopathology. Procedures used in the treatment of psychological disorders of children.

5253*
Seminar in Human Development. Prerequisite: consent of instructor. Behavioral aspects of development from the prenatal period to senescence. Normal development contrasted to exceptional development.

5263*
Personality Theories. Prerequisites: nine credit hours of psychology and consent of instructor. Various theories of personality.

5283*
Community Psychology. Prerequisite: consent of instructor. Positive rehabilitative and preventive objectives; application of psychological knowledge and skills to problems of social change and general improvement of the quality of life. Physical, psychological and social factors viewed through system analysis.

5303*
Quantitative Methods in Psychology I. Prerequisite: 3213. Statistical methods of evaluating research hypotheses in psychology. Descriptive measures, Student's t, one-way analysis of variance, comparisons among groups and statistical robustness are stressed.

5313*
Quantitative Methods in Psychology II. Prerequisite: 5303. A continuation of 5303. Higher-order analysis of variance designs, correlation and regression techniques, analysis of covariance, with emphasis on applications to psychological experimentation.

5323*
Theory and Methods of Scaling. Prerequisites: six credit hours of psychology and three hours in statistics. Theoretical and methodological principles underlying paired comparison, successive interval, fusing, scalogram and equal-appearing interval scales. The application of these measurement scales to research in the behavioral and social sciences.

5353*
Psychology of Motivation. Prerequisite: 3914. Outline of theory and research in human and animal motivation.

5380*
Research. 1-12 credits, 12 maximum. Prerequisite: consent of instructor. Research project on some psychological problem.

5393*
Verbal Processes. Consideration of task and subject variables, transfer and mediation, associative processes and verbal behavior.

5413*
Systems of Psychology. Two different meanings of "system" considered: the traditional meaning dealing with the various schools of psychology, and the modern meaning in which contemporary social problems are viewed as sets of interrelated variables that produce unforeseen and remote effects.

5433*
Psychology of Information Processing: Development and Aging Aspects. Attention, list processing, pattern recognition and related areas in terms of contemporary facts, theory and application. Special attention paid to development and aging aspects of information processing.

5443*
Behavioral Medicine. Prerequisite: graduate standing in the clinical program of the Department of Psychology; consent of instructor. An advanced graduate course for students in training for a Ph.D. in clinical psychology. General considerations for psychophysiological disorders, general intervention strategies in behavioral medicine including biofeedback, and specific consideration and intervention strategies for specific disorders.

5483*
Physiological Psychology. Prerequisite: 3073 or equivalent. Neurological mechanisms underlying human behavior.

5513*
Experimental Learning Theories. Prerequisite: nine credit hours of psychology. Basic concepts and empirical findings in animal and human learning.

5563*
Advanced Social Psychology. Prerequisite: 3743. History, theory and experimentation of dynamic interaction of group membership and individual behavior.

5573*
Experimental Social Psychology. Prerequisite: 3743. Social psychology of psychological research with special emphasis on the conceptualization, planning, execution and ethical fulfillment in a laboratory or laboratory-field experience.

5583*
Developmental Psychobiology. Prerequisites: 3073 or equivalent; consent of instructor. An exploration of the biological aspects of human development, with particular emphasis on the physiological, ethological, and genetic perspectives.

5620*
Seminar in Psychology. 1-9 credits, 9 maximum. Prerequisite: consent of instructor. Consideration of special topics that are particularly timely or technical in nature.

5623*
Seminar and Workshop in Test Construction Techniques. Prerequisite: consent of instructor. Derivation and use of the basic equations and formulas pertaining to the measurement of individual differences on the basis of well defined collections of stimuli.

5640*
Clinical Practicum. 1-12 credits, 17 maximum. Prerequisite: graduate standing in the clinical program of the Department of Pyschology. Practicum experience for graduate students in the clinical psychology program.

5650*
Practicum. 1-16 credits, 16 maximum. Prerequisites: graduate standing in the clinical program of the Department of Psychology, or the doctorate counseling psychology program (marriage and family section). Practicum experience for graduate students in the clinical program of the Department of Psychology who are doing supervised practicum in specific clinical areas of specialization.

5660*
Teaching Practicum. 1-2 credits, 2 maximum. Prerequisite: consent of instructor. Primarily for graduate students with well defined new teaching responsibilities.

5713*
Projective Psychodiagnostic Methods. Prerequisites: 5113, 5153; graduate standing in the clinical program in the Department of Psychology or consent of instructor. Administration and interpretation of projective tests such as the Rorschach, TAT, DAP and their derivatives.

5723*
Child Diagnostic Methods. Prerequisites: 5153, 5173; graduate standing in the clinical program in the Department of Psychology or the doctorate school psychology program, or consent of instructor. Administration and interpretation of diagnostic instruments used specifically with children.

5753*
Objective Psychodiagnostic Methods. Prerequisites: 3443, 4813; graduate standing in the clinical program of the Department of Psychology or the doctorate counseling program, or consent of instructor. Restricted to graduate students in programs designed to prepare students for the professional practice of psychology. Complex objective personality and interest tests and their diagnostic and clinical uses.

5823*
Cognitive Processes. Theory and experimental research findings dealing with human thought processes from a developmental and functional standpoint.

5853*
Group Processes. Prerequisite: 3743. Analysis of both intragroup and intergroup behavior in small groups. Emphasis on experimental research reported. Relationships of small groups to large groups, institutions and collective behavior.

5910*
Internship in Mental Health. 1-6 credits, 6 maximum. Prerequisite: enrollment in mental health specialist program (M.S. option). Supervised clinical experience under the direction of a qualified clinical psychologist in a mental health setting.

6000*
Dissertation. 1-16 credits, maximum 60. Research and report thereon by graduate students in partial fulfillment of requirements for the Doctor of Philosophy degree.

6223*
Research Design. Prerequisites: 3914, 5323, and doctoral level standing. Experimental techniques in psychophysics, sensory processes, attention and perception, motivation and emotion, and learning and memory.

6233*
Computer Applications in Psychology. Prerequisites: 5303 and 5313. Organizing experimental data for computer-assisted analysis. Emphasis on problems peculiar to within-subject experiments used in psychology. Selection, modification and creation of data analysis programs. A thorough knowledge of statistical techniques is assumed.

6283*
Factor Analysis. Factor analysis and implications for measurement of mental abilities, personality traits and learning.

6313*
Systems of Psychotherapy. Prerequisites: 5113; graduate standing in the clinical program of the Department of Psychology or consent of instructor. The major approaches to psychotherapy. Methods for creating multiple impacts for behavioral change, including interpersonal, social, community and preventative interventions.

6393*
Psychology of Language. Review of data and theories of speech and language behaviors. Laboratory techniques and experimental designs will also be reviewed to emphasize understanding of psycholinguistic research.

6513*
Group Treatment Methods. Prerequisites: 5113; graduate standing in the clinical program of the Department of Psychology or the doctorate counseling psychology program, or consent of instructor. Introduction to major techniques of group treatment including Gestalt and transactional analysis as well as more conventional techniques.

6523*
Family Treatment Methods. Prerequisite: graduate standing in the clinical program of the Department of Psychology or the doctorate counseling psychology program. Introduction to techniques and philosophies of family treatment. Includes marital counseling and emphasis on family dynamics.

6553*
Advanced Practice in Marital and Family Treatment. Prerequisites: 6523, concurrent enrollment in counseling or clinical practicum; graduate standing in the clinical program of the Department of Psychology or the doctorate counseling psychology program, or consent of instructor. Advanced methods in assessment, diagnosis and treatment of marital and family problems. Skill development, professionalism, ethics and case management. Dynamics of co-therapy and conjoint treatment. Case consultation format. Same course as ABSED 6553.

6643*
Psychopharmacology. Prerequisites: 3073 or 5054, consent of instructor. A comprehensive course dealing with the various classes of drugs that affect the central nervous system. Primary focus is on clinical research with humans. Covers topics ranging from drug-receptor interactions through substance abuse and behavioral disorders.

6673
Neuropsychological Assessment. Prerequisites: 5054 or 5483, and 5064 and 5153, 5753; graduate standing in the clinical program in the Department of Psychology or consent of instructor. Psychological assessments of the effects of cerebral damage or disease.

6933*
Communication and Persuasion. Seminar concerning the communication process at all levels from face-to-face encounters to the mass media with emphasis on the social-psychological factors that influence persuasive attempts.

RELIGIOUS STUDIES (REL)

1103
(H)The Religions of Mankind. Major world religions such as Hinduism, Buddhism, Judaism, Christianity and Islam with a view to understanding the general nature of religion and its various dimensions.

1111
(H)Religion and Contemporary Issues. The nature of religion and its relation to current problems, such as racism, sexism, hunger, ecology and war. 8 weeks only.

2123
(H)Introduction to the Old Testament. The writings of the Hebrew Scriptures with emphasis upon historical background, critical analysis and theological interpretation.

2223
(H)Introduction to the New Testament. The writings of the New Testament in their historical contexts. Emphasis on interpreting selected New Testament passages.

2513
(H)Religious Groups in the United States. Selected religious groups in 19th and 20th-Century America. Emphasis on significant movements and groups outside of mainstream Christianity.

3123
(H)The Old Testament Prophets. Recommended: 2123. An interpretive study of the Hebrew prophets in historical perspective. Intensive study given to the more significant prophets.

3223
(H)The Teachings of Jesus in Historical Context. Recommended: 2223. The teachings of Jesus in light of modern historical research. Emphasis on interpreting selected passages from the Gospels.

3243
(H)Paul and the Early Church. Recommended: 2223. The letters of Paul in their historical context with special emphasis on his theology and ethics.

3293*
History of Christianity. An intellectual and cultural history of Christianity from the second century to the present day. Same course as HIST 3293.

3303
(H)Modern Christian Thought. Important issues for Christianity in the last two centuries: the historical Jesus, the validity of faith, the authority of the Bible and the challenge of modern science.

3403*
(H,I)The Religions of India. Recommended: 1103. The beliefs and practices of Hinduism, Buddhism and Islam in India. Emphasis is placed on the historical origins, scriptures and current developments of each religion.

3413*
(H,I)The Religions of China and Japan. Recommended: 1103. The beliefs and practices of Confucianism, Taoism, Buddhism and Shinto. Emphasis is placed on historical origins and contemporary trends.

3512
(H)The Jewish Tradition. Recommended: 1103 or 2123. An introduction to Judaism, with emphasis placed on the ideas and values emerging from the historical experiences of the Jewish people.

3533
(H,I)The Islamic Tradition. Recommended: 1103. An introduction to Islam, providing an historical survey up to the modern period, with emphasis on the Quran, the prophet Muhammad and major aspects of Muslim thought and civilization.

3573
(H)The Religions of Native Americans. Recommended: 1103. Selected tribal worldviews, belief systems and religious ceremonies, as depicted in oral traditions, songs and literature. Emphasis on Northern and Southern Plains Indians.

3603
(H)Christian Ethics and Modern Society. Moral decision-making from the perspective of the Judeo-Christian tradition. Emphasis on selected moral issues in human sexuality, recent developments in biology and medicine, war and peace and the environmental crisis.

3613
(H,I)African Cultures and Religion. Key ideas, values and achievements in African culture and tradition as found in literature, art and music viewed in historical and religious perspective.

3623
(H)Religion and the Arts. Key literary, graphic and musical works of art of a historical period will be studied to discover what humans are expressing of religious significance. Selected periods will be chosen from the Renaissance to the present.

3713
(H)Religion, Culture and Society. Recommended: 1103, ANTH 2353, SOC 1113. An introduction to the scientific study of religion. Religious activity in both tribal and technological societies studied in the light of contemporary interpretations of culture and of social behavior. Same course as SOC 3713.

3733*
(H,SpD)Religion: Psychological Interpretations. Recommended 1103 or PSYCH 2313. A study of the development, theory and research of modern psychological perspectives on the religious experience. Same course as IDS 3733 and PSYCH 3733.

3833*
(H)Ethical Issues in Biology and Medicine. Moral problems brought about by recent developments in scientific research and medical technology. Abortion, euthanasia, genetic engineering, and human experimentation. Same course as PHILO 3833.

4013*
(H)Perspectives on Death and Dying. Issues that arise as individuals confront the fact of mortality. Dying patients, the ethical issues of euthanasia and suicide, the process of grief, death in literature and the arts, and philosophical and religious views on immortality. Same course as PHILO 4013.

4023*
(H)Archaeology and the Ancient Near East. Recommended: 2123. A study of archaeological remains in the Near East from the Stone Age to the Iron Age with special attention to the background of the Hebrew Scriptures.

4043*
(H)Archaeology and Early Christianity. Recommended: 2223. A study of archaeological remains from the Roman world which set a background for early Christian development, including cities, art documents and architecture.

4050*
Studies in Religion. 2-6 credits, maximum 6. Independent studies, seminars and courses on selected topics in religion.

4113*
(H,I)The World of Islam: Cultural Perspectives. The cultural heritage of the world of Islam explored through its expression in the art, architecture and literature of the Muslim peoples.

4330*
Seminar in Biblical Studies. 3 hours credit, maximum 9. Prerequisites: two courses in Biblical studies. Selected topics in the academic study of the Bible.

4333*
Contemporary Global Issues in Religious Perspective. Contemporary issues such as international development, global conflict, poverty, etc. seen in the light of religious and cultural values in international context.

4440*
Seminar in Religion and Culture. 3-6 credits, maximum 6. Selected topics on the relationship between religion and culture, as reflected in art, literature, music, journalism, philosophy, the life sciences, or the social sciences.

4613*
(H,I)History of Culture in India. Literature and the arts of India and Pakistan studied in their historical and philosophical context. Same course as HIST 4613.

RUSSIAN (RUSS)

1115
(I)Elementary Russian I. Lab 1 1/2. Understanding, speaking, reading and writing. Method of instruction is audio-lingual.

1225
(I)Elementary Russian II. Lab 1 1/2. Prerequisite: 1115 or equivalent. Continuation of 1115.

2115
(H,I)Intermediate Russian I. Prerequisite: 1225 or equivalent. Continuation of 1225. Russian grammar, composition and conversation.

2225
(H,I) Intermediate Russian II. Prerequisite: 2115 or equivalent. Continuation of 2115.

3003
(I,S)The Soviet Union: History, Society and Culture. A comprehensive view of the Soviet Union, stressing those issues in the political, economic, technological, geographical and cultural situation. Accessible to beginning undergraduates. Same course as HIST 3003 and POLSC 3003.

3013
(I)Russian for Reading Knowledge I. Grammar and vocabulary designed for the student who wishes to be able to read Russian. Translation practice.

3023
(I)Russian for Reading Knowledge II. Prerequisite: 3013 or equivalent. Practice at reading and translating Russian.

3113
Advanced Russian I. Prerequisite: 2225. Advanced study of reading, writing, and speaking skills in Russian language, combined with reading and discussion of literary and other texts in Russian. Conducted in Russian.

3123
(H,I)Russian Culture and Civilization. Art, literature, music, architecture, and contemporary life of Russia. Course taught in English.

3223
Advanced Russian II. Prerequisite: 2225. Advanced study of reading, writing, and speaking skills in Russian language, combined with reading and discussion of literary and other texts in Russian. Conducted in Russian. May be taken before Russ 3113.

4113
(H,I,)Russian Literature in Translation I. Russian literature from its beginning to mid-19th Century: Pushkin, Lermontov, Goncharov, Gogol, Turgenev and Dostoevsky. Readings in English. Classes conducted in English.

4123
(H,I)Russian Literature in Translation II. Russian and Soviet literature from mid-19th Century to present: Tolstoy, Chekhov, Gorky, Zamiatin, Sholokhov, Pasternak, Bunin, Solzhenitsyn, Arzhak (Daniel), Tertz (Sinyavsky), Voznesensky and Evtushenko. Readings in English. Classes conducted in English.

SOCIOLOGY (SOC)

1113
(S)Introductory Sociology. The science of human society. Emphasis on basic concepts. Assists the student in understanding the social influences on day-to-day life.

1123
(S,SpD)Social Issues and Human Values. Social issues discussed and debated. Oral and written expression of views encouraged on a variety of social issues ranging from racism to the role of the police in the modern industrial state. Course draws on many of the social sciences, with major emphasis being in sociology.

2123
(S)Social Problems. Exploration in selected social issues in contemporary American society, such as deviance, poverty, sexism, racism and ageism.

2223
Rural Sociology. Life in rural America and nonwestern societies examined with special emphasis on social relations, population movement, social change and problems of rural society.

2993
Sociology of Racism. Sociological phenomena of racism: developmental processes, problems and consequences.

3113
Theoretical Thinking in Sociology. Prerequisite: 6 credit hours of Sociology, including 1113. Sociological theory in three broad areas: the emergence of social theory, the major schools of social theory and the relevance of theory to sociological research.

3223
(S)Social Psychology. Social basis of personality development and behavior, including symbolic environment, self and group, motivation, attitudes and opinions, and social roles.

3323*
Collective Behavior and Social Movements. Analyzes panics, crazes, riots and social movements emphasizing institutional and social psychological origins and consequences.

3373*
The Sociology of Developing Societies. Prerequisite: one course in sociology or consent of instructor. Theories and practice of development in the Third World since World War II. Emphasis on plans, programs and projects of various national and international agencies and the effects on the culture, social relations, and social structures of Third World countries.

3423
(S)Urban Sociology. Urbanization as a worldwide process. The demography and ecology of cities and metropolitan regions. Urban planning and future development.

3523*
Juvenile Delinquency. Juvenile delinquency behavior in relation to family, school, church, peers, community and institutional structures. The extent of delinquent expressions, varieties of delinquency, comparative international perspectives and new trends of females in delinquency and gang behavior.

3713
(H)Religion, Culture and Society. Recommended: 1113, ANTH 2353, REL 1103. An introduction to the scientific study of religion. Religious activity in both tribal and technological societies studied in the light of contemporary interpretations of culture and of social behavior. Same course as REL 3713.

3723*
Sociology of American Family. Relationship between the family and other American institutional structures. Specific attention to values and behavior in mate selection, sexual behavior, marital relationships and sexual role differentiation.

3823*
(S)Sociology of Death and Dying. Death and dying as social phenomena including cross-cultural perspective. An understanding of occupations and professions dealing with terminal patients in hospitals and with funerals. Students required to engage in original research from community sources.

3883*
The Field of Social Work. Prerequisites: 1113 and 2123. Methods of social work practice, agency setting and current social welfare programs.

3952
Orientation to the Internship in Sociology. Prerequisite: sociology majors or consent of instructor or adviser. Preparation for internship in sociology.

3993
(S)Sociology of Aging. Sociological problems of aging, including the analysis of the behavior of the aged within the framework of social institutions.

4003
Senior Thesis in Sociology. Prerequisites: 3113, 4013, 4133, STAT 4013, and consent of instructor. Conduct a research project (review literature, prepare proposal, gather and analyze data and report results) on a sociologically significant topic or issue.

4013*
Qualitative and Applied Social Research Methods. Prerequisites: 3113 and STAT 4013. Conducting, analyzing and reporting qualitative social research. Research design, data collection, analysis and write-up of evaluation research and social impact assessments. Individual research project included.

4023*
Juvenile Corrections and Treatment Strategies. Prerequisite: 3523 or 4333. The juvenile justice system, emphasizing the juvenile court, diversion and youth service bureaus as well as the more traditional training schools and foster homes. Experimental treatment strategies with institutionalized delinquents.

4133*
(L)Quantitative Methods in Social Research. Prerequisites: 3113 and STAT 4013. Applying sociological theory to designing research; testing hypotheses by statistical techniques including sampling, scaling, use of documents and survey instruments. Applying research data to personal decision making and public policy questions. A research project is included.

4213*
(S)Sociology of Human Sexuality. Prerequisite: junior standing or consent of instructor. Sociological and social psychological aspects of human sexual behavior, attitudes, and relationships. Theoretical concepts, empirical research, and descriptive rates of behavior are discussed.

4223*
Sociology of Mental Health. Sociological approach to mental health and mental disorder. Social and cultural factors and their impact on the therapist-patient relationship. Etiology and treatment of emotional disorders. Opinions and attitudes about mental health.

4333*
Criminology. Summarizes sociological and psychological research pertaining to crime causation and crime trends. Modern trends in control and treatment.

4343*
(S)Medical Sociology. Health and illness as social and societal phenomena including the doctor-patient relationship, distribution and etiology of disease, the social meaning of health and illness, basic epidemiology, and the social processes involved in medical practice. Cross-cultural comparisons and the sociology of the health professions.

4383*
Social Stratification. Systems of class and caste, with special attention to the United States. Status, occupation income and other elements in stratification.

4423*
Community Organization and Development. Structure, change and development of the local community in rapidly changing society. Emphasis on community organization and planned change.

4433*
(S)Social Ecology and Life Processes. Human interdependencies and interrelationships with the social and physical environments, with special focus on the mutual impact of human values, human environment and life phases.

4443*
Sociology of Law and Legal Institutions. Prerequisite: 3523 or 4333. Criminal and civil law as mechanisms of social control; conflict and consensus models of legislation; legality doctrine and its application by police, prosecution and defense, courts and administrative agencies of control. Decision processes in the criminal justice system, personnel and case loads and related areas.

4513*
Demography of Minorities. Compares several minority groups along major demographic dimensions, i.e., a comparison across minority groups as well as within minority groups. Emphasizes social, political and economic factors as affected by population variables.

4533*
(I,S)World Population Problems. Fertility, mortality and migration, and other factors related to population size, density, and composition; the population explosion, worldwide famine, birth control, and other serious social issues.

4623*
(S)Sociology of Industry and Work. The interrelationship of the social order and work plant as a social system, work role behavior and special groups in industry and work.

4643*
(I)Women: A Cross-cultural Perspective. Compares the roles of women in different types of societies (hunting and gathering, horticultural, peasant and agricultural). Social, familial, economic and legal status of women in American society. Same course as ANTH 4643.

4773*
Social Casework Methods. Prerequisite: 3883 or consent of instructor. Methods for social work intervention with individuals, groups and families. Concepts, techniques and assessment methods.

4850
Internship in Sociology. 1-4 credits, maximum 4. Prerequisites: 3952, completion of 12 hours of sociology, or consent of internship coordinator. Field experience in a variety of work settings.

4923*
The Field of Corrections. An overview of correctional work focusing on probation, parole and institutions. A survey of contemporary alternatives to conventional imprisonment.

4953*
Social Welfare as a Social Institution. Historical setting and philosophical base of social welfare. Social welfare's functions and methods in relation to problems of American society.

4990*
Exploration of Sociological Issues. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Examines sociologically significant topics and issues.

5000*
Thesis in Sociology. 1-6 credits, maximum 6.

5113*
Sociological Theory I. Prerequisite: 3113 or equivalent. Major trends in sociological thought, 1800-1920. The emergence of sociological theory in Europe and America.

5213*
Methods of Demography. Prerequisite: STAT 4013. Introduces the student to methods of collecting and analyzing data in the field of demography. Emphasizes population analysis utilizing the three basic variables: birth, death and migration and the attendant statistical mathematical applications.

5243*
Social Research Design and Analysis. Techniques in design, data collection, analysis and interpretation of data for qualitative and quantitative sociological research.

5253*
Sociology of Small Groups. Prerequisite: 3223 or equivalent. Structural variation, ordering, communication, social bonding and task performance in small-group association.

5263*
Methods of Social Research II. Prerequisite: 4133 and STAT 4013, or equivalents. Advanced techniques in sociological research and data analysis focusing on the formulation of substantive research questions and application of a variety of statistical techniques and computer programs to answer such questions.

5323*
Social and Cultural Change. Classical and modern theories of social, cultural and societal change. Particular emphasis on societal development in the modern world system and its impact on individuals and social relationships.

5353*
Social Systems Analysis. Relations between properties of relatively large social systems. Emphasis on theories relating these variables, empirical derivations of their measures and research concerning their interrelations.

5533*
Correctional Institutions and Residential Treatment. Prerequisite: 4923 or equivalent. Nature and effects of custodial institutions on the inmates. Prison community, its structure, social processes and dynamics. Resocialization of prison inmates in new vocational and social skills.

5563*
Community Treatment of Offenders. Prerequisite: 4923 or equivalent. Treating offenders in the community without incarcerating them in prisons. Probation, parole and other rehabilitative services. Impact of new community treatment centers, group homes, probation hotels and halfway houses. Effectiveness of the individual, group and family therapies on the offenders.

5753*
Complex Organizations. Prerequisite: six hours of undergraduate sociology or equivalent. Nature and types of complex organizations: organizational structure; organizations and society; organizational changes.

5883*
Sociology of Education. Manner in which social forces and institutions influence education and the educational system in the United States.

5980*
Internship. 1-6 credits, maximum 6. Supervised field placement.

5990*
Advanced Problems and Issues in Sociology. 1-9 credits, maximum 9. Prerequisite: consent of instructor. Group enrollment or individual research enrollment as needed. Graduate level analysis of special problems and issues in sociology not covered in other Department offerings.

6000*
Dissertation. 1-12 credits, maximum 18.

6110*
Sociological Theory II. 2-3 credits, maximum 6. Critical examination of significant theoretical formulations, 1920 to the present. Relation between theoretical development and current research emphasis.

6213*
The Sociology of Knowledge. Prerequisite: six hours of undergraduate sociology or equivalent. Relationship between human thought and the social context within which it arises.

6260*
Seminar in Current Research Literature. 2-3 credits, maximum 6. Methodological analysis of advanced research in major areas of sociology.

6390*
Seminar in the Family. 2-3 credits, maximum 6. Intensive analysis of published research in the sociology of the family.

6420*
Seminar in Urban Sociology. 2-6 credits, maximum 6. A theoretical and applied approach to cross-cultural urban studies. Examines different methodologies for urban community analysis.

6450*
Seminar in Industrial Sociology. 2-3 credits, maximum 6. Intensive analysis of selected problems in industrial sociology.

6550*
Seminar in Social Organization. 2-3 credits, maximum 6. Research and literature relating to macro-social analysis.

6650*
Seminar in Social Psychology. 2-3 credits, maximum 6. Development and critical analysis of research in social psychology.

6750*
Seminar in Deviance and Criminology. 2-3 credits, maximum 6. Current research and theory in criminology, penology and deviance in modern society.

6950*
Seminar in Social Gerontology. 2-3 credits, maximum 6. A theoretical and practical examination of the sociological implications, both individual and societal, of an aging population.

SPANISH (SPAN)

1115
(I)Elementary Spanish I. Lab 1 1/2. Pronunciation, conversation, grammar and reading.

1225
(I)Elementary Spanish II. Lab 1 1/2. Prerequisite: 1115, or equivalent.

2112
(H,I)Intermediate Reading and Conversation I. Lab 1. Prerequisite: 1225 or equivalent. (May have been gained in high school.) Reading and discussion of simpler Spanish texts, mostly cultural. May be taken concurrently with other 2000-level Spanish courses.

2113
(H,I)Intermediate Conversation and Composition I. Lab 1. Prerequisite: 1225 or equivalent. (May have been gained in high school.) Review and further presentation of grammar and pronunciation; consolidation of basic skills, with additional emphasis on writing. May be taken concurrently with other 2000-level Spanish courses.

2222
(H,I)Intermediate Conversation and Composition II. Lab 1. Prerequisite: 2113 or equivalent. (May have been gained in high school.) Readings, vocabulary building, conversation, guided composition. May be taken concurrently with other 2000-level Spanish courses.

2223
(H,I)Intermediate Reading and Conversation II. Lab 1. Prerequisite: 2112 or equivalent. (May have been gained in high school.) Reading and discussion of more advanced Spanish texts, mostly literary. May be taken concurrently with other 2000-level Spanish courses.

3003
Survey of Spanish Literature. Prerequisite: 20 credit hours of Spanish or equivalent. Development of Spanish and Spanish-American literature to the present. Class conducted in Spanish.

3200
(I)Advanced Conversation and Composition. 1-3 credits, maximum 3. Lab 0-6. Prerequisite: 20 credit hours of Spanish or equivalent. Practice in composition and stylistics, designed to bring students up to a high level of proficiency in speaking and in writing. Spanish majors must take all three credits in one semester.

3210
(I)Advanced Grammar. 1-3 credits, maximum 3. Prerequisites: 20 credit hours of Spanish or equivalent proficiency. Spanish majors must take all three credits in one semester.

3333
(H,I)Hispanic Civilization I. Prerequisite: 20 credit hours of Spanish or equivalent. Reading and discussion of selected texts outlining the development of contemporary Spanish civilization. Classes conducted in Spanish.

3463
(I)Advanced Diction and Phonetics. Lab 1. Prerequisite: 20 credit hours of Spanish or consent of instructor. Required course for teacher certification/licensure. Spanish speech sounds and intonation patterns, with practice to improve the student's pronunciation.

4113
(H)Chicano Literature and Civilization. Prerequisites: 20 credit hours of Spanish or equivalent competence. Reading, analysis, and discussion of the most outstanding works in Chicano literature produced since 1848. Contemporary works are emphasized. Classes conducted in Spanish.

4173
(H,I)Hispanic Drama. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and interpretation of dramatic works selected from the Hispanic literatures.

4220
(I)20th Century Hispanic Literature. 1-3 credits, maximum 3. Prerequisite: 20 credit hours of Spanish or equivalent. Major 20th Century Hispanic writers. Classes conducted in Spanish.

4243
(I)Translation and Writing of Documents. Prerequisite: 20 credit hours of Spanish or equivalent competence. Translation of documents produced by government agencies, universities, business and industrial organizations. Writing of letters, memos, contracts, etc.

4253
(H,I)Masterpieces of Hispanic Literature I. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and analysis of classics selected from the Hispanic literatures.

4263
(H,I)Masterpieces of Hispanic Literature II. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and analysis of classics selected from the Hispanic literatures. An historical continuation of 4253. SPAN 4253 is not a prerequisite for this course.

4333
(H,I)Hispanic Civilization II. Prerequisite: 20 credit hours of Spanish or equivalent. Reading and discussion of selected texts outlining the development of contemporary Hispanic civilization outside the Iberian peninsula. Classes conducted in Spanish.

4550
(I)Seminar in Spanish. 1-3 credits, maximum 9. Prerequisite: 20 credit hours of Spanish or equivalent. Readings and discussion of vital subjects in Spanish.

5110*
Advanced Hispanic Studies. 1-3 credits, maximum 9. Lab TBA. Prerequisite: 22 hours of Spanish or graduate standing in foreign language.

SPEECH COMMUNICATION (SPCH)

2713
(S,SpD)Introduction to Speech Communication. Principles and techniques of preparing for, participating in and evaluating communication behavior in the conversation, the interview, group discussion and the public speech. A competency-based approach.

3010
Speech Activity Participation. 1-3 credits, maximum 6. Preparation for and participation in speech communication and/or speech pathology activities.

3703*
Elements of Discussion. The nature of small groups. Emphasis upon task groups with special consideration given to group roles, group norms, group leadership and effective participation in various types of discussion groups.

3711
Employment Interviewing. Lab 1. Prerequisite: junior standing. Prepares student to understand, prepare for, and participate in employment interviews. Resumes, researching job opportunities and other forms of preparation for an interview.

3713
Argumentation and Debate. Prerequisite: 2713. The responsibilities of the advocate, the proposition, evidence, reasoning, the case, fallacies and refutation. Experience in mini-debates, standard and cross-examination debating.

3723*
Business and Professional Communication. Prerequisite: 2713. Oral communication problems encountered in business and professional settings. Effective listening, business-organizational communication barriers and corrective strategies, interviewing, nonverbal business communication, parliamentary procedures and conducting meetings. Special forms of public speaking along with techniques of oral reporting and briefing.

3733*
(S)Elements of Persuasion. Prerequisite: 2713. Principles and concepts relevant to interpersonal and public persuasive encounters. The instrumental nature of persuasion, audience analysis and the ethics of persuasion. Designing and participating in actual persuasive encounters.

3743
Advanced Public Speaking. Prerequisite: 2713. The preparation and delivery of various types of public speeches.

3793*
Processes of Interviewing and Speech Communication. Prerequisite: 2713. General principles of interviewing are considered along with specific guidelines for the interviewer in survey, journalistic, counseling, selection, appraisal, legal, medical, and sales interviews.

4010*
Research and Practicum. 1-3 credits, maximum 9. Prerequisites: consent of instructor; prospectus should be filed during semester previous to enrollment. Supervised research and/or practicum in one of the following branches: theater, speech communication, speech education, speech correction or audiology.

4703*
Speech Communication Models. Prerequisite: senior standing or consent of instructor. A survey of the structure and functions of speech-communication models.

4723*
(H)History of Public Address. Leading world orators and speakers. Content, style and delivery of their speeches and the historical situation in which they were given.

4743*
Problems of Interpersonal Speech Communication. Prerequisite: 3793. Application of modern communication theory to problems of interpersonal communication. Identification and elimination of barriers to communication in the personal interview and small group setting. Use of role-playing techniques and off-campus projects.

4753*
(I)Intercultural Communication. Study of speech communication problems within today's socio-cultural context. Emphasis upon social and cultural barriers to communication.

4763*
Organizational Communication. Prerequisite: 3793. The interface between communication theory and organizational structure. Nature of communication prob-

lems in organizations, strategies for overcoming such problems and the design of effective communication systems in organizational settings.

4793*
(L,S)Nonverbal Communication. Prerequisites: 2713 and permission of instructor. Nonverbal aspects of speech communication.

5000*
Research and Thesis. 1-3 credits, maximum 6. Prerequisite: approval of major professor. Research in speech and/or audiology.

5013*
Introduction to Graduate Study. Research methods with special emphasis on those used most frequently in communication research; professional opportunities in the various speech fields; practical experience in outlining a piece of research.

5023*
Introduction to Quantitative Research in Speech. Methods and major findings of empirical research in speech.

5210*
Advanced Practicum. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Practical experience for advanced students on and off campus.

5710*
Seminar in Speech. 1-3 credits, maximum 9. Individual and group investigations of problems in speech communication, theater, and speech pathology and audiology.

5713*
Rhetorical Theory. Contemporary rhetorical theory focusing on the processes of social influence.

5723*
Oral Communication Theory. Modern theories dealing with symbolic and communicative behavior.

5733*
Human Relations in Organizations. The place of oral communication in decision-making in organizations. Relationship of oral communication to organizational structure, organizational needs, patterns of leadership and techniques of information collection.

5763*
Seminar in Organizational Communication Consultancy. Diagnostic measures for identifying communication problems in organizations and the development of consulting or interventionist programs to solve such problems.

SPEECH PATHOLOGY (SPATH)

1703
Spoken English for International Students. Lab 1. Oral discussion and laboratory drill designed to improve English pronunciation, intelligibility and oral/aural comprehension. Articulation, stress, pitch, intonation and visual cues of English.

2113
Introduction to Communication Disorders. Prerequisites: 2213 (previous or concurrent enrollment) and sophomore standing. The nature, symptoms, etiology and diagnosis of major speech and language disorders. Methods and techniques utilized in the correction of speech and language disorders. Direct therapy observations.

2213
Phonetics. Prerequisite: sophomore standing. The sounds of English from the standpoints of their production, reception and symbolic use. Extensive practice transcribing English into the international phonetic alphabet.

3010
Pre-practicum Clinical Experience. 1-3 credits, maximum 6. Prerequisite: 2113 or equivalent or concurrent enrollment. Observation of and participation in speech and language pathology and audiology clinical activities.

3123
Audiology and Audiometry. Prerequisite: 2113. Anatomy and physiology of the hearing mechanism and related physics of sound. Common etiologies of hearing disorders. Practical experience in pure tone and speech audiometry. Study of hearing conservation programs.

3213
Communication Disorders in the Classroom. Prerequisite: sophomore standing. The normal development of speech and language. The nature, causes and symptoms of communication disorders. Instruction in identification, referral and classroom management of the communicatively handicapped child.

3224
Speech and Language Development. Prerequisite: 2113, 2213. The nature, theories and influencing factors of speech and language development.

4010*
Clinic Practicum. 1-3 credits, maximum 9. Prerequisites: senior standing in major, 2.75 GPA in major, and consent of instructor. Clinical procedures and supervised practicum in speech and language pathology and audiology.

4133*
Aural Rehabilitation for the Acoustically Handicapped. Prerequisite: 3123. Clinical aspects of habilitation and/or rehabilitation programs for deaf and hard-of-hearing, including: speech reading, auditory training, speech conservation, speech and language therapy, hearing aid orientation and counseling. Amplification units studied.

4214*
Anatomy and Physiology of the Speech Mechanism. Prerequisite: 2113. Structure and function of the speech mechanism. Laboratory experiences.

4233
(N)Physical Basis of Voice and Speech Production. Fundamentals of the integrated biological and physical processes of vocal production and hearing mechanism are presented and demonstrated. The hazards of vocal and auditory abuse and strategies for speech and hearing analysis and conservation are addressed.

4253*
Diagnostic Procedures in Communication Disorders. Prerequisites: 3010, 3224. Speech and language diagnostic testing and procedures, interpreting diagnostic information and deriving appropriate treatment goals.

4312*
Phonological Assessment and Intervention. Prerequisite: 3224. Nature of phonological disorders and their relationship to communication disorders. Survey of assessment and treatment procedures.

4313*
Speech Science. Prerequisite: 4214. Research on the acoustic parameters, the perceptual and productive processes of speech and the interrelationships of these factors during speech communication. Laboratory applications.

4323*
Language Assessment and Intervention. Prerequisite: 3224. Natural and formal assessment of language; cognitive and social development; intervention techniques.

4333*
Voice Disorders. Prerequisite: 4313. The vocal mechanism and factors that may cause voice deviation. Recent research on diagnostic and remediation procedures for hoarseness, pitch deviation, laryngectomy, and other laryngeal conditions.

5000*
Research and Thesis. 1-3 credits, maximum 6. Prerequisite: approval of head of department. Research in speech and language pathology and audiology.

5013*
Research Methods in Communication Disorders. Prerequisite: 2113. Research methods with emphasis on those used most frequently in speech and language pathology and audiology; experience devising and implementing research.

5112*
Language Disorders of Preschool Children. Prerequisite: 3224. Overview of preschool language disorders: history, symptoms, language assessment, theories and methods of language intervention, program evaluation, risks at school, research trends.

5123*
Clinical Audiology. Prerequisites: 3123, 4133, 4313. Hearing disorders and their etiologies. Clinical application of pure tone and speech audiometric tests, including special diagnostic tests. Overview of rehabilitation and amplification.

5133*
Stuttering. Prerequisite: undergraduate speech pathology degree requirements met. Recent research into the nature, causes and treatment of stuttering.

5153*
Neurological Communication Disorders. Prerequisites: 4214, 5263. Nature, diagnosis and treatment of neurologically-based disorders emphasizing aphasia and motor speech disorders.

5172*
Cleft Palate Rehabilitation. Prerequisite: 4313. Recent research in the etiology repair, speech characteristics and communication remediation procedures with persons having cleft palate.

5210*
Advanced Practicum. 1-6 credits, maximum 9. Prerequisite: consent of instructor. Practical experience for the advanced student on or off campus.

5243*
Language Disorders of School-Age Children and Adolescents. Prerequisite: 4323 or consent of instructor. Linguistic, cognitive, and pragmatic deficits of high-risk school-age children and adolescents; impact of spoken and written language deficits on academic achievement. Assessment and intervention strategies.

5251*
Seminar in Diagnostic Methods. Prerequisite: 4253. Applications of techniques used in the evaluation of speech and language disorders.

5263*
Normal and Disordered Communication in an Aging Population. Description of normal age-related changes in communication skills and information about communication disorders which occur in aging. Strategies for dealing with problems.

5710*
Special Topics in Communication Disorders. 1-4 credits, maximum 9. Prerequisite: approval of department head. Individual and group investigations of problems in speech and language pathology and audiology.

STATISTICS (STAT)

2013
(A)Elementary Statistics. Prerequisite: MATH 1513. An introductory course in the theory and methods of statistics. Descriptive measures, elementary probability, samplings, estimation, hypothesis testing, correlation and regression. There is a separate section for students in social sciences. No credit for students with credit in 2023.

2023
(A)Elementary Statistics for Business and Economics. Prerequisite: MATH 1513. Basic statistics course for undergraduate business majors. Descriptive statistics, basic probability, discrete and continuous distributions, point and interval estimation, hypothesis testing, correlation and simple linear regression. No credit for students with credit in 2013.

3013*
(A)Intermediate Statistical Analysis. Prerequisite: 2013 or 2023. Applications of elementary statistics, introductory experimental design, introduction to the analysis of variance, simple and multiple linear regression, nonparametric statistics, survey sampling, time series and Bayesian analysis.

4013*
(A,L)Statistical Methods I. Lab 2. Prerequisites: 60 credit hours including MATH 1513. Basic experimental statistics, basic probability distributions, methods of estimation, tests of significance, linear regression and correlation, analysis of variance for data that are in a one way, a two-way crossed or in a two-fold nested classification.

4023*
(A,L)Statistical Methods II. Lab 2. Prerequisite: 3013 or 4013 or 4033. Basic concepts of experimental design. Analysis of variance, covariance, split-plot design. Factorial arrangements of treatments, multiple regression in estimation and curvilinear regression, enumeration data.

4033*
Engineering Statistics. Prerequisite: MATH 2365. Introduction to probability, random variables, probability distributions, estimation, confidence intervals, hypothesis testing, linear regression.

4043*
Applied Regression Analysis. Prerequisite: one of 4013, 4033, 5013 or equivalent. Matrix algebra, simple linear regression, residual analysis techniques, multiple regression, nonlinear regression, dummy variables, influence statistics.

4053*
Statistical Methods for Engineers. Lab 2. Prerequisite: 4033. Methods of experimental statistics for engineers. Analysis of variance, multiple comparison test, 2n factoral arrangement of treatments, fractional factorials, randomized block designs, simple and multiple linear regression. No credit for students with credit in 4013 or 5013.

4091*
Statistical Analysis System. Prerequisite: 4013 or equivalent. SAS dataset construction, elementary statistical analysis, and use of statistics and graphics procedures available in the SAS package.

4113*
Introduction to Probability Theory. Prerequisite: MATH 2365 and one other course in MATH which has either 2265 or 2365 as a prerequisite. Basic probability theory, random events, dependence and independence, random variables, moments, distributions of functions of random variables, weak laws of large numbers, central limit theorems.

4203*
Mathematical Statistics I. Prerequisite: MATH 2365. Introduction to probability theory for students who are not graduate majors in statistics or mathematics. Probability, dependence and independence, random variables, univariate distributions, multivariate distributions, moments, functions of random variables, moment generating functions.

4213*
Mathematical Statistics II. Prerequisites: 4203 and MATH 3013. Statistical inference for students who are not graduate majors in statistics or mathematics. Sampling distributions, maximum likelihood methods, point and interval estimation, hypothesis testing.

4223*
Introduction to Statistical Inference. Prerequisites: 4113 and MATH 3013. Sampling distributions, point estimation, maximum likelihood methods, Rao-Cramer inequality, confidence intervals, hypothesis testing, sufficiency, completeness.

4910*
Special Studies. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special subjects in statistics.

5000*
Research in Statistics. 1-6 credits, maximum 6. Methods of research and supervised thesis or report.

5013*
Statistics for Experimenters I. Prerequisites: graduate standing and MATH 1513. Introductory statistics course for graduate students. Descriptive statistics, basic probability, probability distributions, fundamentals of statistical inference, hypothesis testing, regression, one-way classification, analysis of variance, comparative experiments, correlation and linear regression, introduction to categorical data analysis.

5023*
Statistics for Experimenters II. Prerequisites: graduate standing and 4023 or 4053 or 5013. Analysis of variance, covariance, use of variance components and their estimation, completely randomized, randomized block and Latin square designs, multiple comparisons, subsampling of experimental units, factorial arrangements of treatments, single degree of freedom comparisons, experiments involving split-units.

5033*
Nonparametric Methods. Prerequisite: one of 4023, 4043, 4053, 5023 or consent of instructor. A continuation of 4013 and 4023, concentration on nonparametric methods. Alternatives to normal-theory statistical methods; analysis of categorical and ordinal data, methods based on rank transforms, measures of association, goodness of fit tests, order statistics.

5043*
Sample Survey Designs. Prerequisite: one of 4013, 4033, 5013 or consent of instructor. Constructing and analyzing personal, telephone and mail surveys. Descriptive surveys including simple random, stratified random designs. Questionnaire design, frame construction, nonsampling errors, use of random number tables, sample size estimation and other topics related to practical conduct of surveys.

5053*
Time Series Analysis. Prerequisite: 4043 or 4053. An applied approach to analysis of time series in the time domain and the frequency domain. Descriptive techniques, probability models for time series, autoregressive processes and forecasting. Box-Jenkins methods, spectral analysis and use of computers.

5063*
Multivariate Methods. Prerequisites: 4043 and 4023 or 4053 or 5023. Use of Hotelling's T-squared statistic, multivariate analysis of variance, canonical correlation, principal components, factor analysis and linear discriminant functions.

5113*
Intermediate Probability Theory. Prerequisites: 4113 and MATH 4363. Measure theoretical presentation of probability, integration and expectation, product spaces and independence, conditioning, different kinds of convergence in probability theory and statistical spaces. Same course as MATH 5113.

5133*
Stochastic Processes. Prerequisites: 4113 and MATH 2613. Definition of a stochastic process, probability structure, mean and covariance function, the set of sample functions, stationary processes and their spectral analyses, renewal processes, counting processes, discrete and continuous Markov chains, birth and death processes, exponential model, queueing theory. Same course as INDEN 5133 and MATH 5133.

5203*
Large Sample Inference. Prerequisites: 4223 and 5113. Different types of convergence in probability theory, central limit theorem, consistency, large sample estimation and tests of hypotheses, concepts of asymptotic efficiency, nonparametric tests.

5213*
Bayesian Decision Theory. Prerequisites: 4223 and MATH 4363. Statistical spaces, decision spaces, loss and risk, minimum risk decisions, conjugate families of distributions, Bayesian decisions.

5303*
Experimental Design. Prerequisite: 5023 or 4203 with consent of instructor or 4053 with consent of instructor. Review of basic concepts and principles of comparative experiments, the role of randomization in experimentation, interpretation of effects and interactions in multifactor designs, error term selection principles, multiple comparisons, split-unit experiments, incomplete block designs, confounding of factoral effects in 2n and 3n series of factorials, single and fractional replication optimum seeking designs, pooling of experiments over time and/or space, crossover and switch back designs.

5323*
Theory of Linear Models I. Prerequisites: 4233, and MATH 3013, and one of 4023, 4053 or 5023. Multivariate normal distributions of quadratic forms, general linear models, Markov theorem, variance components, general linear hypotheses of full rank models.

5333*
Theory of Linear Models II. Prerequisite: 5323. Advanced regression topics; mean model theory and application to fixed models; orthogonal polynomials; data structures, observational and sum of squares identities, mean model identities. Building linear models from data structures, parameterizations and reparameterization, conventional linear model theory, variance components, computing techniques.

5403*
Theory of Sample Design. Prerequisite: 4113 or 4203. Deriving estimates and variances of estimates for different sampling designs. Mathematical development of sampling. Consideration of simple probability sampling including simple random, stratified random, cluster and multistage sampling. Estimation techniques including ratio and regression techniques. Determination of sample sizes and allocations.

5513*
Multivariate Analysis. Prerequisite: 5323. Multivariate normal distribution, simple, partial and multiple correlation, multivariate sampling distributions. Wishart distribution, general T-distribution, estimation of parameters and tests of hypotheses on vector means and covariance matrix. Classification problems, discriminate analysis and applications.

5910*
Seminar in Statistics. 1-6 credits, maximum 12. Special studies for master's students. Survey and discussion of research in mathematical statistics and statistical methods.

6000*
Research and Thesis. 2-10 credits, maximum 24. Prerequisite: consent of advisory committee. Directed research culminating in the Ph.D. thesis.

6013*
Genetic Statistics. Prerequisites: 4213 or 4223, and ANSI 6003; or consent of instructor. Linear models for quantitative traits, genetic relationship and linkage. Theory of selection and crossbreeding. Mathematical techniques in inbreeding. Path coefficient theory.

6123*
Advanced Probability Theory. Prerequisites: 5113 or MATH 5113, and MATH 4673. Sequences of random variables, convergence of sequences, and their measure theoretical foundations. Different kinds of convergence in probability theory. Characteristic functions and their applications. Laws of large numbers and central limit theorems. Conditioning. Introduction to stochastic processes. Same course as MATH 6123.

6213*
Advanced Statistical Inference. Prerequisites: 5113, and 5203 or 5213. Point estimation, maximum likelihood, Cramer-Rao inequality, confidence intervals, Neyman-Pearson theory of testing hypothesis and power of test.

6323*
Advanced Design of Experiments. Prerequisite: 5303 and 5323 or consent of instructor. Construction of various experimental designs, such as mutually orthogonal series of Latin Squares, balanced and partially balanced incomplete block designs, confounded and fractionally replicated designs. Response surface methodology. Theory of factorial arrangements of treatments. Confounding of factorial effects. Fractional replication of fractorials, confounding in mixed series of factorials, randomization tests, transformations of data, plot techniques and principles of split-plot techniques. Analysis of series of experiments and analysis of covariance.

6910*
Special Problems. 1-6 credits, maximum 12. Investigation of special problems in the theory and application of statistics using current techniques. Special studies for Ph.D. level students.

TECHNICAL EDUCATION (TECED)

3103
Introduction to Technical Education. Prerequisite: OAED 3113. The role and function of technical education in the development of human resources. Historic and philosophic bases for technical education with emphasis on programs, purposes, and objectives and the variety of environments in which such programs exist.

4112*
Instructional Aids. Materials and hardware currently available in typical vocational and technical education programs. Practice in the development of projected and nonprojected materials. Each student develops instructional aids appropriate for use in the technical specialty.

5113*
Comparative Occupational Education. Prerequisite: graduate standing. Ideas, practices and systems of occupational education in other countries compared with contemporary practices in the United States to provide a basis for an enlarged, critical view of technical education.

5223*
Curriculum Development in Technical Education. The interrelationship of mathematics, science, technical specialty and general education in technical curriculums. Contemporary practices in constructing, revising and evaluating technical curriculums.

5233*
Occupational Analysis. Techniques for determining educational requirements of technical occupations. Analysis systems used by educational institutions, the military and the United States Department of Labor.

THEATER (TH)

1000
Theater Practicum. Lab 2. 1 credit, maximum 6. Laboratory experience in theater production: acting and/or crew assignments. Graded on pass-fail basis.

1913
Voice and Diction. Freeing the natural voice; development of proper breathing techniques, resonance, and range; use of International Phonetic Alphabet in developing articulation and pronunciation; exercises in phrasing and intonation; preliminary dialect work.

2413
(H)Introduction to the Theater in Western Civilization. Character, plot, thematic, historical and production analyses of various types of play scripts; understanding the work of various theater artists; developing appreciative audiences.

2423
Oral Interpretation. Reading aloud effectively; training in voice improvement, platform techniques, selection criteria and audience analysis.

2453
Acting I. Prerequisite: 2413. Ensemble techniques and creative improvisation; vocal and physical development for the actor; theories and techniques of acting; fundamental scene and character analysis; scene performance workshops.

2613
Technical Production I. Lab 4. Elementary techniques of stagecraft, lighting and costume for the stage. Emphasis on basic skills. Practical experience preparing for Departmental productions.

2623
Technical Production II. Lab 4. Prerequisite: 2613. Intermediate course in costume, stagecraft and stage lighting. Refinement of basic technical skills, introduction of design and conceptualization principles. Practical experience preparing for departmental productions.

3010
Upper-Division Projects. 1-3 credits, maximum 6. Prerequisites: 60 credit hours and consent of instructor. Individual or group study of techniques, history, or literature of the theater. Required written survey of the project and self-evaluation of its results, or a term paper.

3453
Acting II. Prerequisite: 2453. Continuation and refinement of Acting I. Emphasis on textual and character analysis, characterization and inner technique. Stanislavski acting method explored through workshops utilizing scenes from classis realistic plays, including those of Ibsen, Strindberg and Chekov.

3773
Stage Makeup. Lab 2. Techniques of stage makeup. Application and relationship to character. Facial anatomy, prosthesis, wigs and hair. Laboratory work in preparation for departmental productions.

3883
Stage Movement for Actors. Techniques and exercises to build the actor's awareness and abilities for use of the bodily instrument on stage; preparation and readiness routines; rhythms, postures, and movement patterns appropriate to various styles of theater and to specific character roles.

4413*
Lighting for Theater and Television. Lab 2. Stage lighting design, elementary electricity, design of lighting instruments. Practical experience in lighting in preparing for productions.

4420*
Summer Theater. 3-6 credits, maximum 6. Workshop in all phases of theater production: acting, stagecraft, lighting, makeup, publicity, box office, etc.

4433*
Scene Design for Theater and Television. Prerequisites: 2613 and 2623. The designer's approach to the script; execution of sketches, models and working drawings.

4443*
Directing. Prerequisite: 2453. Emphasizes play analysis for production, problems in staging, and the role of the director. Planning and direction of scenes in laboratory situations.

4453*
(H)Theater History I. Aesthetic and social relationships of theater and western civilization from primitive times to the mid-17th century.

4463*
(H)Theater History II. Aesthetic and social relationships of theater and western civilization from the mid-17th century through the 19th century.

4473*
Theater History III. Aesthetic and social relationships of theater and western civilization from 1900 to the present.

4523*
Reader's Theater. Innovative approaches to presentation of alternate forms of literature for the stage.

4713*
Stage Costume History I. Lab 2. Comprehensive history of theatrical costume from ancient Egypt to 1700. Impact of fashion on the stage. Practical experience preparing for departmental productions.

4723*
Stage Costume History II. Lab 2. Comprehensive history of theatrical costume from 1700 to the present. Impact of fashion on the stage. Practical experience preparing for departmental productions.

4813*
Stage Costume Design. Lab 4. Prerequisites: 2413 and 2613 and 2623. Basic treatment of costume design; practical application through design sketches. Style of stage costume. Practical experience preparing for departmental productions.

5010*
Seminar in Theater. 1-3 credits, maximum 12. Prerequisite: consent of instructor. Individual or group studies or techniques, history or literature of the theater. A term paper or written report and self-evaluation of the study or project is required.

5090*
Individual Theater Projects. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Individual projects in directing, acting, or design and technology for a specified theater production, with concept, realization, and self-evaluation under faculty guidance.

5413*
Dramatic Theory. Concepts of play construction and audience effects: classic, neoclassic and modern.

5443*
Problems in Advanced Directing. Prerequisites: 4443, consent of instructor. Problems in directing period styles, especially Shakespeare, Restoration comedy, absurdist drama, and avant-garde drama. Preparation, rehearsal and staging of a complete production.

5453*
Problems in Advanced Acting. Prerequisite: 3453, consent of instructor. Period styles in acting, special problems in television and film acting, auditioning techniques, special preparations for professional acting auditions.

TRADE AND INDUSTRIAL EDUCATION (TIED)

2000
Field Experience in Industrial Practice. 2-6 credits, maximum 16. Prerequisite: consent of instructor. Supervised work experience in student's proposed teaching area with special emphasis on occupational skill development. Written agreement between student, employer and Department must be made prior to beginning of field experience program.

3000
Trade and Industrial Occupational Experience. 1-24 credits, maximum 24. Prerequisites: two years teaching experience, satisfactory completion of the required basic 16 credit hours of TIED courses and consent of instructor. Credit to be determined by a special skill competency examination.

3203
Introduction to Trade and Industrial Education. Opportunities provided by vocational education, with special emphasis on trade and industrial education and its relationship to other elements of the educational system. Legislative aspects of vocational education, general education, student guidance, and programs for disadvantaged and handicapped students.

4103*
Instructional Procedures in Trade and Industrial Education. Prerequisite: 4344. Methods and techniques for effective teaching and learning in classroom and shop instruction. Emphasis on the use of instructional aids and competency development. No credit for students with credit in OAED 4103.

4110*
Trade Technical Information. 1-4 credits, maximum 6. Prerequisite: consent of instructor. New developments in scientific and technical information and knowledge that are relevant to current trade practices.

4123*
Coordinating Trade and Industrial Youth Activities. Youth clubs in vocational education at local, state and national levels. Procedures for planning programs of work, incorporation of youth activities into curriculum, adviser characteristics and responsibilities, fund-raising activities, and techniques for recognizing outstanding members and community supporters.

4214*
Safety, Organization and Management of Learning Facilities. Techniques and procedures for organizing and managing shop and laboratory facilities and learner activities to enhance the quality of instruction and improve efficiency of equipment and space utilization including all safety rules and procedures.

4344*
Trade Analysis and Instructional Planning. Analysis of trades and occupational job activities; development of course outlines and specific instructional materials for shop and laboratory courses.

5114*
Interdisciplinary Cooperative Education. Prerequisites: 3203 and 4344. Techniques and procedures for coordinating cooperative education programs. Includes planning, organizing, implementing and evaluating effective cooperative programs.

5153*
Supervision of Vocational Education. Prerequisite: consent of instructor. Role and function of administrators responsible for supervising the planning, implementation and management of vocational education programs.

5223*
Evaluation of Instruction. Prerequisite: 4103. Principles of evaluation and methods for applying these principles to improve the effectiveness of vocational education programs.

5232*
Teaching Related Information. Selection of job-related topics common to most trades with procedures for incorporating those topics into the regular curriculum.

5313*
Guidance, Placement and Follow-Up in Occupational Education. Prerequisite: vocational teaching experience. Teacher-counselor cooperation in vocational student advisement, placement and follow-up.

5443*
Individualizing Competency-Based Instruction Programs. Develops knowledge and skills utilizing the concept of open entry/open exit necessary for planning, developing and implementing a competency-based vocational education program.

5552*
Education and Industry Relations. Prerequisite: vocational teaching experience. Techniques for establishing and maintaining positive relationships between vocational industrial education, industry and the community.

5662*
Conference Leading. Developing skills in organizing and leading conferences based upon individual and group behavior patterns.

5773*
Related Information for Interdisciplinary Cooperative Education. Prerequisites: 3203 and 4344. Selection, organization and application of resources materials for direct and indirect related study in part-time cooperative classes.

5882*
Practices and Problems of the Coordinator. Prerequisites: 3203 and 4344. Current practices and problems in planning and coordinating interdisciplinary cooperative programs.

5910*
Developing and Analyzing Teaching Content. 1-3 credits, maximum 6. Prerequisites: 4344 and consent of instructor. Provides opportunity for experienced teachers to incorporate the latest industrial technology into their course of study.

UNIVERSITY (UNIV)

1011
(S)American Studies Survey. Provides an overview of the United States society and culture using an interdisciplinary approach. Study of U.S. culture from sociological, anthropological, language, educational, political, geographical, economic, and historical perspectives.

2001
Academic Assessment and Evaluation. Prerequisite: acceptance into the University Academic Assessment Program or consent of instructor. Required for students in University Academic Assessment Program. Designed to help students identify reasons for experiencing academic difficulty; assess individual learning styles and personality types; understand the educational system and current issues in American education; develop goals, attitudes and study skills needed to achieve academic success; and explore careers, majors, and alternative educational experiences. Does not apply toward total hours for graduation.

2510
Innovative Studies. 1-3 credits, maximum 6. Lab 0-6. May be used for not more than two semesters for new or experimental topics or techniques.

3110
Directed Study. 1-6 credits, maximum 6. Prerequisite: written application approved by instructor, the department head, and the dean of the student's college. Independent study, research, field work or internship.

5940*
Career Orientation and Guidance. 1-3 credits, maximum 6. Developing models for career orientation: implementing programs of guidance for occupational choice. Employment opportunities and career development.

VETERINARY MEDICINE (VMED)

5111
Veterinary Medical Orientation I. Prerequisite: first-year standing in College of Veterinary Medicine. Veterinary medical terminology, history and ethics of the profession, veterinary surveys of the biological kingdom, selected techniques and clinical presentations, and special topics. Graded on pass-fail basis.

5221
Veterinary Medical Orientation II. Prerequisite: 5111. Major breeds of animals; veterinary perspectives concerning animal production and marketing systems; selected techniques and clinical presentations; and special topics. Graded on pass-fail basis.

6611*
Veterinary Medical Specialty Conference I. Prerequisite: third-year standing in College of Veterinary Medicine. Specialty conferences for third-year veterinary medical students presented by visiting professionals. A limited number of field trips will be conducted in which special presentations will be made.

6721
Veterinary Medical Clinic Conference I. Prerequisite: fourth-year standing in College of Veterinary Medicine. Presentation and discussion of selected clinical cases by fourth-year students and interdepartmental faculty groups. Graded on pass-fail basis.

6821
Veterinary Medical Clinical Conference II. Prerequisite: 6711. Presentation and discussion of selected clinical cases by fourth-year students and interdepartmental faculty groups. Graded on pass-fail basis.

VETERINARY MEDICINE AND SURGERY (VMS)

5412*
Jurisprudence and Medical Economics. Prerequisite: second-year standing in the College of Veterinary Medicine. Veterinary jurisprudence, medical economics, ethics, public relations, records, banking, insurance, U.S.D.A. and F.D.A. regulations. Visiting lectures in specialty areas assist in this course.

5422
Veterinary Surgery I. Prerequisite: second-year standing in the College of Veterinary Medicine. The pathophysiology of surgery including an introduction to techniques in veterinary surgery and anesthesiology.

5431*
Veterinary Radiology I. Prerequisite: second-year standing in the College of Veterinary Medicine. Veterinary radiology, radiological diagnosis and therapy; use of radioisotopes in veterinary medicine.

6516
Systemic Medicine and Diseases of Domestic Animals I. Prerequisite: third-year standing in College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of diseases of domestic animals.

6532
Radiology II. Prerequisites: 5431 and third-year standing in the College of Veterinary Medicine. Recitations and demonstrations pertaining to the interpretation of radiographs and evaluation of radiological therapy. Continuation of 5431.

6543
Clinical and Surgical Techniques I. Prerequisite: third-year standing in the College of Veterinary Medicine. Behavorial traits, physical examination and restraint of animals, introduction to clinical techniques of medicine and surgery relating to clinical handling of animals.

6614
Systemic Medicine and Diseases of Domestic Animals II. Prerequisite: third-year standing in College of Veterinary Medicine. Lectures and discussion of reproduction in domestic animals including principles of parturition and dystocia, genital diseases and breeding problems.

6615
Systemic Medicine and Diseases of Domestic Animals III. Prerequisites: 6614 and third-year standing in the College of Veterinary Medicine. Continuation of 6614.

6623
Surgery II. Prerequisites: 5422 and third-year standing in the College of Veterinary Medicine. Lectures and discussions in operative techniques and practice in veterinary surgery.

6642
Surgery III. Prerequisites: 6623 and third-year standing in the College of Veterinary Medicine. Lectures and discussions in anatomical topics, operative, techniques and practice in veterinary surgery.

6643
Clinical and Surgical Techniques II. Prerequisites: 6543 and third-year standing in College of Veterinary Medicine. Continuation of 6543.

6651
Foreign Animal Diseases. Prerequisite: third-year standing in College of Veterinary Medicine. Lectures and discussions involving diseases of the world. Emphasis on diseases which are a potential threat to United States livestock.

6703
Preceptorship Clinic. Prerequisite: fourth-year standing in College of Veterinary Medicine. Diagnosis, prognosis, prevention and treatment of diseases of animals presented in the preceptorship program.

6723*
Small Animal Surgery Clinic. Prerequisites: fourth-year standing in College of Veterinary Medicine. Diagnosis, prognosis, prevention and treatment of surgical diseases of small animals are studied by assignment to the Small Animal Surgery Section of the Boren Veterinary Teaching Hospital.

6753*
Small Animal Medicine Clinic. Prerequisite: fourth-year standing in College of Veterinary Medicine. Diagnosis, prognosis, prevention and treatment of diseases of small animals are studied by assignment to the Small Animal Medicine Section of the Boren Veterinary Medical Teaching Hospital.

6756
General Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnoses, prognoses, treatment, and prevention of animal diseases. Students conduct introductory clinical studies by assignments in the following: food animals, small animals, equine, radiology, surgery and anesthesiology.

6763*
Equine Medicine and Surgery Clinic. Prerequisite: fourth-year standing in College of Veterinary Medicine. Diagnosis, prognosis, prevention and treatment of diseases of Equidae are studied by assignment to the Equine Section of the Boren Veterinary Medical Teaching Hospital.

6764
Special Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Special assignments for introductory clinical studies in the following: selected species clinic; herd-health program; necropsy, clinical pathology and parasitology, diagnostic laboratory, and special aspects of the basic sciences.

6773*
Food Animal Medicine and Surgery Clinic. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, prevention and treatment of diseases of the various species of food animals are studied by assignment to the Food Animal Section of the Boren Veterinary Medical Teaching Hospital.

6783*
Field Services and Herd Health Clinic. Prerequisites: fourth-year standing in College of Veterinary Medicine. Diagnosis, prognosis, and treatment of animal disease cases presented to the Field Services unit and herd health studies of animals in herds, bands and flocks entered in health programs of the Boren Veterinary Medical Teaching Hospital.

6791
Elective I. Prerequisites: 6615 and fourth-year standing in the College of Veterinary Medicine. Elective for selected areas of medicine and surgery. The diagnosis, prognosis, prevention and treatment of diseases of animals.

6811
Special Lectures and Discussions. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Special lectures and discussions of selected topics in Veterinary Medicine and Surgery.

6813*
Intensive Care Clinic. Prerequisite: fourth-year standing in College of Veterinary Medicine. Diagnosis, prognosis and treatment of severe cases of animal disease including trauma cases.

6833*
Radiology Clinic. Prerequisite: fourth-year standing in College of Veterinary Medicine. Students study the science and art of radiographic techniques and interpretation while assigned to the Radiology Section of the Boren Veterinary Medical Teaching Hospital.

6843*
Anesthesiology Clinic. Prerequisite: fourth-year standing in College of Veterinary Medicine. Students study the science and art of anesthetizing large and small animals while assigned to the Anesthesiology Section of the Boren Veterinary Medical Teaching Hospital.

6856
General Clinic II. Prerequisites: 6756 and fourth-year standing in the College of Veterinary Medicine. Diagnoses, prognoses, treatment, and prevention of animal diseases. Students conduct continuing clinical studies by assignments in the following: food animals, small animals, equines, radiology, surgery and anesthesiology.

6864
Special Clinic II. Prerequisites: 6764 and fourth-year standing in the College of Veterinary Medicine. Special assignments for continuing clinical studies in the following: selected species clinic; herd-health program; necropsy, clinical pathology and parasitology, diagnostic laboratory, and special aspects of the basic sciences.

6891
Elective II. Prerequisites: 6615, 6756, and fourth-year standing in the College of Veterinary Medicine. Elective for selected areas of medicine and surgery.

6900*
Clinical Problems and Investigation. 1-6 credits, maximum 6. Prerequisites: 6756, or graduate standing in the College of Veterinary Medicine. Clinical research problems and techniques.

6910*
Advanced Clinics. 1-6 credits, maximum 6. Prerequisites: 6756, 6856, 6864, or graduate standing in the College of Veterinary Medicine. Diseases of animals.

6920*
Seminar. 1-3 credits, maximum 3. Prerequisite: graduate standing in the College of Veterinary Medicine or biological sciences. Literature and research problems pertaining to veterinary medicine and surgery.

6930*
Comparative Anesthesiology. 1-3 credits, maximum 3. Prerequisite: graduate standing in the College of Veterinary Medicine or consent of the head of the department. Anesthesiology of animals.

6940
Special Clinic III. 1-4 credits, maximum 4. Prerequisites: fourth-year standing in the College of Veterinary Medicine and consent of head of the department. Elective for selected areas of medicine and surgery. The diagnosis, prognosis, and treatment of diseases of animals in selected areas.

6950*
Special Surgical Problems and Techniques. 1-5 credits, maximum 5. Lab 3-5. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Advanced training in surgical problems and techniques especially as they are related to research.

VETERINARY PARASITOLOGY, MICROBIOLOGY AND PUBLIC HEALTH (VPARA)

3123
Animal Hygiene. Prerequisite: junior standing in the College of Agriculture. Principles of sanitation and of prevention and control of common diseases of livestock.

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: senior standing with registration for graduate credit or graduate standing. Research problem for credit in meeting requirements of the M.S. degree under the supervision of a graduate faculty member and with permission of the Department head.

5110*
Special Problems. 1-6 credits, maximum 6. Prerequisite: graduate standing or consent of department head. Special research problems in veterinary microbiology and parasitology.

5113*
Veterinary Immunology. Lab 3. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Basic principles of immunology and their application to veterinary medicine.

5213*
Diseases and Parasites of Wild Animals. Lab 1. Prerequisite: consent of instructor. A systematic approach to bacterial, viral and parasitic diseases of wild animals. Principles of disease transmission as it relates to individuals and populations of wild animals. Principles applicable to all areas of zoology, veterinary medicine and wildlife management. Same course as ZOOL 5593.

5224*
Veterinary Bacteriology. Lab 2. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Pathogenic bacteria of domesticated animals. Fungi pathogenic for domesticated animals and their relationship to public health.

5242*
Veterinary Biometry and Principles of Public Health. Prerequisite: first-year standing in the College of Veterinary Medicine. Statistics applied to biological observations applicable to veterinary medicine and principles of public health and epidemiology.

5313*
Veterinary Virology. Lab 3. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Viruses responsible for disease in domesticated animals.

5322*
Food Hygiene. Prerequisite: second-year standing in the College of Veterinary Medicine. Public health principles and standards applying to the maintenance of a wholesome food supply. Regulations and procedures for inspection of animals slaughtered for food and of food products of animal origin; and human nutrition, environmental and consumer aspects of food quality.

5323*
Introduction to Public Health. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Relationship and responsibilities of the veterinarian to public health programs. Topics in community and enviromental health.

5333*
Veterinary Parasitology. Lab 3. Prerequisite: second-year standing in the College of Veterinary Medicine or graduate standing with major in certain biological sciences. Protozoan and external parasites of domestic animals.

5404*
Techniques in Parasitology. Prerequisites: graduate standing and general parasitology; helminthology or concurrent enrollment. Experimental application of basic research and teaching techniques in helminthology and protozoology. Individual participation and analysis of experimental situations and techniques applicable to all areas of zoology.

5444*
Veterinary Parasitology. Lab 2. Prerequisite: second-year standing in the College of Veterinary Medicine or graduate standing with major in certain biological sciences. Internal helminth parasites of domestic animals.

5523*
Advanced Helminthology. Lab 3. Prerequisite: senior or graduate standing in zoology or entomology or graduate standing or consent of department head. Structure, taxonomy, life cycles and host-parasite relationships of helminth parasites affecting invertebrate and vertebrate animals.

5533*
Veterinary Virology. Prerequisites: 5313, MICRO 4124 or equivalent. Discussion of theoretical and practical problems relating to the molecular biology of virus replication including virus structure and replication strategies, virus-host cell interactions, and anti-viral mechanisms.

5613*
Biology of Parasites. Prerequisites: graduate standing, general parasitology, or consent of instructor. A systematic and ecologic approach to the study of parasitology. Host-parasite relationships, physiology, ecology and behavioral aspects of parasitic organisms.

5723*
Parasitic Protozoa. Lab 3. Prerequisite: graduate standing in zoology or entomology or consent of instructor. Structure, life cycle, physiology, host-parasite relationships, and diagnosis concerned with protozoan parasites.

5833*
Veterinary Diagnostic Microbiology. Lab 6. Prerequisite: graduate veterinarian status or consent of instructor. Laboratory methods employed in the isolation of microorganisms and application of these methods in the diagnosis of specific animal diseases.

6000*
Research Thesis. 1-11 credits, maximum 45. Prerequisite: candidacy for the Ph.D. degree. Research problems for graduate student to meet thesis requirement of the Ph.D. degree.

6110*
Seminar. 1-6 credits, maximum 6. Prerequisite: graduate standing. Subjects for study and discussion for graduate students.

6613*
Public Health and Preventive Medicine. Prerequisite: third-year standing in the College of Veterinary Medicine or consent of instructor. The relationship of zoonotic diseases to community and environmental health. Epidemiological principles in the practice of veterinary preventive medicine.

6711*
Veterinary Preventive Medicine. Prerequisites: fourth-year standing in the College of Veterinary Medicine or consent of instructor. The uses of epidemiology in the practice of veterinary preventive medicine.

6753*
Advanced Veterinary Epidemiology. Prerequisites: STAT 2013 or equivalent. The application of epidemiologic techniques to disease investigations in veterinary medicine. A group discussion format. Also a project involving the application of epidemiologic principle to population disease problems.

VETERINARY PATHOLOGY (VPATH)

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: graduate standing. Research in veterinary pathology. Graduate credit in meeting requirements of the M.S. degree.

5315*
Veterinary Pathology I. Lab 2. Prerequisite: second-year standing in the College of Veterinary Medicine or written consent of department head. Lectures in cellular and tissue pathology, pigments, inflammation, disturbances of growth and circulation lead into pathology of the various systems. The functional disturbances that accompany changes in structures, as well as the cause and pathogenesis of disease, are stressed. Students are taught to correlate altered structure and function with clinical signs.

5413*
Clinical Pathology. Prerequisite: second-year veterinary standing or graduate standing with consent of department head. Laboratory methods used in evaluation of pathology conditions in animals. Hematology, urinalysis and clinical chemistry.

5425*
Veterinary Pathology II. Lab 2. Prerequisite: 5315 or written consent of department head. Continuation of 5315.

5550*
Pathological Techniques and Special Problems. 1-4 credits, maximum 20. Prerequisite: graduate standing in biological sciences. Techniques and methods used in diagnosis, technical work and research in pathology.

6000*
Thesis. 1-15 credits, maximum 40. Prerequisite: graduate standing. Research in veterinary pathology. Graduate credit in meeting requirements of the Ph.D. degree.

6523*
Pathology of Infectious Diseases. Prerequisite: 5425. Pathology of specific infectious diseases of animals, including those communicable to man and methods employed in their diagnosis.

6613*
Avian and Laboratory Animal Diseases. Prerequisite: 5425 or written consent of department head. Biological characteristics, husbandry, diagnosis, prevention, and treatment of diseases of birds (including domestic poultry) and selected species of animals used in teaching and biomedical research.

6811
Differential Diagnosis. Prerequisite: fourth-year standing in the College of Veterinary Medicine. The differential diagnosis of diseases of domestic animals.

6823*
Diagnostic Pathology Clinic. Prerequisite: fourth-year standing in College of Veterinary Medicine. Participation in animal necropsy, dinical pathology and clinical parasitology laboratories to study diagnosis, prognosis, prevention and treatment of diseases.

6910*
Seminar. 1-2 credits, maximum 6. Prerequisite: graduate standing in biological sciences. Literature and research problems in veterinary pathology.

6920*
Diagnostic Pathology. 1-4 credits, maximum 20. Prerequisite: graduate standing in the College of Veterinary Medicine or written approval of department head. A weekly review of current cases submitted to the Department and the methods employed in their diagnosis. Students examine necropsy reports, species and preparations individually and are required to formulate their own diagnosis.

6930*
Laboratory Animal Pathology. 1-2 credits, maximum 2. Prerequisites: 6701 or written consent of department head. Etiology and pathogenesis of spontaneous and experimentally induced diseases of common used species of laboratory animals.

6933*
Neuropathology. Prerequisites: 5425, graduate standing and written consent of department head. Morphologic changes which occur in the nervous systems of the domesticated animals and the correlation of such lesions with recognized specific diseases.

6943*
Advanced Oncology. Prerequisite: 5315. Neoplastic diseases of animals with emphasis on morphologic characterization, etiology, metastatic propensities and mechanisms and comparative relationships among different animal species.

6950*
Advanced Systemic Pathology. 3-4 credits, maximum 18. Prerequisites: 5425, graduate standing or written consent of department head. Total credit not to exceed 6 for the M.S. degree and 12 for the Ph.D. Re-enrollment permits the study of 2 to 4 different groups of organs and systems of the animal body. A consideration of the pathogenesis and the morphological, biochemical, and comparative aspects of lesions found in organs and tissues of the domesticated animals.

6963*
Advanced Clinical Pathology. Prerequisites: 5425 or equivalent, graduate standing, and written consent of department head. Applied clinical biochemistry, organ function tests and related cytologic examination.

6973*
Advanced Hematology. Prerequisites: 5425, or equivalent, graduate standing, written consent of department head. The etiology and pathogenesis of the diseases of the blood and bone marrow.

ZOOLOGY (ZOOL)

2104
Human Anatomy. Prerequisite: BISC 1603. Gross anatomy of the human body and its systems based on comparisons with nonhuman mammals dissected in the laboratory, with minor emphasis on embryology and histology.

2513
(N)Introduction to Wildlife Conservation. Prerequisites: BISC 1114 or 1303. The profession of wildlife conservation; the interdisciplinary nature of wildlife conservation is emphasized by lectures, guest speakers, films, and slide presentations.

3013*
Biological Microtechnique. Lab 3. Prerequisite: BISC 1403 or 1603. Techniques for preparation of biological materials for microscopic examination. Same course as BOT 3013.

3104*
Invertebrate Zoology. Lab 4. Prerequisite: BISC 1603. Morphology, physiology, reproduction and ecology of major invertebrate groups.

3115*
Vertebrate Morphology. Lab 6. Prerequisite: BISC 1603. Comparative gross anatomy of representative vertebrates with consideration given to embryology, histology and evolution.

3123*
(N,SpD)Heredity and Man. Human heredity: the impact of genetics on human endeavor. For the nonmajor.

3133*
Evolution. Prerequisite: BISC 3003 or 3024. Development of the evolutionary concept: speciation, evolutionary mechanisms and phylogenetic concepts.

3143
Marine Ecology. Lab 2. Adaptation of organisms for life in the sea, food webs and mineral cycling, factors regulating community organization, and the sea as a resource.

3204
(N)Introductory Anatomy and Physiology. Lab 2. Prerequisites: CHEM 1215 or equivalent and BISC 1214 or equivalent. Structure and function of the mammalian body. Lab sections specialized in human or domestic animal physiology. No credit for students with prior credit in 4215.

3423
Field Ornithology. Lab 4. Field work in identification, habits and life histories of birds.

3500
Colloquium on Environmental Crises. 1 credit, maximum 4. Current environmental issues presented by films and speakers. Critiques written on several selected presentations.

3513*
Principles of Wildlife Ecology. Prerequisite: 60 credit hours, including BISC 3034. Application of ecological principles to the production and control of natural populations.

3604*
Vertebrate Natural History. Lab 6. Prerequisite: BISC 1603. Basic principles of vertebrate classification and functional organization: systematic, life histories, reproduction, behavior and ecological adaptations of vertebrates, emphasizing local fauna. One weekend field trip required.

3633
Regional Analysis and Planning. Prerequisite: BISC 1603. An introduction to methods of examining and analyzing regions. Examination and interpretation of the spatial, social and ecological aspects of regional planning. Same course as GEOG 3633.

3700
Readings and Special Studies in Zoology. 1-3 credits, maximum 6. Prerequisites: BISC 1603 and consent of instructor. Discussion of selected readings.

4103*
General Parasitology. Lab 2. Prerequisite: 3104. Fundamentals of parasitism with emphasis on: life cycles, disease conditions, epidemiology, diagnosis, treatment, historical significance, terminology, taxonomy and parasitological techniques.

4134*
(L)Embryology. Lab 4. Prerequisite: 3115, BISC 3014, or consent of instructor. Biochemical basis of development with emphasis on gene regulation. Comparative development of sea urchin, frog, chick and pig. Experiments using frog and mouse, including the molecular level.

4154*
Herpetology. Lab 6. Prerequisite: BISC 3034 or consent of instructor. Systematics, evolution, distribution, life histories, ecology, behavior, techniques of collection and preservation of North American reptiles and amphibians. Three weekend field trips required.

4164*
Ornithology. Lab 4. Prerequisite: BISC 1603. Classification, evolution, distribution, identification, life histories, and morphological, ecological and behavioral adaptations of birds. One weekend field trip required.

4174*
Mammalogy. Lab 4. Prerequisite: 3205 or consent of instructor. Classification, distribution, life histories, economic importance, techniques of field study, methods of collection and preservation of mammals.

4215*
Mammalian Physiology. Prerequisites: CHEM 3015 and BISC 1603. Descriptive and quantitative functional analysis of the mammalian nervous, endocrine, respiratory, excretory, digestive, cardiovascular, musculoskeletal and reproductive organ systems. For majors in basic biological (including premedical, pre-dental and preveterinary) sciences.

4222*
Mammalian Physiology Laboratory. Lab 6. Prerequisite: 4215. Laboratory experiments that illustrate function of organs, organ systems or mechanisms of whole body physiological control. For students majoring in basic biological sciences.

4231
Seminar in Physiology. Research and the integration of experimental biology with applied biology. Active participation by the student.

4243*
Introductory Pharmacology. Prerequisite: 3204 or 4215. Major drug classes based on their predominant use and/or principal activity in the body; basis for drug action; and modification of drugs and their action by physiological processes.

4253*
General Vertebrate Histology. Lab 3. Prerequisite: 3115 or consent of instructor. Cellular structure of tissues and organs.

4264*
Cell Physiology. Lab 2. Prerequisite: BISC 3014 or BIOCH 3653. Cellular activities and fundamental physiological processes.

4404*
Ichthyology. Lab 6. Prerequisite: 3115 or consent of instructor. Systematics, evolution, distribution and morphological, ecological and behavioral adaptations of fishes. Emphasis on Oklahoma forms. Two weekend field trips required.

4414*
Fisheries Management. Lab 4. Prerequisite: BISC 3034. Techniques and principles involved in management of fishes. Field trip fee required.

4434*
(L)Limnology. Lab 3. Prerequisite: BISC 3034. Physical, chemical and biological factors in lakes and streams.

4513*
Wildlife Management. Prerequisite: 3513. Biological basis for the management of wildlife populations and habitats, with emphasis on current management problems.

4523*
Wildlife Management Techniques. Prerequisite: 4513, ENGL 3323 strongly recommended. The semistructured format includes problem identification, project planning and design, land use surveys and mapping, wildlife populations and habitat analysis, data interpretation, development of project area research/management recommendations and report preparation and presentation.

4532*
Zoo Biology. Lab 3/day. Prerequisite: 4 hours of zoology or biology. An extension course taught at the Oklahoma City Zoo. Conservation of endangered species, animal acquisition and transport, restraint, sanitation and animal health, behavior, exhibit planning and architecture, zoo administration and research potential. Students undertake a research project in exhibit design. Lecturers include professional staff members of the Oklahoma City Zoo and guest speakers.

4700
Undergraduate Research Problems. 1-4 credits maximum 4. Prerequisite: consent of instructor. Participation in faculty research and/or execution of a problem formulated by the student.

4750
Honors Study in Zoology. 1-5 credits, maximum 5. Prerequisites: 90 credit hours, GPA of 3.30 in 16 or more hours in zoological courses, approval of Department head and proposed supervising instructor. Individual study in the development of zoological concepts. Extensive reading, literature search and special experimentation. An individual problems course for the gifted student.

5000*
Research for Master's Thesis. 1-6 credits, maximum 6. Prerequisite: approval of major adviser. Independent research for the M.S. thesis under the supervision of graduate faculty member.

5010*
Graduate Seminar. 1-3 credits, maximum 10. Prerequisite: consent of instructor. Discussion of selected topics.

5020*
Special Problems. 1-4 credits, maximum 10. Prerequisites: graduate standing and consent of instructor. A report of results obtained is to be placed in Department files.

5030*
Teaching Zoology. 1-4 credits, maximum 4. Prerequisites: senior or graduate standing and consent of Department head. Supervised teaching in the department laboratories. Attendance at seminar on problems involved in teaching zoology in college.

5110*
Problems in Physiology. Prerequisite: consent of instructor. Investigations in physiology for graduate and advanced undergraduate students. Same course as PHSI 5110.

5113*
Ethology. Lab 3. Prerequisite: consent of instructor. The development of ethological principles and their use in analyzing the organization, function and causation of behavior. Emphasis on the adaptiveness of vertebrate behavior and the use of behavior in clarifying evolutionary relationships.

5123*
Behavioral Ecology. Prerequisite: BISC 3034 or equivalent. Analysis and description of the behavior of animals in their natural environment, especially in terms of natural selection and adaptation. A synthesis of ethology, population genetics, sociobiology, and evolutionary theory. Largely descriptive and generalized with limited emphasis on mathematical theory.

5133*
Evolutionary Ecology. Lab 2. Prerequisite: BISC 3034. Ecological concepts dealing with contemporary evolutionary processes, not phylogeny. Life history traits, R and K selection, sociality, kin and group selection, speciation, competition, predation, plant-animal coevolution, niche theory, species diversity and biogeography. General models and mechanisms, with examples drawn from all kingdoms.

5143*
Ecological Computer Modeling. Lab 3. Prerequisites: BISC 3034; BISC 5133 strongly recommended. Use of BASIC to write programs that model simple concepts in ecology and behavioral biology. Use of interactive program packages that model more complex ecological and evolutionary phenomena at the computer console. No prior experience with computers or programming necessary.

5203*
Physiological Systems Modeling. Lab 1. BASIC programs to model and analyze simple physiological processes. Models to evaluate more complex physiological processes. No prior experience with computers or programming necessary.

5213*
Comparative Physiology. Prerequisites: 4264, BISC 3014, or BIOCH 3653. Comparison of circulation, digestive, excretory, and sensory systems of vertebrates and invertebrates. Same course as PHSI 5213.

5223*
Membrane Biophysics and Bioenergetics. Prerequisites: PHYSC 1214, and BISC 3014 or BIOCH 4113 or CHEM 3354 or PHYSC 3313. Application of biophysical, biochemical and biological techniques to the study of the structure and function of membranes and membrane components; kinetic measurements, spectroscopic techniques and diffractive techniques. Application of these illustrated with current research problems. Same course as PHYSC 5353.

5413*
Principles of Ecotoxicology. Prerequisites: BIOCH 3653 and consent of instructor. Integration of major processes involved with transport, exposure and response of biological systems to xenobiotics.

5424*
Analysis of Environmental Contaminants. Lab 6. Prerequisites: organic chemistry and graduate standing. Analytical methods for measuring environmental contamination or pollution; toxicity bioassay, gas chromatography, atomic absorption, infrared and ultraviolet spectrometry.

5433*
Advanced Fishery Science. Lab 4. Prerequisites: 4404, 4414, 4434, and 6 credit hours of statistics or consent of instructor. Application of ecological and evolutionary theory to problem solving in fishery research and management.

5443*
Aquaculture. Lab 2. Prerequisite: graduate standing or consent of instructor. Environmental and nutritional requirements, diseases and cultural practices affecting growth and production of aquatic animals. Three weekend field trips required.

5493*
Wildlife Nutritional Ecology. Prerequisite: 4523. Basic nutritional principles for application in solving wildlife and fisheries management problems. Importance of nutrition in regulating wild animal populations through examination of the effects of malnutrition on recruitment, growth, disease, and survival. Techniques and skills for assessing both the nutritional suitability of the habitat and condition of the population.

5504*
Biology of Fishes. Lab 6. Prerequisites: 4404, 4434. Ecology, food habits, behavior, life histories and distribution of fishes.

5523*
Early Life History of Fishes. Lab 3. Prerequisites: 4404 and graduate standing or consent of instructor. Early life stages of fishes and the environmental factors influencing growth and survival during the first year of life.

5533*
Water Pollution Ecology. Lab 6. Prerequisite: 4434 or consent of instructor. Effects of pollution on the ecology of aquatic ecosystems. Effects of contaminants on the structure and function of ecosystems; ecology of plankton, fish and benthic macroinvertebrates.

5552*
Population Dynamics. Prerequisites: BISC 3034, STAT 4013. Quantitative approaches to population parameters and related processes. Natural regulation of numbers emphasized.

5563*
Woodland Wildlife Ecology. Lab 3. Prerequisite: 4513 or BISC 3034. Vertebrate species diversity in the world's woodland and forested biomes. Changes imposed by land clearing and development and their effects upon wildlife diversity and populations. Options for wildlife conservation, from strict nature reserves to integrating wildlife habitat management into land use practices. Field trip required.

5573*
Grassland and Desert Wildlife Ecology. Prerequisite: BISC 3034. Ecology of grasslands and deserts with emphasis on vertebrate species diversity, adaptations to semi-arid and arid ecosystems, and management problems associated with such habitats.

5583*
Wetland Wildlife Ecology. Lab 3. Prerequisite: 4513 or consent of instructor. Ecology of various types of wetlands with emphasis on the management problems for waterfowl and furbearers.

5593*
Diseases and Parasites of Wild Animals. Lab 2. Prerequisite: consent of instructor. A systematic approach to bacterial, viral and parasitic diseases of wild animals. Principles of disease transmission as it relates to individuals and populations of wild animals. Principles are applicable to all areas of zoology, veterinary medicine and wildlife management. Same course as VPARA 5213.

6000*
Research for Ph.D. Dissertation. 1-15 credits, maximum 30. Prerequisite: 30 credit hours of acceptable graduate work. Independent research for the Ph.D. dissertation under the supervision of a graduate faculty member.

6110*
Advanced Physiology of Selected Systems. Prerequisite: 4215 or PHSI 5125. Advanced studies in gastrointestinal, cardiovascular, respiratory, excretory and neuroendocrine physiology. Each part of this sequential course may be taken for two hours credit. Student should ascertain the topics before registering for this course a second time. Same course as PHSI 6110.

INDEX

A

Abbreviations of Course Listings, 145
Academic Regulations, 25
Accounting, 62, 146
Accreditation, 6
  see also specific colleges
Activities, Student, 18
Adding Courses, 11
Administration
  Administrative Services, 62
  Higher Education/Educational Administration, 71, 173
  University, 2
Admission
  Application, 7
  Freshman, 7, 8, 9
  High School Preparation for, 8
  International Student, 9
  Nonresident, 9
  Readmission, 7, 9
  Resident, 8
  Transfer, 7, 9
Admission to the Graduate College
  Chart, 113
  Departmental or Program Requirements, 117
  International, 116
  Test Scores, 116
  Transfer Credits, 117
Adult Education/Occupational, 73, 212
Advanced Standing Program, 8, 19
Advertising, 52
Advisement, 20
Aerospace/Mechanical Engineering, 87, 205
Aerospace Studies (Air Force), 53, 146
Agricultural
  Communications, 33
  Economics, 33, 147
  Education, 34, 148
  Engineering, 34, 80, 149
Agriculture, College of, 32
  see also specific subjects
  General, 35, 149
  Mechanized, 34, 208
Agronomy, 36, 150
ALPHA Program, 11
Alumni Programs and Services, 24
Animal Science, 37, 151
Anthropology, 57, 153
Apartments, University, 17
  Rates, 14
Application
  Admission, 7
  Housing, 7
Applied Behavioral Studies, 68, 153
Architecture, 81, 155
Area Studies Certificates, 41
Art, 43, 156
Arts and Sciences, College of, 40, 157
  see also specific subjects
Assistantships, Teaching and Research, 110
Astronomy, 158
Athletics, 158
Auditing
  Faculty and Staff, 12
  Fee, 13
Aviation and Space Education, 69, 158

B

Bachelor's Degrees, 31
  see also specific colleges
Behavioral Studies, Applied, 68, 153
Biochemistry, 37, 158
Biological Science, 59, 159
Botany, 44, 159
Broadcasting/Journalism, 51, 198
Business Administration, College of, 61
  see also specific subjects
  Department of, 63, 160
Business Communications, 160
Business Education, 161
Business Law, 161
Business Professions, 161

C

Calendar
  University, 4
  Graduate College, 107
Certificates, Area Studies, 41
  Women's Studies, 41
Chemical Engineering, 82, 161
Chemistry, 45, 162
Child Development/Family Relations, 91, 180
Chinese, 163
Civil Engineering, 83, 163
Clothing, Textiles & Merchandising, 91, 166
College of
  Agriculture, 32
  Arts and Sciences, 40
  Business Administration, 61
  Education, 67
  Engineering, Architecture and Technology, 76
  Graduate, 107
  Home Economics, 90
  Osteopathic Medicine, 97
  Veterinary Medicine, 99
Communications
  Agricultural, 33
  Mass, 203
  Speech, 57, 222
Community Services/Home Economics Education, 94, 191
Computer/Electronics Technology, 88, 176
Computer Engineering/Electrical, 84, 174
Computer Systems/Management Science, 65
Computing and Information Science, 46, 167
Construction Management Technology, 88, 168
Consumer Studies/Housing, Interior Design, 95, 193
Corrections, *see Sociology*
Costs
  Auditing, 13
  Correspondence Courses, 13
  Estimated, 15
  Extension Courses, 13
  Facilities and Special Services, 13
  Faculty/Staff Members, 14
  General Fees (Nonresidents), 13
  General Fees, (Residents), 13
  Graduate Assistants, 14
  Graduation Fee, 13
  Obligation, 15
  Residence Hall Rates, 14
  Special Class Charges, 13
  University Apartments, 15
  Veterinary Medicine, 13
Counseling Services, 17
Course Listings, 145
Curriculum and Instruction Education, 70, 169

D

Degrees
  Agriculture, 32
  Arts & Sciences, 40
  Business, 61
  Education, 67
  Engineering, Architecture and Technology, 76
  Graduate, 119, 122, 123, 126
  Home Economics, 90
  Osteopathic Medicine, 97
  Veterinary Medicine, 99
  University Studies, 18
    Extended Studies, 18
  Listing, 31
Dentistry, Pre, 41
Disabled Student
  Housing, 17
  Services, 18
  see also Facilities
Disruption of the Educational Process, Regents' Resolution, 30
Doctoral Degrees, 122, 123
  see also specific departments
Dropping Courses, 11
  Refund Policy, 14

E

Ecology, Wildlife and Fisheries, 59
Economics, 63, 171
Education, College of, 67, 172
  see also specific subjects
Educational Administration and Higher Education, 71, 173
Electrical and Computer Engineering, 84, 174
Electrical Power Technology, 176
Electronics and Computer Technology, 88, 176
Employment, *see Financial Aid*
Engineering, Architecture and Technology, College of, 76, 177
  see also specific subjects
  Admission, 10, 77
  General, 85, 185
  Science, 177
  Technology, 87
English, Department of, 46, 177
Enrollment Procedure
  Continuing, 11
  Faculty, Staff, 12
  First-time, 11
  Graduate, 117
  Transfer Students, 11
Entomology, 38, 179
Environmental Science, 112, 180
Expenses, *see Costs*
Extended Studies, *see University Studies, Bachelor of*

F

Facilities, 6, 21, 109
Family Relations and Child Development, 91, 180
Fees, *see Costs*
Finance, 64, 181
Financial Aid
  see also specific colleges
  Employment, 16
  for Graduate Students, 110
  Grants, 16
  Loans, 16
  Scholarships, 16
  Work-study, 16

Fire Protection and Safety Technology, 88, 182
Food, Nutrition and Institution Administration, 93, 182
Food Science, 112
Foreign Languages and Literatures, 48, 183
see also specific subjects
Forestry, 38, 184
Former Students, Readmission, 7, 9
Foundation, OSU, 24
Fraternities/Sororities, *see Greek Organizations*
French, 185
Freshman
Enrollment, 11
Nonresidents, 9
Oklahoma Residents, 8

G
General Administration, 185
General Education, 6
see also specific colleges
General Engineering, 85, 185
General Technology, 88, 185
Genetics, 186
Geography, 48, 186
Geology, 49, 187
German, 188
Graduate
Calendar, 107
Centers, 111
College, 107, 188
Council and Members, 108
Enrollment, 117
Programs, *see specific departments*
Regulations, 116
Graduation Requirements, *see Academic Regulations*
see also specific colleges
Greek, 188
Greek Organizations, 23
Grants, *see Financial Aid*

H
Health, 49, 188
Health Services, 17
Health, Physical Education and Leisure, 49, 189
High School Preparation, 8
see also specific colleges
Higher Education/Educational Administration, 71, 173
History, 50, 189
Home Economics
College of, 90
see also specific subjects
Department of, 94, 191
Education and Community Services, 94, 191
Honor and Service Organizations, 24
see also specific colleges
Honors Program, 18
see also specific colleges
Horticulture and Landscape Architecture, 39, 192, 199
Hospital, *see Health Services*
Hotel & Restaurant Administration, 95, 193
Housing
Application, 7
Disabled Student, 17
Greek Organizations, 23
Residence Halls, 16
University Apartments, 17
Housing, Interior Design and Consumer Studies, 95, 193

I
Identification Cards, 11
Industrial Engineering and Management, 86, 195
Industrial Technology Education, 72, 197
Interdisciplinary Studies, 197
Interior Design/ Housing, Consumer Studies, 95, 193
International Student
Admission, 9
Graduate Admission, 116
Services, 18
Status Maintenance Fee, 13

J
Japanese, 197
Journalism and Broadcasting, 51, 198

L
Landscape Architecture/Horticulture, 39, 192, 199
Latin, 199
Law, Pre-, 19
see also specific colleges
Leisure, 49, 199
Library Science, 42, 200
Loans, *see Financial Aid*

M
Major fields, *see specific colleges & degree listing*
Management, 64, 200
Management Information Systems, 65
Management Science & Computer Systems, 65
Manufacturing Systems Engineering, 112
Manufacturing Technology, 88, 202
Marketing, 65, 202
Marketing Education, 73, 202
Mass Communications, 203
Master's Degrees, 119
see also specific departments
MASUA Traveling Scholar Program, 19, 111
Mathematics, 52, 203
Mechanical and Aerospace Engineering, 87, 205
Mechanical Design Technology, 89, 207
Mechanical Power Technology, 89, 207
Mechanized Agriculture, 34, 208
Medical Technology, 44, 208
Medicine
Osteopathic, 97
Pre-, 19
see also specific colleges
Veterinary, 99
Merchandising/Clothing, Textiles, 91, 166
Microbiology, 44, 208
Military Science, 53, 209
Military Service
Fee Refund Policy, 14
Military Studies, Departments of, 53
Aerospace Studies, 53, 146
Military Science, 53, 209
Minority Programs and Services, 18
Minors, 41
Mission of the University, 6
Music, 54, 209
Fees, 13

N
Natural Science, 54, 112, 212
Nonresidents of Oklahoma
Costs, 13
Freshmen, 9
Pre-engineering, 9, 77
Transfers, 9
Nutrition/Food, and Institution Administration, 93, 182

O
Occupational and Adult Education, 73, 212
Off-Campus Program, 111
Office Management, 212
Oklahoma City, OSU Technical Branch, 25
Okmulgee, OSU Technical Branch, 25
Organizations
Greek, 23
Honor and Service, 24
see also specific colleges
Osteopathic Medicine, College of, 97
Osteopathy, Pre-, 41

P
Parking
Fees, 13
Regulations, 11
Pathology
Plant, 39, 216
Speech, 57, 223
Veterinary, 100, 227
Personnel Management, 64
Petroleum Technology, 89, 212
Philosophy, 54, 213
Physical Education, 50, 213
Physical Examination, 7
Physics, 55, 214
Physiology, 59
Physiological Science, 99, 215
Placement, University, 21
Plant Pathology, 39, 216
Political Science, 55, 216
Preprofessional Programs, 19
see also specific colleges
Privacy, Students' Rights, 12
Professional Degrees, Doctor of
Osteopathy, 97
Veterinary Medicine, 99
Profile, Student, 6
Psychology, 56, 218
Public Relations, 52

R
Radio/TV/Film, 52
Readmission, 7, 9
Research Centers, 109
Refund, Withdrawal and Drop Fee Policy, 14
Regents
for Higher Education, State, 2
for OSU, Board of, 2
Regulations
Academic, 25
Graduate, 116
Parking, 11
Religious Studies, 56, 220
Residence Halls
Life, 16, 24
Rates, *see Costs*
see also Housing
Residency Status, 7
Residents
Costs, 13
Freshmen, 8
High School Seniors, 8

Special Adult Admission, 8
Transfers, 9
Restaurant Administration/Hotel, 95, 193
ROTC, see *Military Studies, Departments of*
Russian, 220

S
Safety Technology/Fire Protection, 88, 182
Scholarships, *see Financial Aid*
Science, *see specific subjects*
Scholarship-Leadership Enrichment Program, 19
Semester at Sea, 19
Sociology, 56, 220
Sororities/Fraternities, *see Greek Organizations*
Space Science Education, 69
Spanish, 222
Specialist in Education Degrees, 126
see also specific departments
Speech Communication, 57, 222
Speech & Language Pathology & Audiology, 57, 223
Statistics, 58, 223
Study Abroad, 19

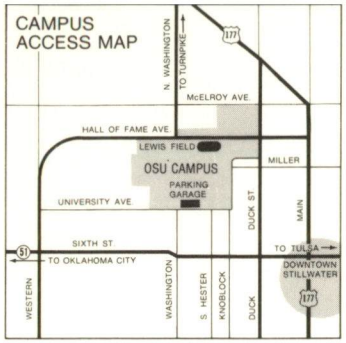
T
Teacher Education Programs, 73
Graduate, 111
Technical
Branch, Oklahoma City, 25
Branch, Okmulgee, 25
Education, 73, 224
Technology, Division of Engineering, 87
General, 88, 185
Theater, 58, 224
Trade and Industrial Education, 73, 225
Transcripts, 12
Transfers
Enrollment, 11
Graduate College, 117
Nonresidents, 9
Residents, 9
Tuition, *see Costs*
Tulsa, University Center at, 19, 111

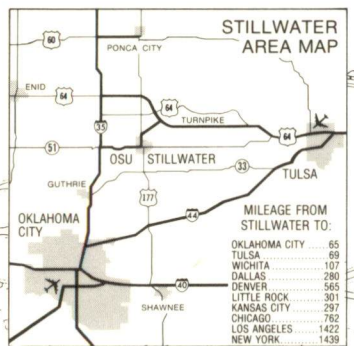
U
University, 225
University Center at Tulsa, 19, 111
University Studies, Bachelor of, 18
see also specific colleges

V
Vehicle Registration and Parking Regulations, 11
Veterinary Medicine, College of, 99, 226
Costs, 13
Medicine and Surgery, 100, 226
Parasitology, Microbiology and Public Health, 100, 227
Pathology, 100, 227
Pre-, 33, 41

W
Wildlife and Fisheries Ecology, 59
Withdrawing from the University, 11
Refund Policy, 14
Women's Studies Certificate, 41

Z
Zoology, 59, 228





Alphabetical Index

33 Architecture
55 Animal Disease Diagnostic Laboratory
84 Animal Sciences
56 Agricultural Center
63 Agricultural Engineering Laboratory
81 Agriculture
37 Athletic Dressing Room
101 Architectural Services and Physical Plant Administration
133 Baseball Stadium (Reynolds)
5 Bennett Memorial Chapel
132 Bennett Hall
54 Bovine Laboratory
58 Brumley Apartments
10 Business Administration
130 Ceramics/Sculpture
15 Civil Engineering
13 Classroom Building
59 Colvin Center Annex
60 Colvin Physical Education Center
113 Construction Laboratory 1 - Fire Tech
114 Construction Laboratory 2 - Const. Tech
62 Controlled Environment Laboratory
28 Cordell
32 Crutchfield
25 Dairy
29 Diesel Laboratory
127 Driver's Training Range
68 Drummond Hall
116 Electronics Laboratory
17 Engineering North
16 Engineering South
123-6 Family Housing
115 Fire Protection Publications Warehouse
121 Fire Publications and Training
2 Fire Station No. 2
119 Fluid Power Research Center
35 Football Offices
36 Gallagher-Iba Arena
4 Gundersen
11 Hanner
117 Hazardous Reaction Laboratory
61 Headhouse and Greenhouse
14 Home Economics East
80 Home Economics West
64 Iba Hall
31 Industrial Arts
6 Journalism and Broadcasting (Miller)
69 Kerr-Drummond Cafeteria
70 Kerr Hall
18 Library (Edmon Low)
23 Life Sciences East
22 Life Sciences West
21 Mathematical Sciences
83 Meat Laboratory
134 Mechanical Engineering Laboratory
9 Morrill
50 Motor Pool and Garage
26 Noble Research Center
77 North Murray
1 Old Central Museum of Higher Education
73 Parker Hall
3 Performing Arts (Seretean Center)
118 Petroleum Technology Classroom
120 Petroleum Technology Warehouse
100 Physical Plant Services
24 Physical Sciences
108 Plant Sciences and Water Conservation Laboratory
85 Poultry
27 Power Plant
135 President's Home
79 Public Information
30 Radiation Laboratory
72 Scott Hall
74 Scott-Parker-Wentz Cafeteria
76 South Murray
34 Stadium (Lewis)
75 Stout Hall
82 Student Health Center
110 Student Services Maintenance
111 Student Services Warehouse
7 Student Union
8 Studio Arts (Bartlett Center)
78 Telecommunications Center
12 Thatcher
129 Track and Field Center (Droke)
122 University Printing/Central Mailing
57 USDA
53 Veterinary Medical Teaching Hospital (Boren)
51 Veterinary Medicine
112 Vo-Tech Education Warehouse
109 Vo-Tech Print Shop
71 Wentz Hall
20 Whitehurst
19 Willard
66 Willham Cafeteria
65 Willham Hall North
67 Willham Hall South
38 Wrestling Hall of Fame

Academic

81 Agriculture
23 Arts and Sciences
10 Business Administration
4 Education
17 Engineering, Architecture and Technology
80 Home Economics
20 Graduate College
51 Veterinary Medicine
18 Library

Administration

20 Bursar
20 Budget
20 Controller
20 Enrollment Information
20 Grants and Contracts
20 Personnel Office
20 President's Office
20 Vice President, Academic Affairs and Research
20 Vice President, Business and Finance
20 Vice President, Student Services
20 Vice President, University Relations and Extension

Athletics

36 Athletic Ticket Office
133 Baseball Stadium
34 Football Stadium
36 Gallagher-Iba Arena
60 Physical Education Center
129 Track and Field Center

Research Facilities

81 Agricultural Experiment Station
16 Bioenvironmental Engineering Laboratory
61 Cereal Insects Laboratory
15 Civil Engineering Laboratory
113 Construction Laboratory 1 - Fire Technology
114 Construction Laboratory 2 - Construction Technology
106 Dairy Cattle Center
16 Electrical Engineering Laboratory
116 Electronics Laboratory
22 Entomology
119 Fluid Power Research Center
31 General Technology Laboratory
83 Meat Laboratory
134 Mechanical Engineering Laboratory
28 NASA/Aerospace Education Services Project
55 Oklahoma Animal Disease Diagnostic Laboratory
108 Plant Science Research
85 Poultry
102 Sheep Research
56 USDA
53 Veterinary Medical Teaching Hospital
1 Museum of Higher Education
57 OSU Museum

Residence Halls

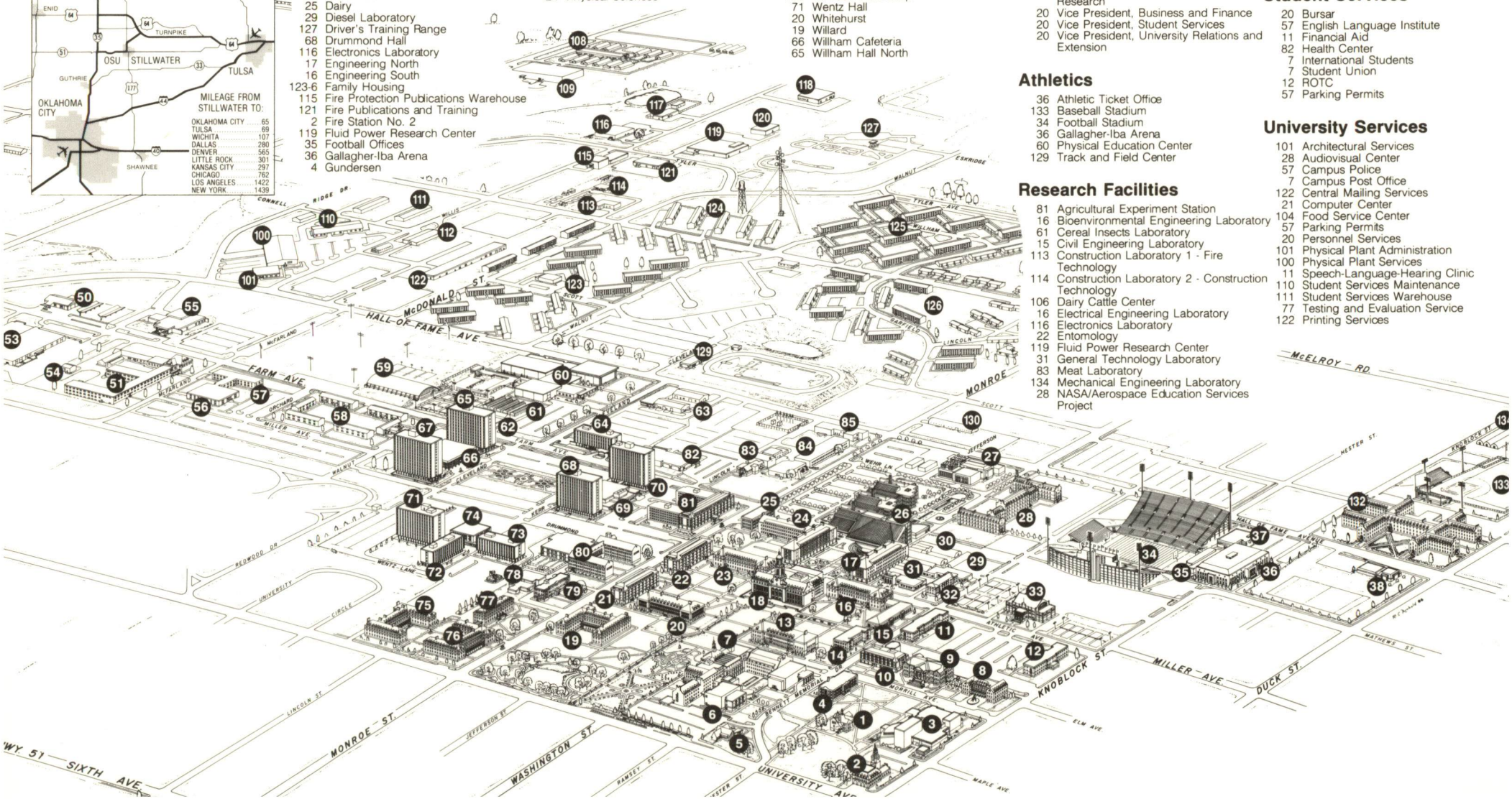
132 Bennett
58 Brumley
68 Drummond
64 Iba
70 Kerr
73 Parker
72 Scott
75 Stout
71 Wentz
65 Willham North
67 Willham South

Student Services

20 Bursar
57 English Language Institute
11 Financial Aid
82 Health Center
7 International Students
7 Student Union
12 ROTC
57 Parking Permits

University Services

101 Architectural Services
28 Audiovisual Center
57 Campus Police
7 Campus Post Office
122 Central Mailing Services
21 Computer Center
104 Food Service Center
57 Parking Permits
20 Personnel Services
101 Physical Plant Administration
100 Physical Plant Services
11 Speech-Language-Hearing Clinic
110 Student Services Maintenance
111 Student Services Warehouse
77 Testing and Evaluation Service
122 Printing Services



Office of the Registrar
Oklahoma State University
Stillwater, OK 74078

NONPROFIT
ORGANIZATION
U.S.
POSTAGE
PAID
STILLWATER, OK
74078
Permit No. 191

$2.50

OKLAHOMA STATE UNIVERSITY
CENTENNIAL
1890 • 1990

This publication is printed and distributed by Oklahoma State University as authorized by the Office of the Registrar. 20,000 copies printed at a cost of $24,140.

OFFICE OF
PRESIDENTIAL ADVANCE

COVER PAGE

TO: C. CAWLEY

FROM: M. LUKENS

TOTAL NUMBER OF PAGES: 2
(including cover page)

DATE: 5-1

TIME: 0900

MESSAGE: FYI

NEL

IF YOU HAVE ANY QUESTIONS OR PROBLEMS WITH THE TRANSMISSION PLEASE CALL.

TELEPHONE NUMBER: _____

Additionally, we hope that you will check the status of OSU's bid with the Department of Defense to serve as the network coordinator for a military tele-training network:

DABT 60-90-R-0010
TRADOC Contracting Activity
Building 1748
Attn: ATCA (Maj. Greuling)
Fort Eustis, Virginia 23604-5538

Additional items with respect to the brief reception being held in our Coaches' Building with the President prior to commencement will be: 1) getting approval for our OSU photographic staff to take pictures during the activity, and 2) placing the academic robes and regalia of the platform party in the Coaches' Building in advance to the President's arrival so that they can be thoroughly examined.

We look forward to having you and the Advance Team in Stillwater.

HWB:ar

Attachments

FAX 202/456-6218

To C. CAWLEY

THE WHITE HOUSE
WASHINGTON

(508)
693 - 1926

David McCullough

John Gable (516)
922-1221

OSU

Oklahoma State University

STILLWATER, OKLAHOMA 74078
STUDENT UNION 470
(405) 744-5362

OFFICE OF THE VICE PRESIDENT FOR
UNIVERSITY RELATIONS AND PUBLIC AFFAIRS
AND
EXECUTIVE DIRECTOR OF THE INSTITUTE FOR
INTERNATIONAL TRADE AND ECONOMIC DEVELOPMENT

TO: Carolyn Cawley

Phone # 202-456-7750 FAX #

FROM: Harry W. Birdwell

DATE: April 30, 1990

SUBJECT:

Number of pages including this cover page: 11

CENTENNIAL
1890 • 1990

Celebrating the Past . . . Preparing for the Future

DOUG GAMBLE

424 - 36th Place
Manhattan Beach, CA 90266
(213) 546-6409

4/30/90

To MARK LANGE

Hi Mark,

I faxed three pages to you on Saturday. I don't know if you were there to receive it or ~~nx~~ not.

Please let me know if it didn't get to you and I'll transmit again.

Thanks.

Doug

OSU

Oklahoma State University

STILLWATER, OKLAHOMA 74078
STUDENT UNION 470
(405) 744-5362

OFFICE OF THE VICE PRESIDENT FOR
UNIVERSITY RELATIONS AND PUBLIC AFFAIRS
AND
EXECUTIVE DIRECTOR OF THE INSTITUTE FOR
INTERNATIONAL TRADE AND ECONOMIC DEVELOPMENT

TO: Carolyn Cawley

Phone # 202-456-7750 FAX #

FROM: Harry W. Birdwell

DATE: April 30, 1990

SUBJECT:

Number of pages including this cover page: 11

I'm re-sending this. Not all the pages went through the first time.

CENTENNIAL
1890 • 1990

Celebrating the Past . . . Preparing for the Future

1990 COMMENCEMENT
PLATFORM PARTY

OSU PRESIDENT:
Dr. John R. Campbell

SPEAKER/HONORARY DEGREE RECIPIENT:
U.S. President George Bush

HENRY G. BENNETT RECIPIENTS:
Mrs. Barbara Bush
Mr. H. P. Donnelley
Chief Wilma Mankiller

SECRETARY OF EDUCATION:
Lauro Cavazos

OKLAHOMA GOVERNOR:
Governor Henry Bellmon

OKLAHOMA CONGRESSIONAL DELEGATION:
The Honorable Jim Inhofe, 1st Congressional District
The Honorable Wes Watkins, 3rd Congressional District
The Honorable Don Nickles, U. S. Senator

OSU BOARD OF REGENTS:
Mr. L. E. "Dean" Stringer, Chairman,
(Attorney, Crowe & Dunlevy, Oklahoma City, Oklahoma)
Mr. Ed Malzahn, Vice Chairman
(Businessman/Farmer, Perry, Oklahoma)
Mrs. Carolyn Savage
(Ranching & Business Enterprises, Hominy, Oklahoma)
Mr. Jack Craig
(President, State Board of Agriculture, Oklahoma City)
Dr. John Montgomery
(Retired Veterinarian, Poteau, Oklahoma)
Mr. Robert "Robbie" Robbins IV
(Farmer, Altus, Oklahoma)
Mr. Jimmie C. Thomas
(Rancher/Businessman, Ada, Oklahoma)
Mr. Jerrell Chesney
(Chief Exec. Officer, OSU Board of Regents, Shawnee, Oklahoma)

STATE REGENTS FOR HIGHER EDUCATION:
Mr. James Barnes, Chairman of the Board and President and Chief Executive Officer of MAPCO, Inc., a Tulsa-based energy company.
Dr. Donald Halverstadt, Physician, Oklahoma City, Oklahoma
Mr. George Weyerhaeuser, Vice President and Mill Manager of the Weyerhaeuser Paper Company, Valliant, Oklahoma
Mr. Bob Allee, Rancher, Elk City, Oklahoma
Mr. J. D. Helms, Attorney, Linn & Helms, Oklahoma City, Oklahoma
Dr. Ed Calhoon, Physician, Beaver, Oklahoma
Ms. Avalon Reece, Counselor, Muskogee High School, Muskogee, Oklahoma
Mrs. Ann Woolley, Owner of a commercial cow/calf ranch, Ada, Oklahoma
Dr. Hans Brisch, Chancellor

(Platform Party cont.)

OSU DEANS:

Dr. Joe Alexander, Dean, College of Veterinary Medicine
Dr. Charles Browning, Dean, College of Agriculture
Dr. Norman Durham, Dean, Graduate College
Dr. Smith Holt, Dean, College of Arts and Sciences
Dr. Ken King, Dean, College of Education
Dr. Patricia Knaub, Dean, College of Home Economics
Dr. Karl Reid, Dean, College of Engineering, Architecture and Technology
Dr. Robert Sandmeyer, Dean, College of Business Administration

Dr. Edward Johnson, Dean of Libraries

STUDENTS REPRESENTING EACH COLLEGE:

Deborah Ragland, Ph.D. Environmental Science, Graduate College
Paul Chapman, M.S., Forest Resources, Graduate College
John Otto, Doctor of Veterinary Medicine
Diane K. Hufnagel, B.S. Agricultural Economics, College of Agriculture
Kimberly McCoy, B.A. History, College of Arts and Sciences
Theresa Marie Seres, B.S., Accounting, College of Business Administration
Hue Tran, B.S., Elementary Education, College of Education
Jennifer Robinson, B.S., Industrial Engineering, College of Engineering, Architecture and Technology
Claire Marie Ripley, B.S., Clothing, Textiles, and Merchandising, College of Home Economics

OSU VICE PRESIDENTS:

Dr. Ron Beer, Vice President for Student Services
Dr. Harry Birdwell, Vice President for University Relations and Public Affairs
Dr. Jay Boggs, Vice President for Academic Affairs and Research
Dr. Gene Satterfield, Interim Vice President for Business and Finance
Dr. Robert Klabenes, Vice President and Director, OSU Technical Branch, Okmulgee, Oklahoma

COM PRESIDENT:

Dr. Clyde Jensen, President, OSU College of Osteopathic Medicine, Tulsa, Oklahoma

OSU FOUNDATION PRESIDENT:

Mr. Charles Platt, President, OSU Foundation, Stillwater, Oklahoma

OSU ALUMNI ASSOCIATION NATIONAL PRESIDENT:

Bruce Benbrook, Vice President, Stock Exchange Bank of Woodward, Oklahoma

FACULTY COUNCIL CHAIRMAN:

Dr. John Thornton, Professor of Zoology, OSU, Stillwater, Oklahoma

IMMEDIATE PAST PRESIDENT OF PHI KAPPA PHI

Dr. Neil Luebke, Professor of Philosophy, OSU, Stillwater, Oklahoma

(Platform Party continued)

SGA OUTGOING PRESIDENT: (benediction)
Ms. Kimberly McCoy, student, Outgoing President of the OSU Student Government Association

INVOCATION:
Dr. Margaret Nelson, Associate Professor of English, OSU, Stillwater, Oklahoma

CENTENNIAL COMMENCEMENT

Oklahoma State University

Friday, May 4, 1990

Stillwater

PROGRAM

Dr. John R. Campbell, President, Oklahoma State University, Presiding

Processional
"Pomp and Circumstance" .....Elgar
University Wind Ensemble and Symphonic Band
Professor Joseph P. Missal, Conductor

The National Anthem
"Star Spangled Banner".....Key
Ensemble and Audience
Ms. E. Lucile McCoy, Soloist

The Invocation
"Cherokee Prayer" .....Anonymous
Read by Dr. Margaret Nelson

Introduction of Commencement Speaker — Gov. Bellmon

The Commencement Address
George Bush
President of the United States

Conferring of Honorary Degree
Doctor of Economics
George Bush, President of the United States

Conferring of the Henry G. Bennett Distinguished Service Awards

Greetings from the OSU Board of Regents
Mr. L.E. "Deen" Stringer, Chairman

Conferring of Degrees*

Recognition of Graduates who are members of Phi Kappa Phi

Recognition of Newly-Commissioned Officers

Greetings from the OSU Alumni Association
Mr. Bruce Benbrook, National President

Alma Mater Hymn
"OSU Alma Mater" .....McCulloh
Ensemble and Audience
Professor Glenn Dowlen, Soloist

The Benediction
Ms. Kimberly McCoy, President
Oklahoma State University Student Government Association

Recessional for Platform Guests
University Wind Ensemble and Symphonic Band
Professor Joseph P. Missal, Conductor

(Graduates and guests will remain in their seats until members of the Platform Party have recessed.)

*All persons whose names appear in this program are candidates for the respective degrees. These degrees are conferred subject to the completion of the requirements thereof.



The Henry G. Bennett Distinguished Service Award

The award is named for the former president of Oklahoma State University (1928-51) who made countless contributions to the university, to higher education, and to the benefit of humankind as the first director of America's Point Four program for technical assistance to nations around the world.

The award recognizes persons of outstanding citizenship and leadership. Selection is made by a committee representing the faculty, administration, board of regents and alumni of the university, and the general public.

Bennett is generally credited as being the originator of technical assistance which used teams of specialists from American colleges and universities to teach natives of other countries how to improve food production, housing, health and education "with the tools at hand."

Mrs. Barbara Pierce Bush

The life and countless contributions of Mrs. Barbara Pierce Bush reflects her high level of energy and commitment to a wide variety of timely community projects, to the betterment of society, as well as her devotion to family.

As the nation's 36th First Lady, Mrs. Bush has chosen the promotion of literacy and the importance of reading as special areas of focus. She serves as Honorary Chairperson of the Barbara Bush Foundation for Family Literacy, an organization whose mission it is to establish literacy as an all-important value in every family in America, to support the development of family literacy programs, and to bring about major reductions in the rate of illiteracy at home and abroad.

Mrs. Bush is a sponsor of the Laubach Literacy Volunteers, which is a world-wide program committed to eradicating illiteracy. She is the Honorary Chairperson for the National Advisory Council of Literacy Volunteers of America, Inc., and she is the Honorary Chairperson for the National Committee on Literacy and Education of the United Way. She also serves on the Board of Directors of "Reading is Fundamental."

Being particularly encouraging of volunteer, community, and corporate support of schools, Barbara Bush serves as the Honorary Chairperson of the National Association of Partners in Education. She has taken a particular interest in the problem of learning disabilities, and has provided important encouragement for many national organizations that seek to bring about greater public awareness and effective treatment for the learning disabled.

Reflecting her own years as an active volunteer, Mrs. Bush encourages widespread voluntarism and the giving of an individual's time and energies for the betterment of others.

Through her promotion of literacy and encouragement of voluntarism to benefit others, Mrs. Barbara Pierce Bush has brought great prestige and high honor to herself, to her family, to the nation, and to the universe.

Mr. H. F. Donnelley

Mr. H. F. Donnelley enrolled at Oklahoma State University in 1919—and 70 years later—at age 88—continues to be actively involved with the OSU Community Education Center, as well as continuing to be an enthusiastic alumni and contributing community leader.

H. F. Donnelley is known as one of Oklahoma's great educational and youth service pioneers, and serves as an inspiration to young and old alike. He has served as a volunteer and professional scouting executive, and as a classroom teacher. He founded an insurance company, served on school boards, and has distinguished himself on the local, state, national, and international levels as an advocate of education and social services. Indeed, numerous social service programs have flourished under Mr. Donnelley's leadership, particularly noteworthy is the IOA Youth Ranch, currently known as the Lion's Boys' Ranch. Mr. Donnelley's visionary efforts on prevention strategies for youth, including the project of "Hidden Treasure," involved more than 7,000 people of all ages from 77 communities in an intergenerational project of discovering their heritage. The "History Alive!" program, cosponsored by the Oklahoma Historical Society and the Community Education Center, was stimulated through the work of H. F. Donnelley and centers on the development of partnerships of youth and family in serving institutions, businesses, and community organizations.

To recognize his philosophy of and contributions to "persons helping themselves and their community," the National Community Education Association presented him with their prestigious Distinguished Service Award in 1989. Through his tireless efforts and personal dedication to educational, social, and humanitarian issues, priorities, and concerns, H. F. Donnelley has brought great prestige and honor to himself, to his family, and to Oklahoma State University.

Chief Wilma P. Mankiller

Chief Wilma P. Mankiller, Principal Chief of the Cherokee Nation, was born in the Indian Hospital in Tahlequah, Oklahoma. She has deep roots in the rural community of Rocky Mountain in Adair County. She learned early the hardships of poverty in rural America, and also learned about the difficulties of urban poverty when, in 1957, she and her family were forced to move to San Francisco, California, as part of the Bureau of Indian Affairs Relocation Program. In 1983, Wilma Mankiller was the first woman elected as Deputy Principal Chief for the Cherokee Nation. Following the resignation of the Principal Chief in 1985, she was selected for that high position of leadership—the first woman to ever hold such an office in any Indian Tribe. In 1987, she was elected to the position by the members of the Cherokee Nation.

Through her commitment to rural community development, Chief Mankiller was instrumental in establishing the Cherokee Community Development Department, and she has been responsible for obtaining funding for the Cherokee Gardens commercial horticulture operation, the Bell Community project, as well as many other high priority important social services. She has become known as a quiet, but effective advocate for her people and for Oklahoma.

Chief Mankiller has been recognized and honored by various organizations for her distinguished work with the public and for her basic philosophy of the empowerment of people at the local level. Representative honors she has received include: American Indian Woman of the Year, 1969; Oklahoma Women's Hall of Fame, Governor's Advisory Committee, 1986; Women of Year, *Ms. Magazine*, 1987; John W. Gardner Leadership Award, Independent Sector, 1988; and the Indian Health Service Award, U.S. Public Health Service, 1989.

Through her commitment to service organizations, as well as her work and dedication to the improvement of the Cherokee people, Chief Wilma P. Mankiller has brought great prestige and honor to herself, to her family, to those who comprise the distinguished Cherokee Nation, and to Oklahoma.

OSU

Oklahoma State University

OFFICE OF THE PRESIDENT

STILLWATER, OKLAHOMA 74078-0001
WHITEHURST HALL
405-744-6384
~~FAX: 405-744-6071~~

FAX COVER PAGE

DATE: April 27, 1990

TO: Peggy Dooley

President Bush's office

OFFICE PHONE NO.:

FAX PHONE NO.: 202-456-7750

FROM: President John Campbell's office

Linda Miesner

OFFICE PHONE NO: 405-744-6387

FAX PHONE NO: 405-744-6285 **(Note our new fax number)**

NO. PAGES (INCLUDING COVER PAGE): ~~28~~ 17 Sent before transmission was interrupted
11 being sent

CALL FOR ASSISTANCE WITH FAX TRANSMISSION: 405-744-6384

NOTES: If you need any further information, please call.

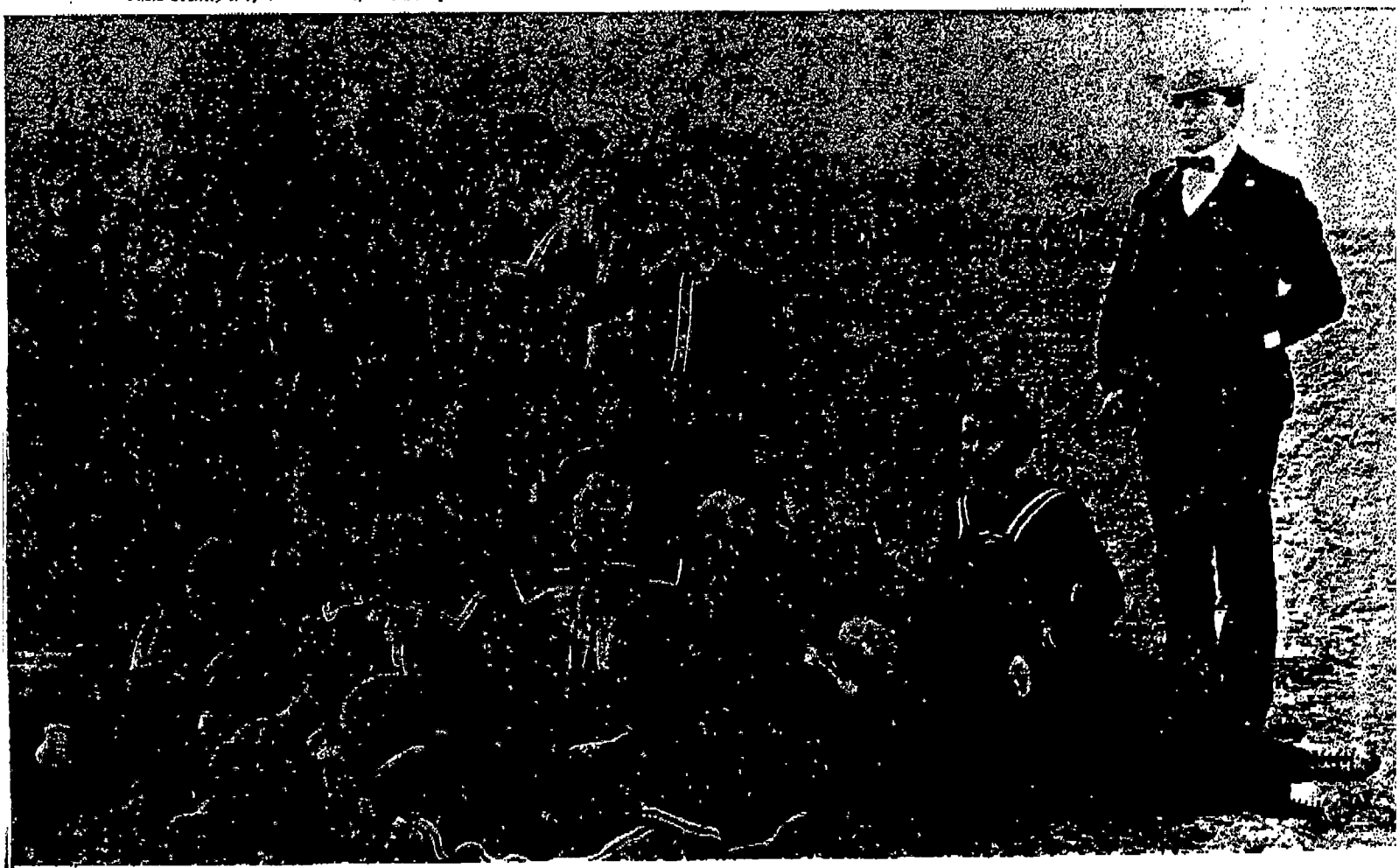
CENTENNIAL
1890 • 1990

Celebrating the Past . . . Preparing for the Future

The earliest athletic events were spontaneous games played by the students. Baseball was a favorite and competition among classes became keen.

In 1895, the first organized activity consisting of a track and field day was held to celebrate the Land Run of 1889. Success in these events often

Photo Courtesy of Special Collections, OSU Library



The first OAMC basketball team belonged to the women (above) who also stitched up their own uniforms in the A&M sewing laboratory. Current track events for women at OSU (right) make quite a contrast to those early days.

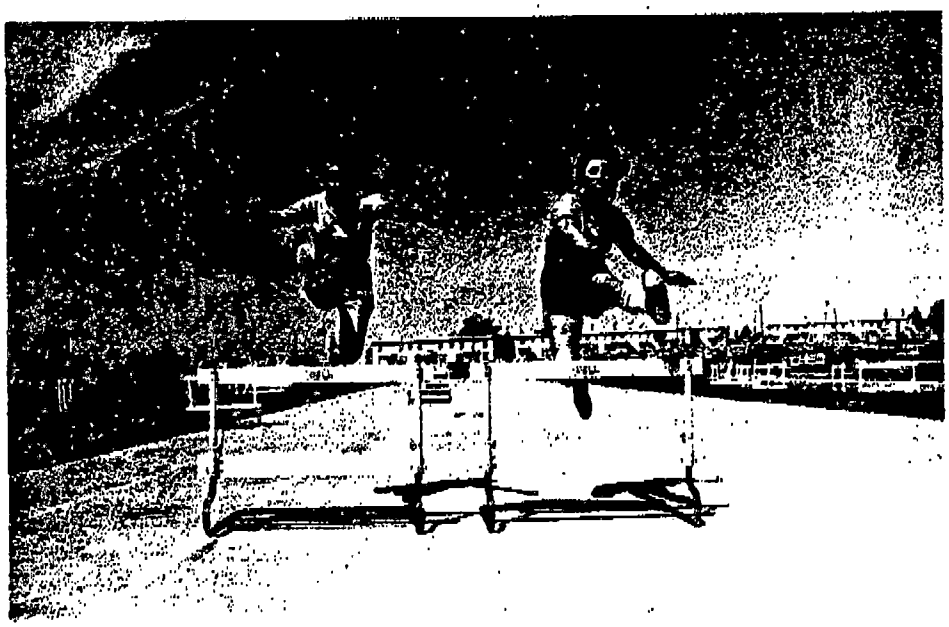


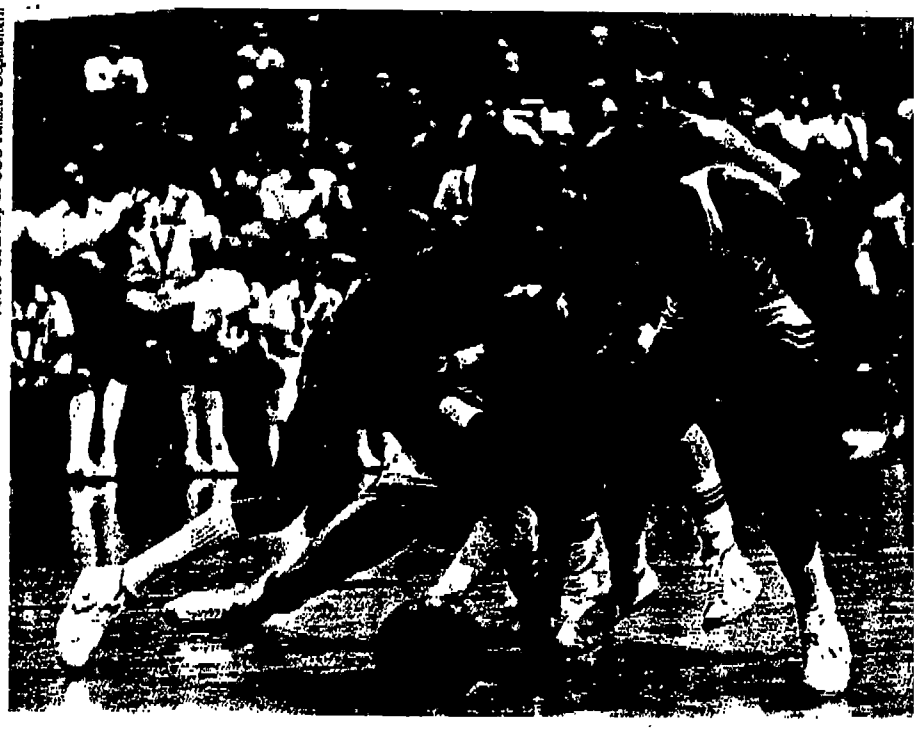
Photo by Tom Johnston

guaranteed participation in the events of the Oklahoma Intercollegiate Athletic Conference. After three years of winning competition, OAMC brought the famed Douglas Cup home in 1902. This tradition continues today through well-rounded varsity and intramural programs at OSU.

Photo Courtesy of OSU Athletic Department



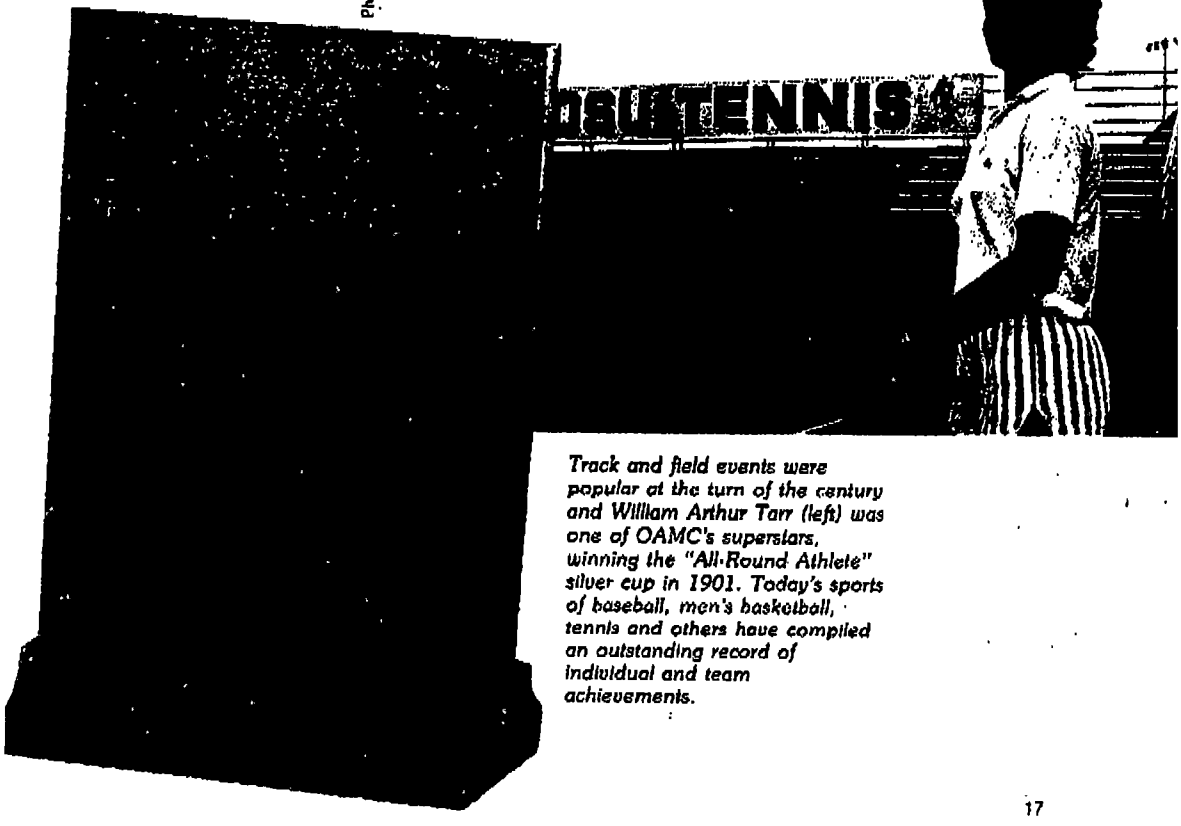
Photo Courtesy of OSU Athletic Department



Courtesy of OSU Museum Collection



Photo by Tom Johnston



Track and field events were popular at the turn of the century and William Arthur Tarr (left) was one of OAMC's superstars, winning the "All-Round Athlete" silver cup in 1901. Today's sports of baseball, men's basketball, tennis and others have compiled an outstanding record of individual and team achievements.



Photo Courtesy of OSU Museum

School spirit has always been intense. Although girls could not participate in the earliest sporting events, they were urged to cheer the participants. President Angelo Scott was a staunch advocate of athletic competition and often became so excited at events that he was known to faint.

Although each class had its own set of colors, orange and black, patterned after Princeton's colors, was chosen to represent the school and the early students became known as the Tigers. A Harvest Day Festival was held each year with a parade downtown, the forerunner of today's homecoming events.

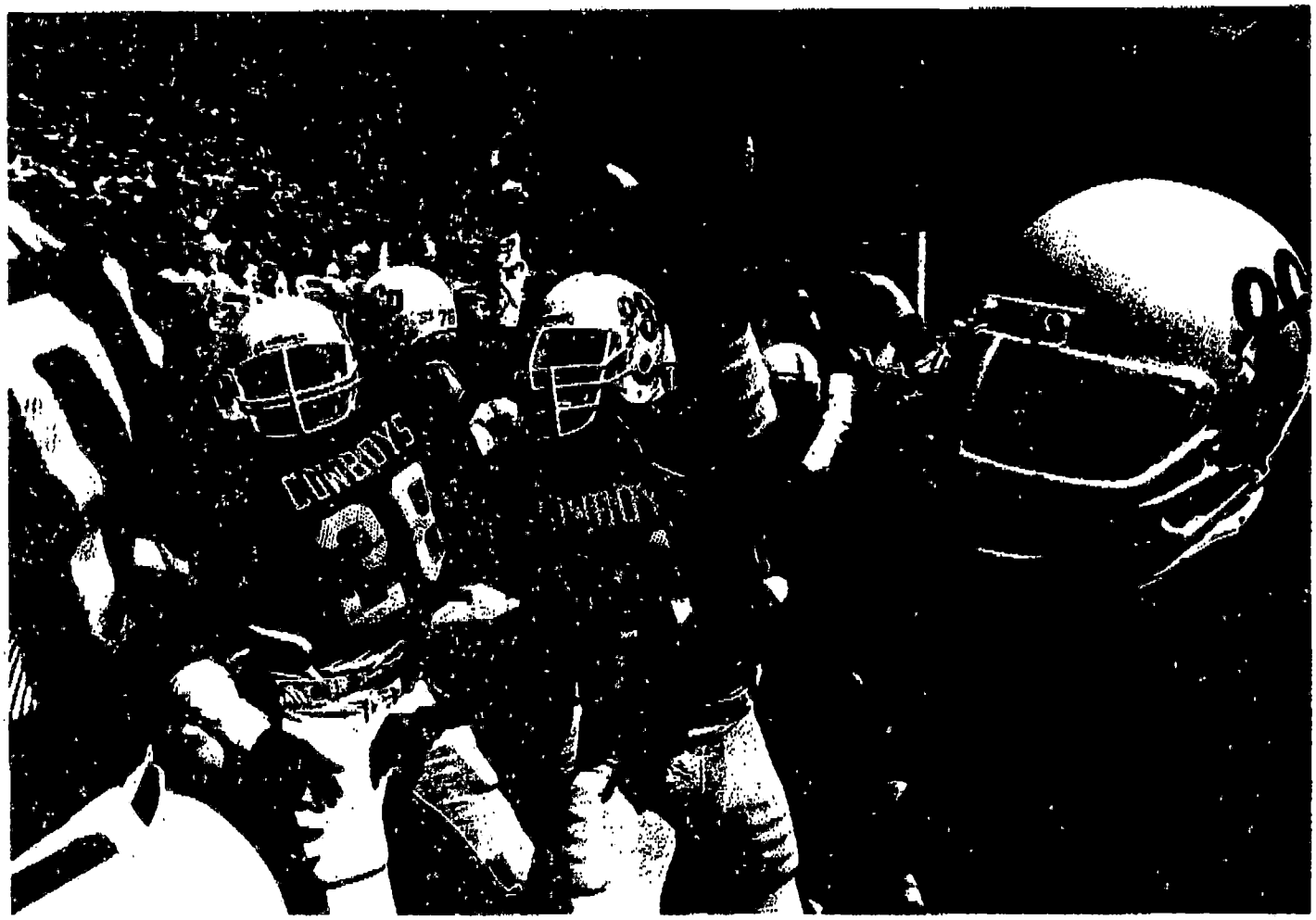


Photo by Jim Thomas

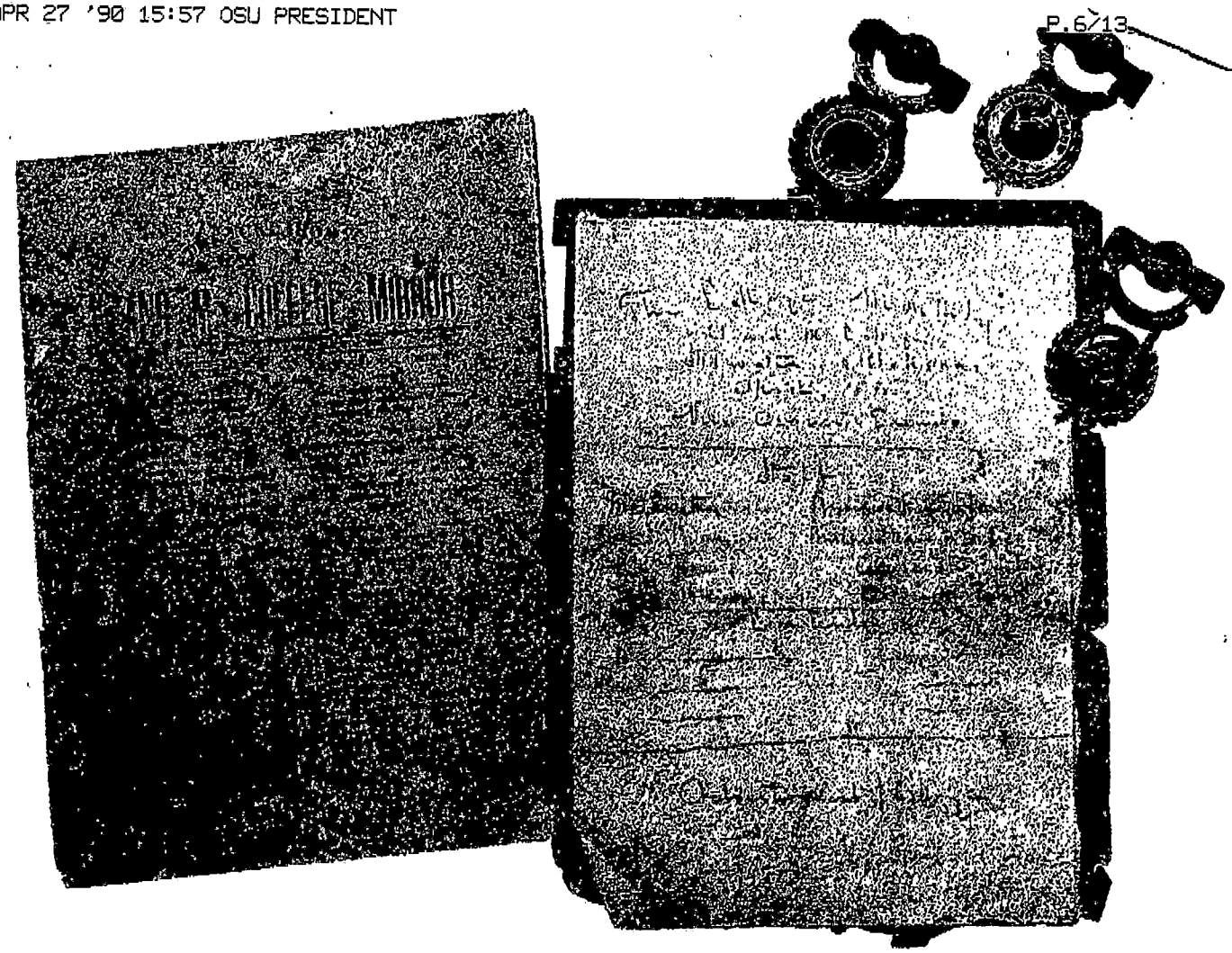




Photo by OSU Athletic Department



The first varsity football team was not fielded until 1901, so the Class of 1902 that became the "99-00 Champions" were probably intramural champions (far upper left). The 1984 Gater Bowl champions (far left) resemble only faintly the boys who wore the individually fashioned, homemade uniforms of 1900. A Harvest Day Festival parade down Main Street in Stillwater (top right) was a predecessor of Homecoming. An OSU twirler performs for the enjoyment of a football crowd (left). Wrestling as a major sport (above) did not appear until 1915.



Courtesy of Special Collections, OSU Library



Photo by Tom Johnston

Photo Courtesy of OSU Museum



Throughout the years, the pursuit of an education has remained at the forefront at Oklahoma State. While the curriculum has continued to change drastically, the direction of the university has always been carried out in the unique land-grant tradition.

In 1890, Alfred Newton Jarrell bargained with Frank Duck: "If you will give your northwest forty, I will give my northeast forty . . . and we will locate the Oklahoma A. and M. College and the Experiment Station, so none of the politicians can ever move it, and we will have a school capable of giving our children all the education they are capable of holding."

Little could Jarrell have realized the full potential of his words. But, it is precisely that past of which he is a part that gives so much meaning to the present, and even more promise for the future.

A chemistry class in 1909-1910 was located in the new chemistry building (below). Modern labs today permit every student to experiment with his or her own computer (lower left). The first edition of the student newspaper (top left). is shown with the layout sketched by the editor. The paper has been published continuously since 1895.

Because there was no graduating class until the fifth year of the school, agriculture professor Alexander Magruder offered the medals shown above for "merit in declamation." Arthur Clark, Earl Howell, and John Osborn were 1906 OAMC Engineers (above).

Outreach Magazine Files



At times, early-day tragedies have turned into present-day triumphs through the determination of alumni and friends of the university.

During the Harvest Day Festival of 1914, the Women's Building (Gardiner Hall) burned. Because Morrill Hall had burned just two months earlier, many questioned the future of OAMC. Political opponents were sure to take advantage of the destruction of the two most modern buildings on campus and try to move the college elsewhere.

But both buildings were rebuilt and the college continued to grow. With a recent total renovation, the old Women's Building has been resurrected as the Bartlett Center for the Studio Arts.

As the various faces of the university's buildings changed, so did the nature of the student's educational experience. Classroom facilities have advanced from steam engines to lasers in three-quarters of a century, in many cases thanks to the same friends of the university who contributed to building projects.

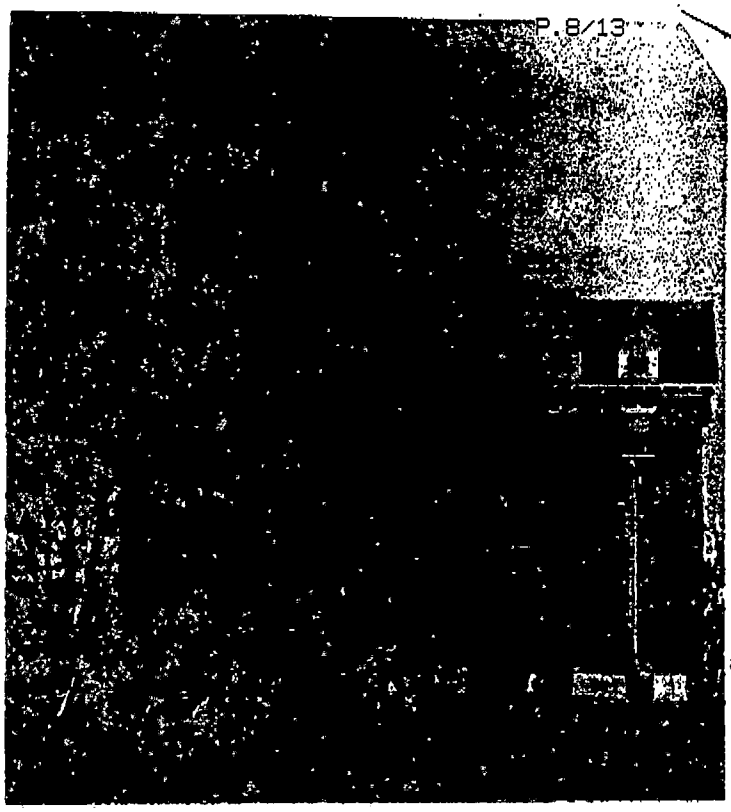


Photo Courtesy of OSU Museum

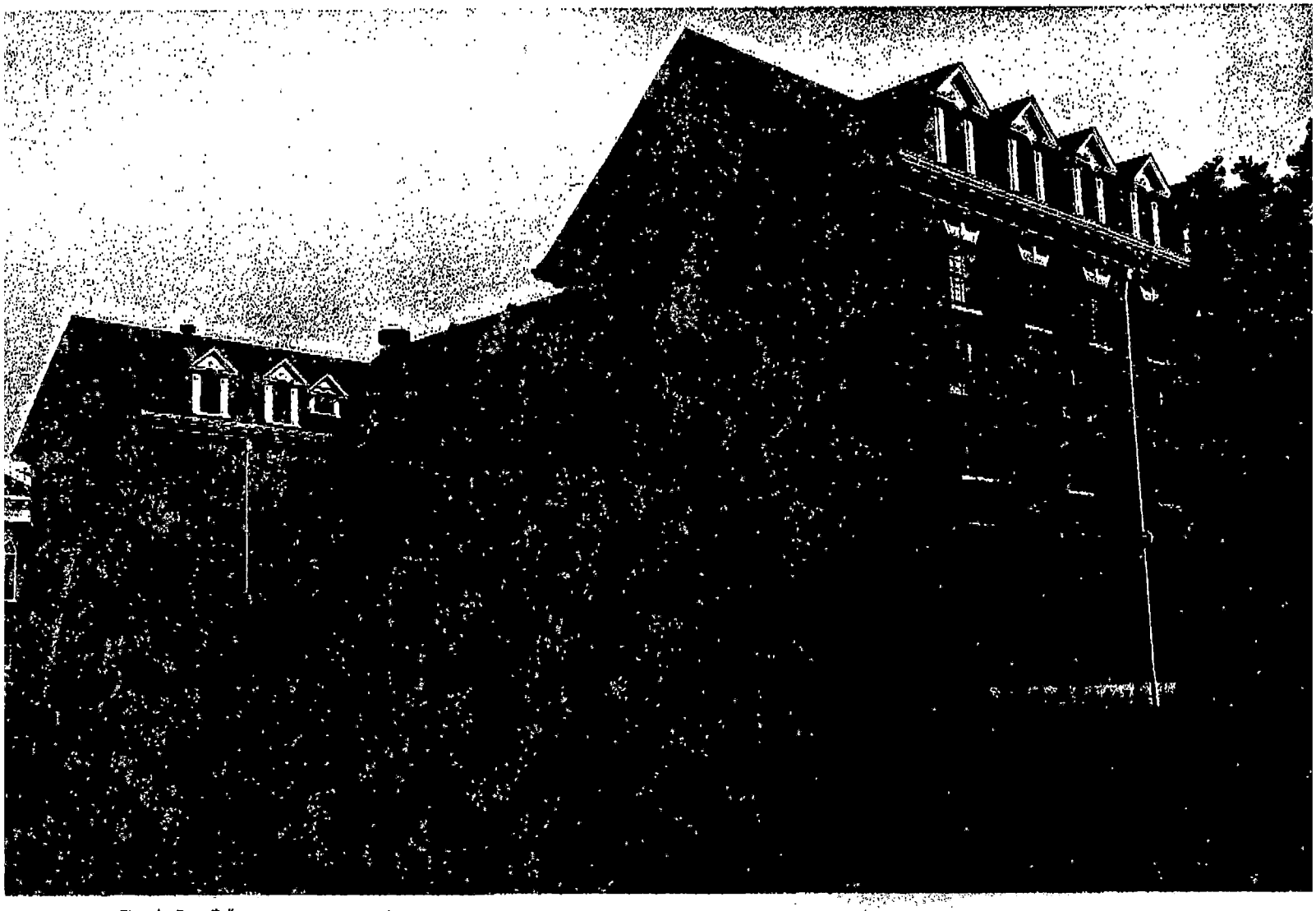


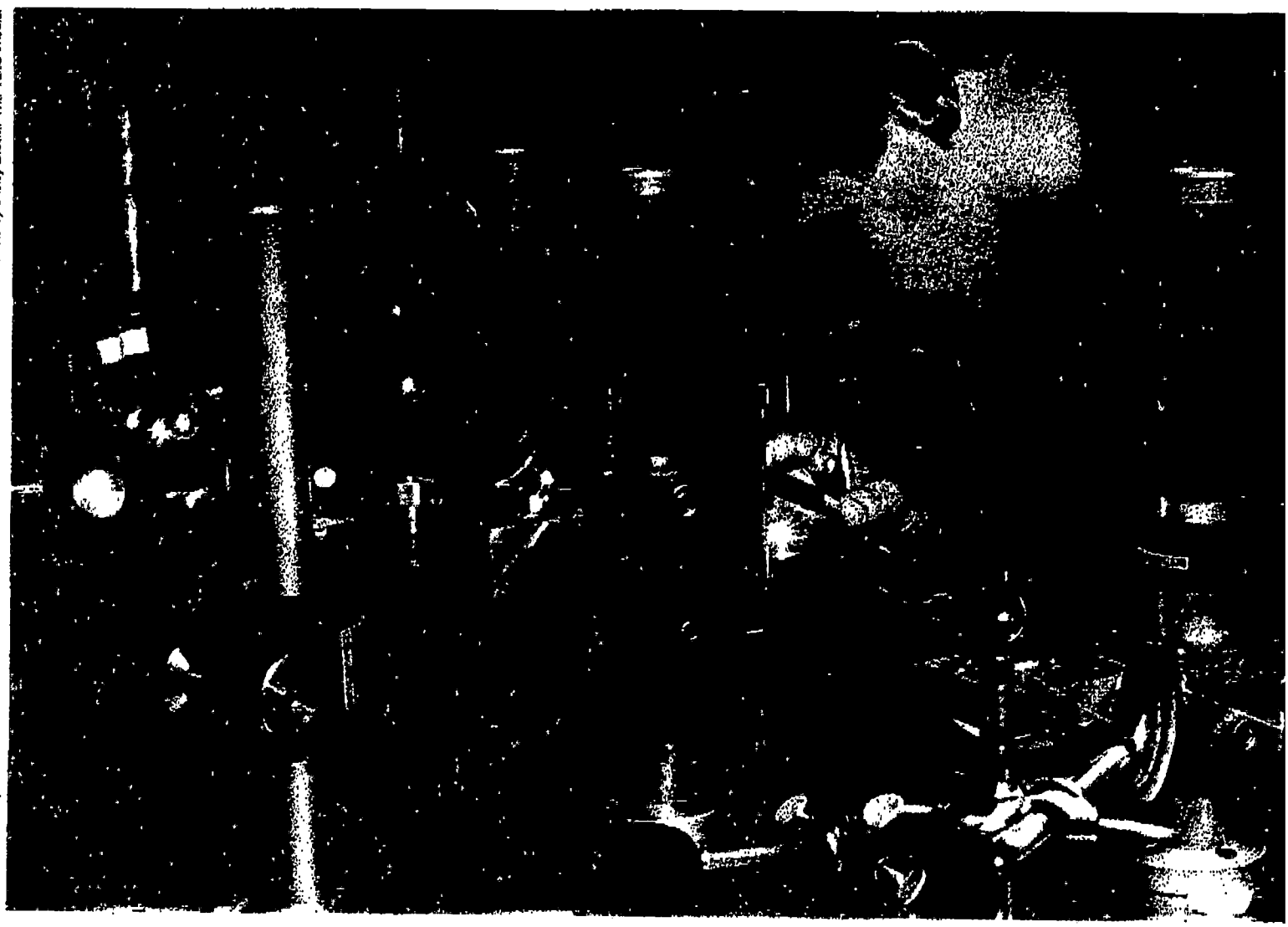
Photo by Doug Dollar

Photo Courtesy of OSU Museum



Few persons imagined that when the Women's Building burned in 1914 (far left) it would be rebuilt not only once but totally renovated in the 1980s into the Bartlett Center for the Studio Arts (lower left). Members of a School of Agriculture and Domestic Economy class of 1910 stand proudly before a tractor steam engine (left). Today's students and faculty can be equally proud of their modern laser lab (below).

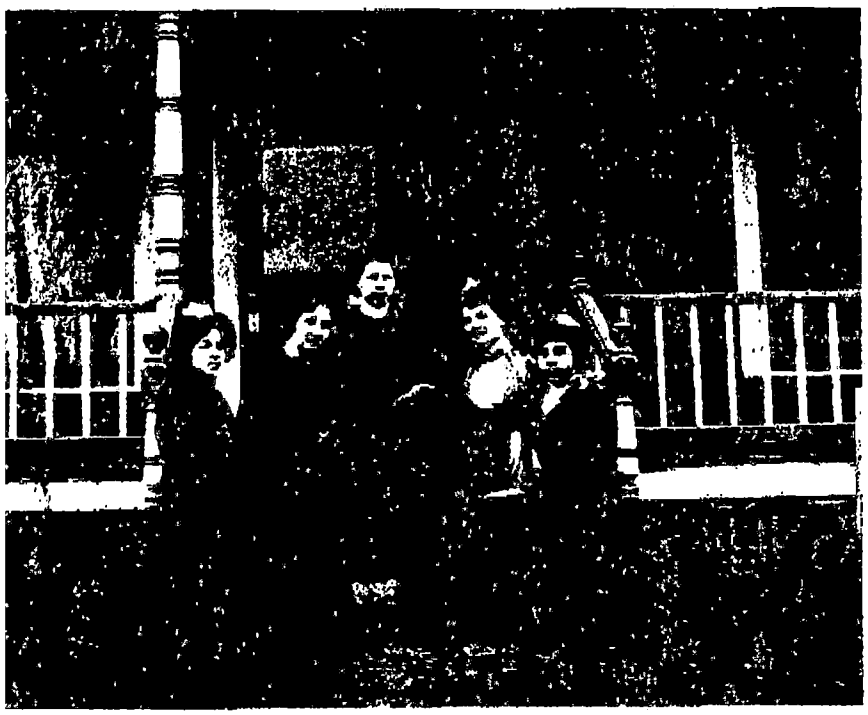
Photo by Sherry Brown, The Tulsa Tribune



This, then, is a glimpse of your heritage as an OSU alumnus. What we find today did not simply appear full blown, but started as merely a hope and a vision present in the minds of a band of pioneers.

What was begun by determined citizens was built and improved by each generation of students, facul-

Photo Courtesy of Special Collections, OSU Library



There was a time to relax as well as a time to study for early-day students (above). The first Commencement Exercises for six graduates in 1896 was indeed a milestone. Among the graduates were Frank Duck and Edwin Jarrell, son of Alfred N. Jarrell. A view of the campus about 1910 shows continued expansion (below).

COMMENCEMENT EXERCISES

OF THE

OKLAHOMA

Agricultural and Mechanical College

AT THE

Assembly Hall, Wednesday, June 10, 1896, at 10 a. m.

Music.

Prayer.

Address, - - Governor W. C. RENFROW, Guthrie.

Address, - - - - Hon. HORACE SPEED, Guthrie.

ORATIONS BY GRADUATING CLASS.

ARTHUR WESLEY ADAMS, - "The Esthetics of Emotion."

JAMES HOMER ADAMS, - - "The Study of Nature."

FRANK ELSWORTH DUCK, - - - "Sir Humphrey Davy."

ALFRED EDWIN JARRELL, - - "Abraham Lincoln."

ERVIN GIBSON LEWIS, - - "Man, the Master."

OSCAR MATISON MORRIS, - "Pictures in the Fire."

Conferring Degrees.

Benediction.

Courtesy of Special Collections, OSU Library

Photo Courtesy of OSU Museum



Outreach Magazine Files

ty and alumni, during OSU's 95-year history. The scenery has changed as buildings have been constructed, and then torn down. Students, faculty, and administrators have come and gone. But the reality of the conviction of early settlers hasn't faded—education is still opportunity.



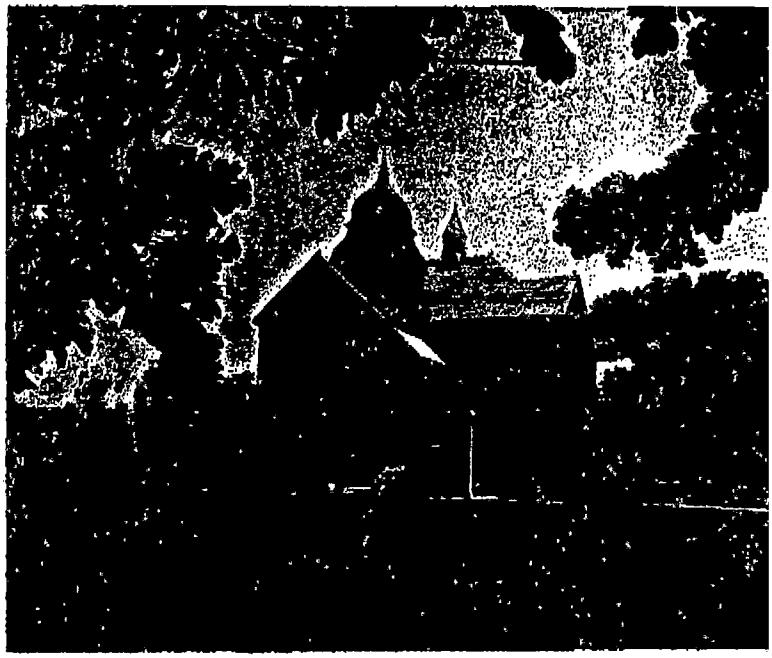
Photo Courtesy of Special Collections, OSU Library





During a student outing in 1895 (above), the ladies rode while the men walked. Standing left to right: Earl Meyers, Tom Hartman (first OAMC graduate to serve as a regent of the institution), and George Bowers. Seated left to right: Cora Miltmore (OAMC librarian, 1903-1914), Minnie Dysart, and Bertha Hutto. Harry Hix (above) poses in his cadet uniform which all male students were required to wear. One of the earliest cadet corps lines up on a town street.

Reminders of our heritage can be found across the campus mixed not only with modern highrises, but telecommunications satellite dishes pointed toward the heavens. Very close by, students of tomorrow play outside the Home Economics Child Sciences Center, and further on, preparations are underway for starting construction of the Noble Research Center for Agriculture and Renewable Natural Resources. Truly, OSU is your heritage, but OSU is also your future.



The past and the future of Oklahoma State University: Old Central, the first academic building, now stands in the midst of a beautiful landscape (right); while the model for the Noble Research Center (below) symbolizes the greatness of OSU's future. Youngsters at OSU's Child Sciences Center (top right) enjoy a party.

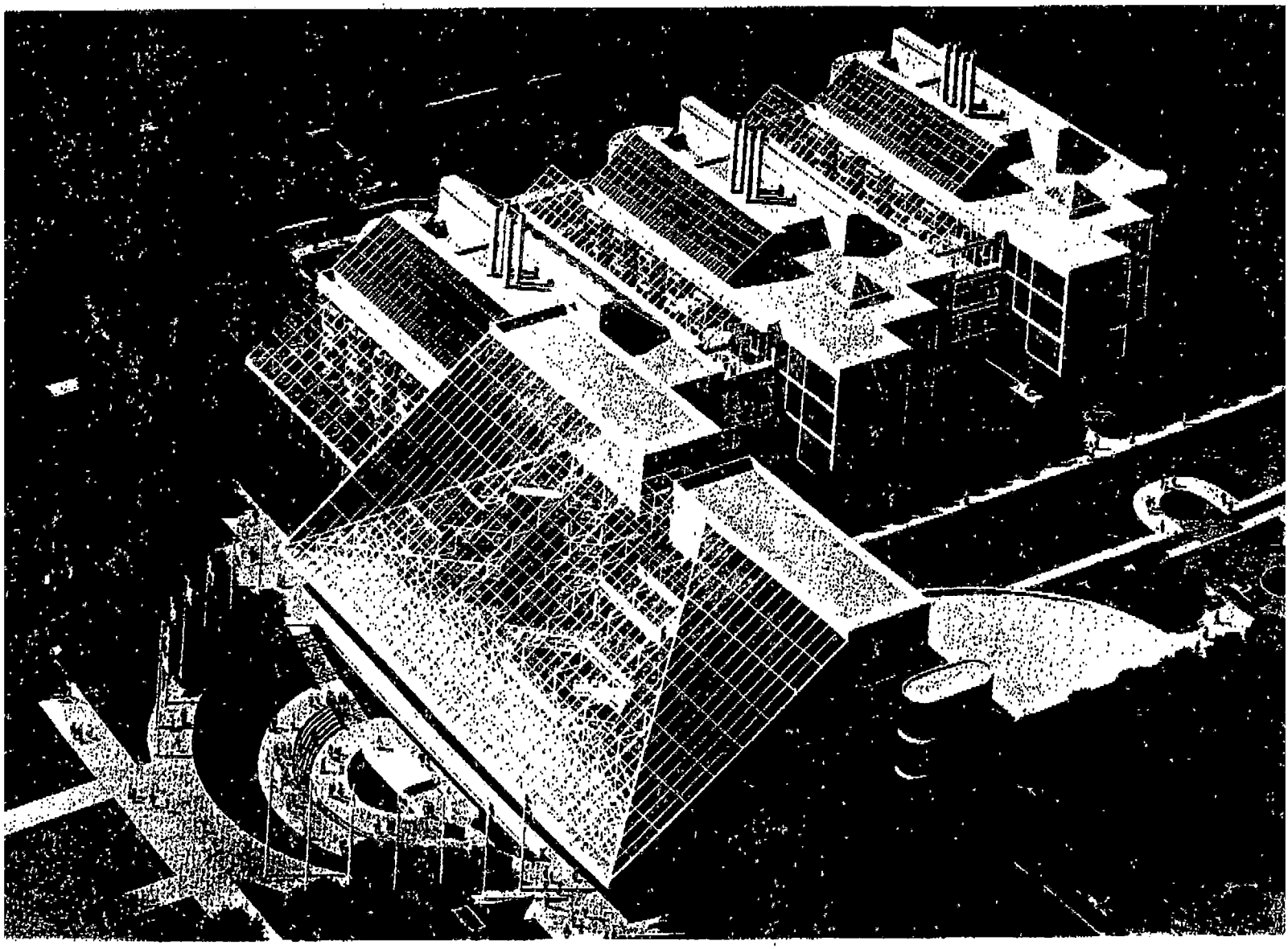


Photo by Tom Johnson

Photo by Jean Shipman

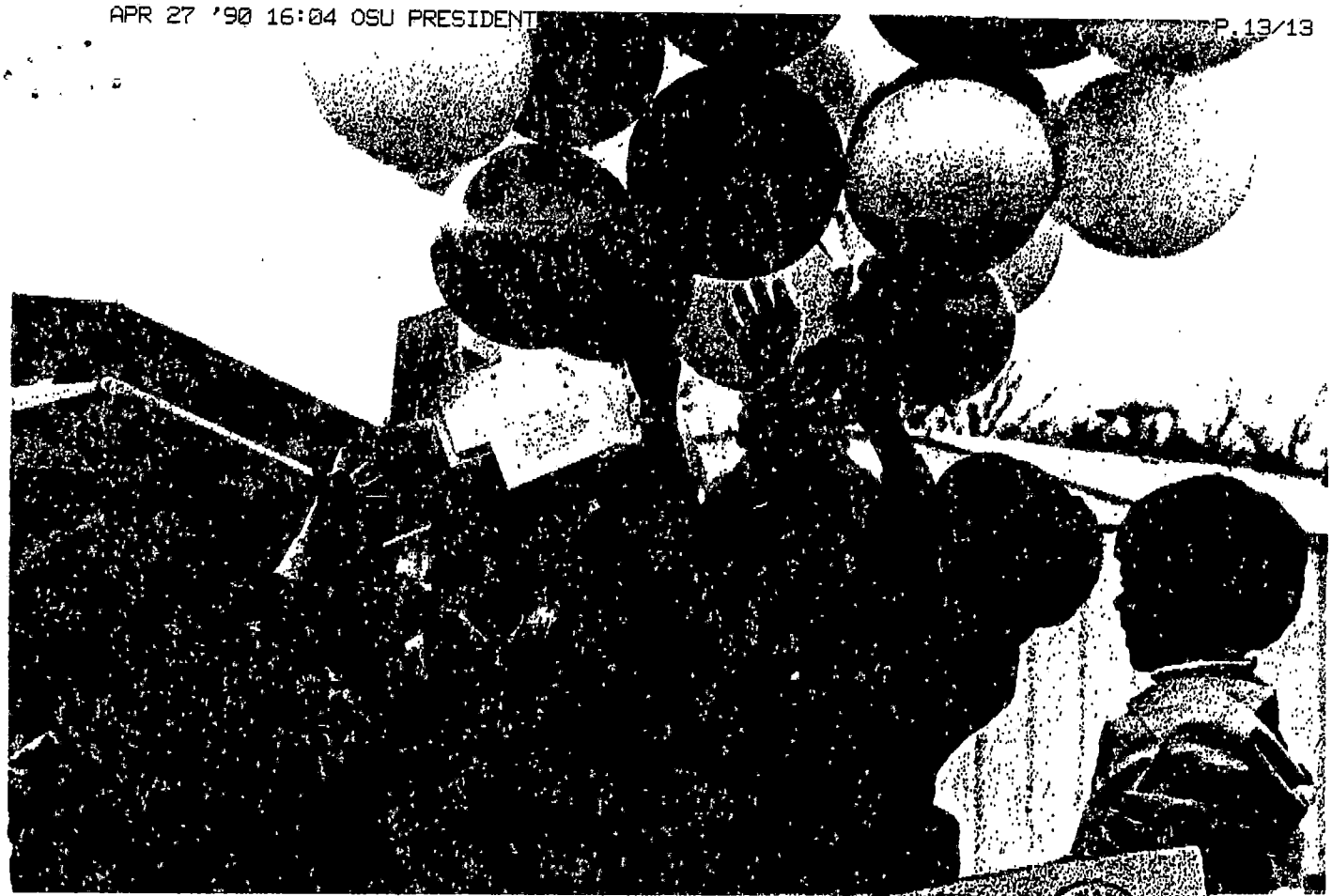
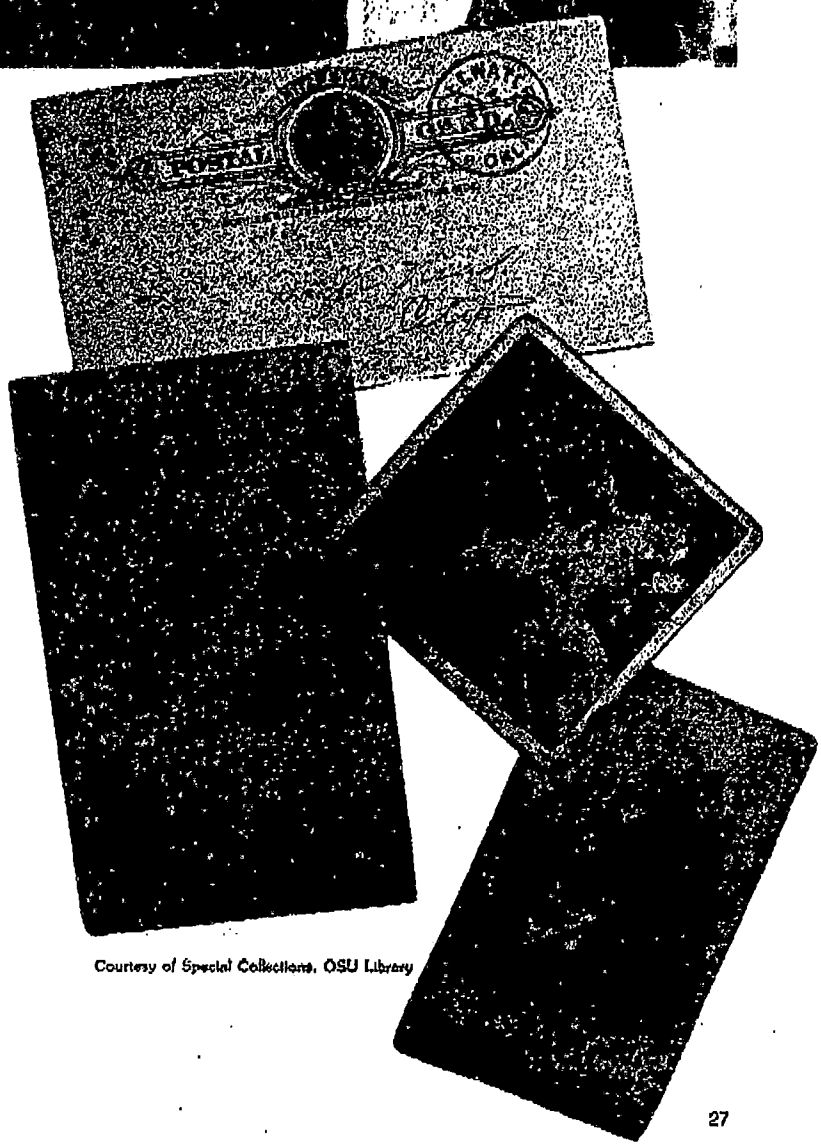


Photo by Jim Thomas





OSU's Edmon Low Library (above) stands as the official visual symbol of the university. James Neal (right) was the first director of the experiment station. Katie, Neal's daughter and one of the college's first students, received her academic reports through the mail—sent directly to her father.

Courtesy of Special Collections, OSU Library

(Dooley)

REMEMBER WHEN . . .

1902—Room and board in the homes of Stillwater families cost $2.25 to $3 per week. There were no tuition charges and books cost $2 to $4 per term.

1906—Morrill Hall was completed. Agriculture, the president's office and the general administrative services of the college moved into it.

1908—The OSU Wave Song was written by speech professor H. G. Seldomridge.

1915—Ed Gallagher returned to the campus as director of athletics, marking the beginning of big-time athletics at Oklahoma A. and M. College. He was the first man to represent an Oklahoma institution in the Olympics.

1919—The college annual was titled the Victory Redskin. In honor of the war's end and in anticipation of the homecoming of Oklahoma A. and M.'s students and faculty, a live campus Christmas tree was erected and decorated in December, thereby starting a long-standing Christmas tradition on the campus.

In the fall semester of 1921, the school of home economics adopted a baby boy from an orphan's home. The child was cured of an addiction to morphine, induced at the orphanage to stop his crying, and fed fresh milk and processed dairy products produced by males majoring in agriculture. The baby was presented to his adoptive parents in December 1921, "a great sturdy, rosy-cheeked and laughing baby." His stay at OAMC was written up in the *New York Evening World* and filmed by RKO Pathe News for movie theaters. It was estimated the publicity reached 50 million people.

1925—An official ban on student cars was issued by President Knapp. "There are two fundamental rules behind the rule . . . one is the prevention of immorality so prevalent over the entire country, due largely to the indiscriminate use of automobiles . . . second . . . students who have their own automobiles are generally failures in their college work."

1928—OAMC won its first national wrestling team championship.

1938—To gain approval, the new sports complex was carefully described as the 4-H Club and Student Activity Building. Some people, convinced the school never would fill such a huge arena, dubbed it Iba's folly. Others, proud of the A&M athletic program and the man who developed it, started calling the building Gallagher Hall. In 1987, Gallagher Hall was completely renovated and the name was changed to Gallagher-Iba Arena in tribute to Henry P. Iba, OSU's basketball coach and athletic director from 1934 to 1970.

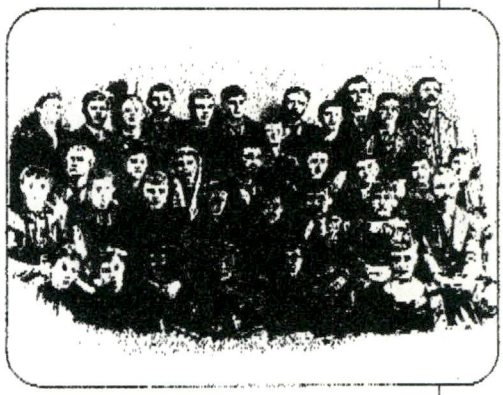
1942—Roxie A. Weber arrived on campus with a medical degree from Johns Hopkins University. She became the director of health services by 1950 and advocated a campus wellness program—an innovative idea that finally came to fruition in the 1980s.

1954—Pink and purple shirts, ties and socks were favored by men. The "bop," a new dance fad, was banned in the Student Union. Two male students were arrested for wearing Bermuda shorts. The arresting Stillwater officers charged the students with "indecent, immoral and foolish" exposure of their legs.

1955—During a demonstration to the Tech Society, Frank "Pistol Pete" Eaton accidentally shot a hole in the baseboard of the Student Union's Varsity Room.

1957—The OSU Alma Mater was written by OSU graduate Robert L. McCulloh, a 1949 graduate.

1958—The Bennett Memorial Chapel, honoring former President and Mrs. Henry G. Bennett, as well as university students killed in World Wars I and II and the Korean Conflict, was dedicated.



FROM THE

Freshman Bible

A Key to Freshman Conduct
Dedicated to the Class of '29

Football Games—

Before the final whistle blows, your pep leader will divide your section in two. One group will carry the players of both teams off the field and to the Gymnasium; the other group will stand in their places until the field is cleared. Then they will replace the torn places in the turf, under the direction of substitute Aggie football players.

Basketball—

Confine your defamations of opposing teams to such remarks as dictated by the unwritten principles of fair sportsmanship. Remember that the men on the floor are defenseless against your loud-mouthed epithets. If they could shout back, they'd probably make a fool of you.

OKLAHOMA STATE UNIVERSITY

Your Heritage, Your Future

A look at the world of Oklahoma State today and beyond from the perspective of our pioneer heritage.

By DOUG DOLLAR and ANN CARLSON

Education was opportunity to the early settlers of Oklahoma Territory. In 1884, the boomers who arrived at Stillwater Creek built a schoolhouse—although they stayed only 46 days before the military escorted them north back to Kansas. With desk benches made of green cottonwood, the town of Stillwater started the first public school in Oklahoma Territory in the fall of 1889.

Little wonder that House Bill 82 proposed by James Mathews to the first Legislative Assembly sought to establish a land-grant college in Payne County. Early-day citizens worked and schemed to locate the college and corresponding experiment station in Stillwater. They were so convinced of the importance of the school for the future, its establishment became a "life and death" matter; they were even accused of being a "damned shrewd bunch of horsetraders" in the process.

As Alfred Edwin Jarrell, class of 1896, looked back almost fifty years later, he recalled that the country was founded by "not only sturdy and progressive people . . . but men of vision. They knew that education was the one lever that could raise them out of the mire of superstition and ignorance, and that it must not be confined to the privileged few."

The passage of legislation establishing the Oklahoma Agricultural and Mechanical College on December 25, 1890, just twenty months after the Land Run of 1889 that settled the territory, was a natural outgrowth of those beliefs.

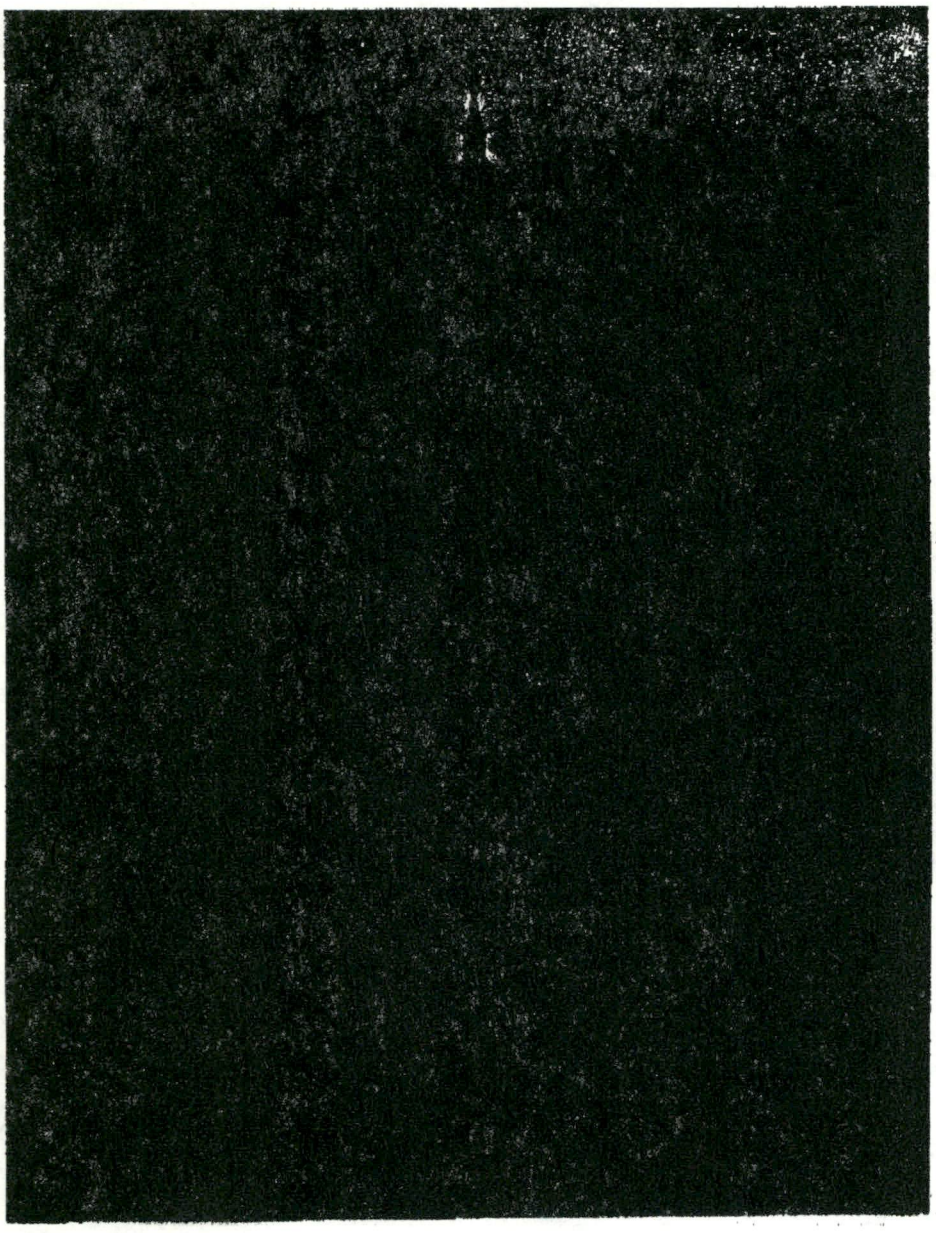
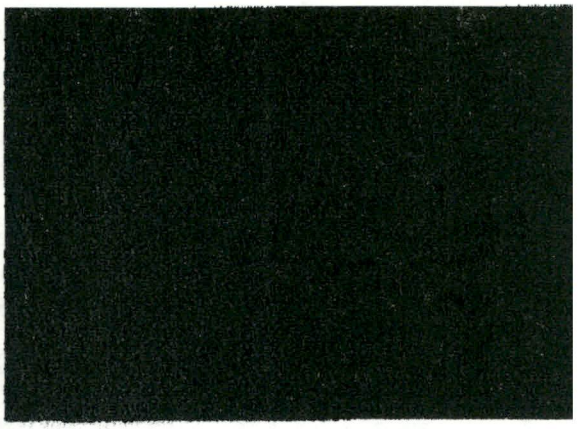


Photo by Russ Grove

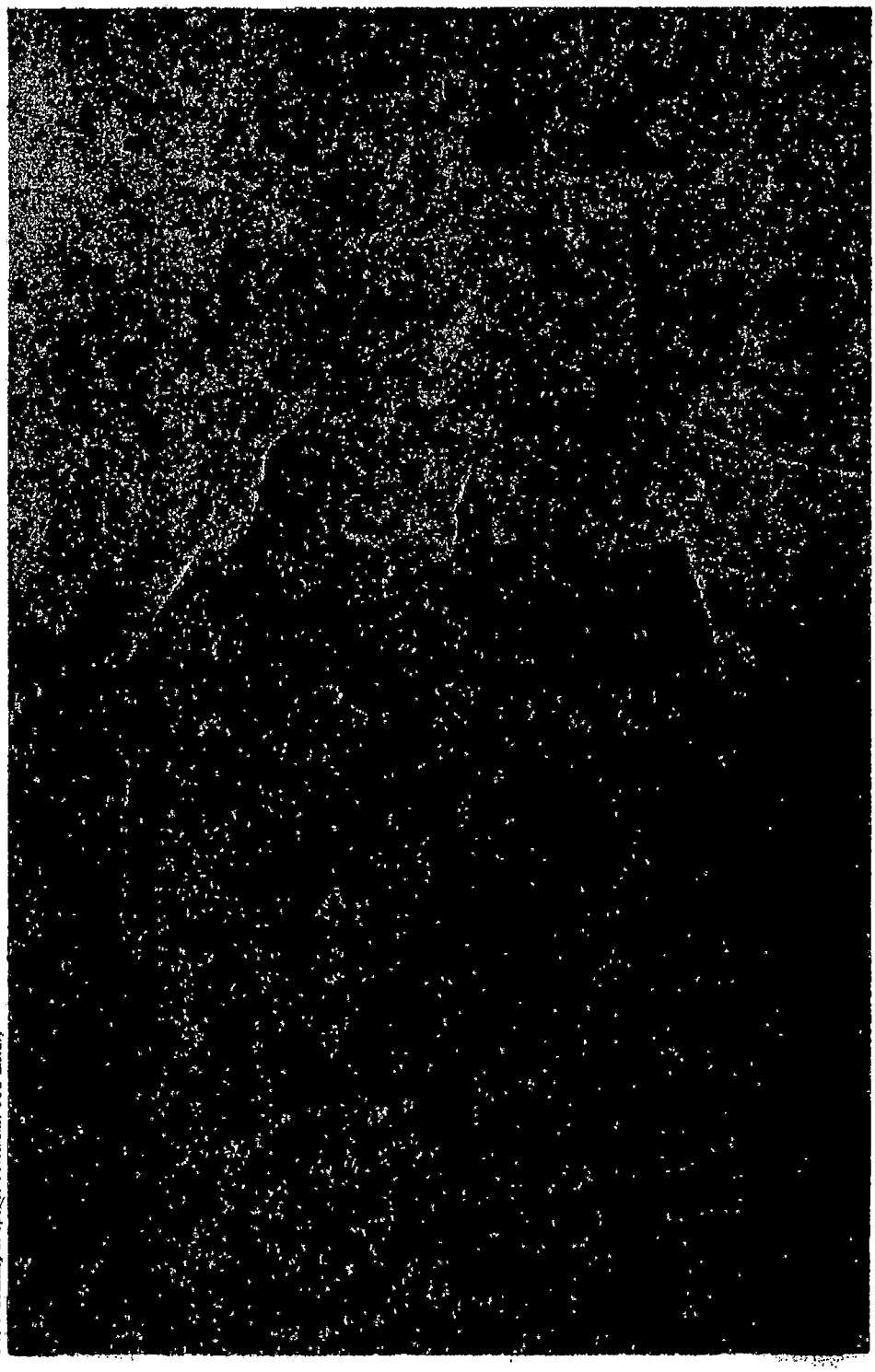


The sun sets in peaceful tranquility over the Oklahoma State University campus (left). It must have appeared much the same for thousands of settlers at day's end when they first poured into the area hoping to claim a homestead and improve their lot in life (above).

When the first students assembled for class on December 14, 1891, there were no buildings, no books, and no curriculum.

In reality, there were no college students either, as no one was qualified academically for the freshman class. Advanced common school pupils were encouraged to enroll in the college's preparatory department—a typical practice in land-grant institutions like OAMC where commitment to the concept of higher education for everyone

This glass-plate print of Old Central was one of the earliest photographs of the building (left). It stands in stark contrast to the modern, sprawling Oklahoma State University campus today.



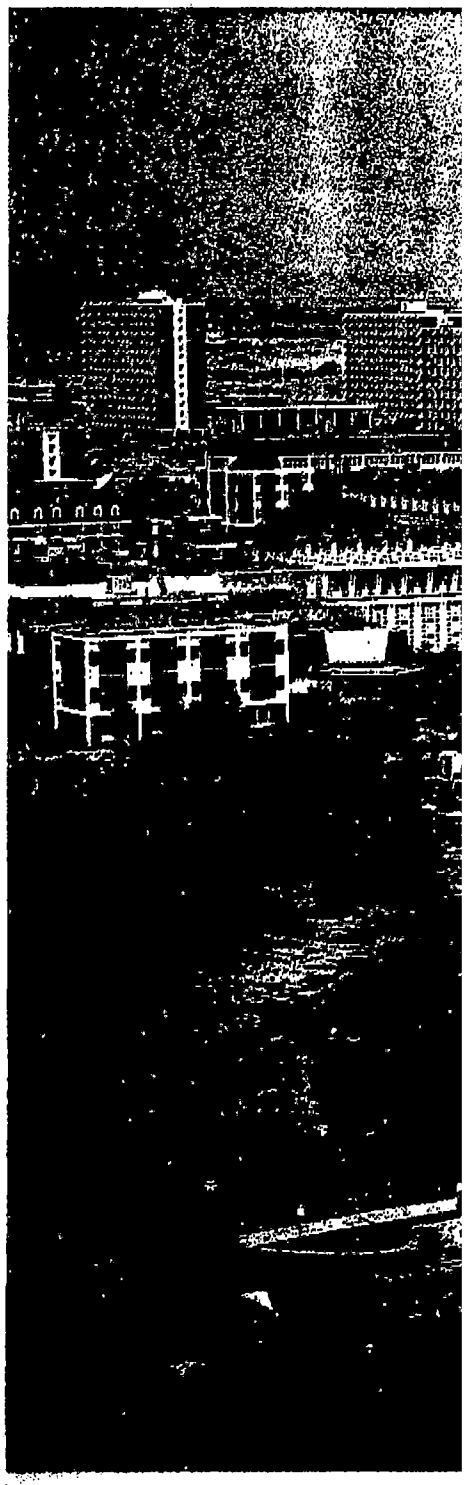


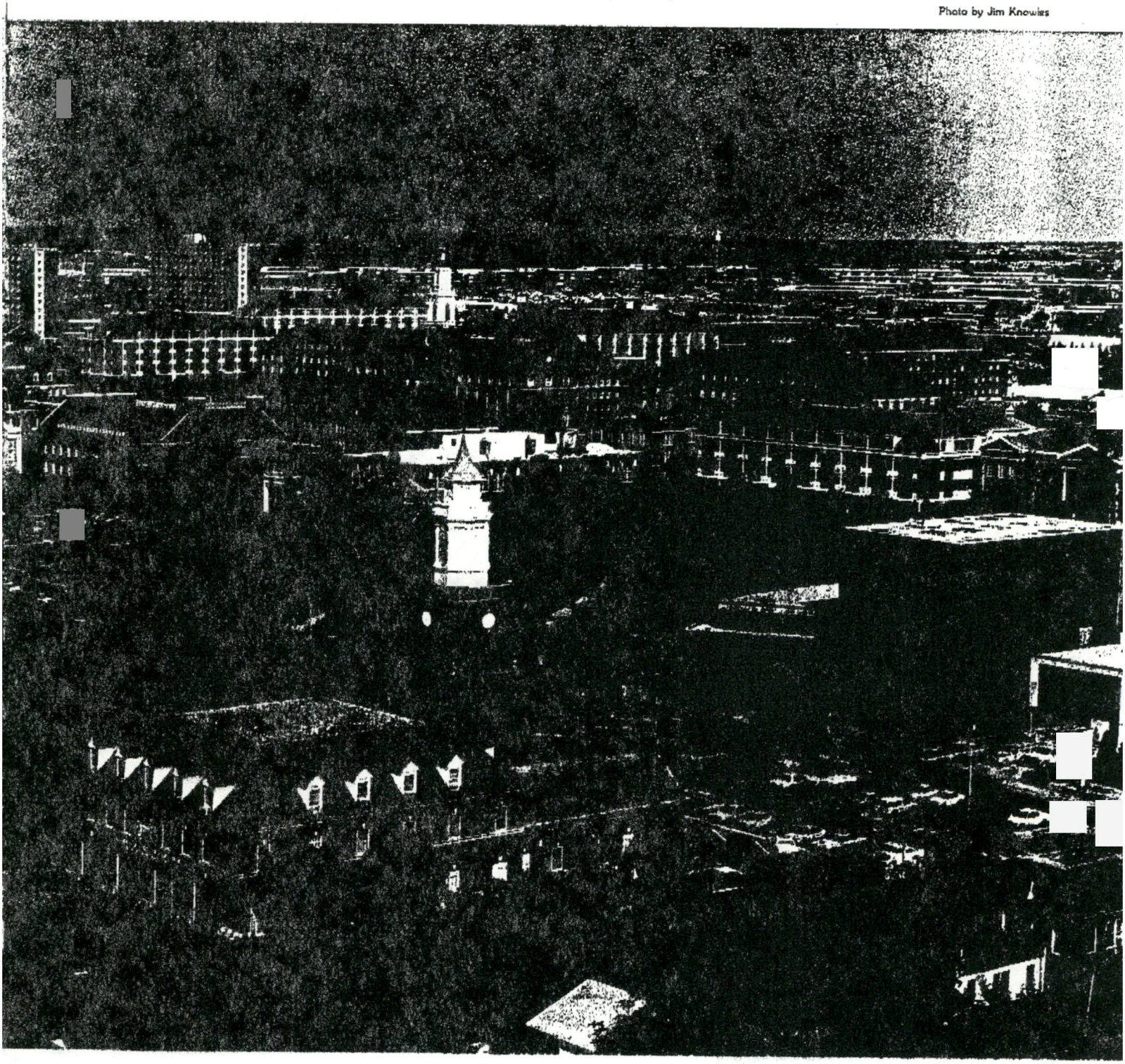
Photo Courtesy of Special Collections, OSU Library

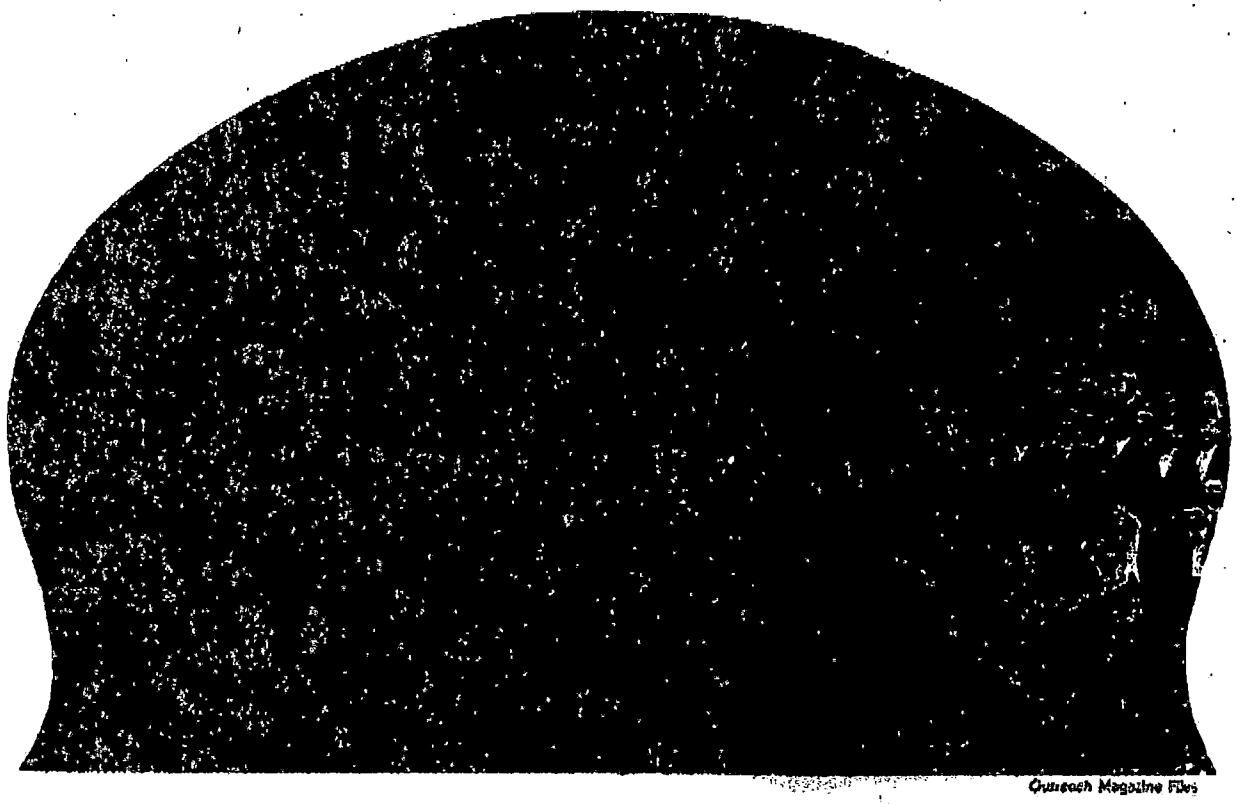
existed.

In 1894, two years before the first collegiate class would graduate and two and a half years after classes began in local churches, 144 students moved into the first academic building. Located on the southeast corner of the college's 200 acres of land, Old Central, as it became known in later years, was built at a cost of $25,000. Extravagantly proclaimed the finest building in the territory, it had six lecture rooms, offices for the president and experiment station director, two recitation rooms, a basement for storage and laboratory experiments, and an auditorium that would seat four hundred people.

Its spires pointing upward, Old Central reminded all that education would bring success to the new territory. Undoubtedly, what eventually did develop on the college campus by some 90 years of progress was far beyond the wildest imaginings of those early occupants.

Photo by Jim Knowles



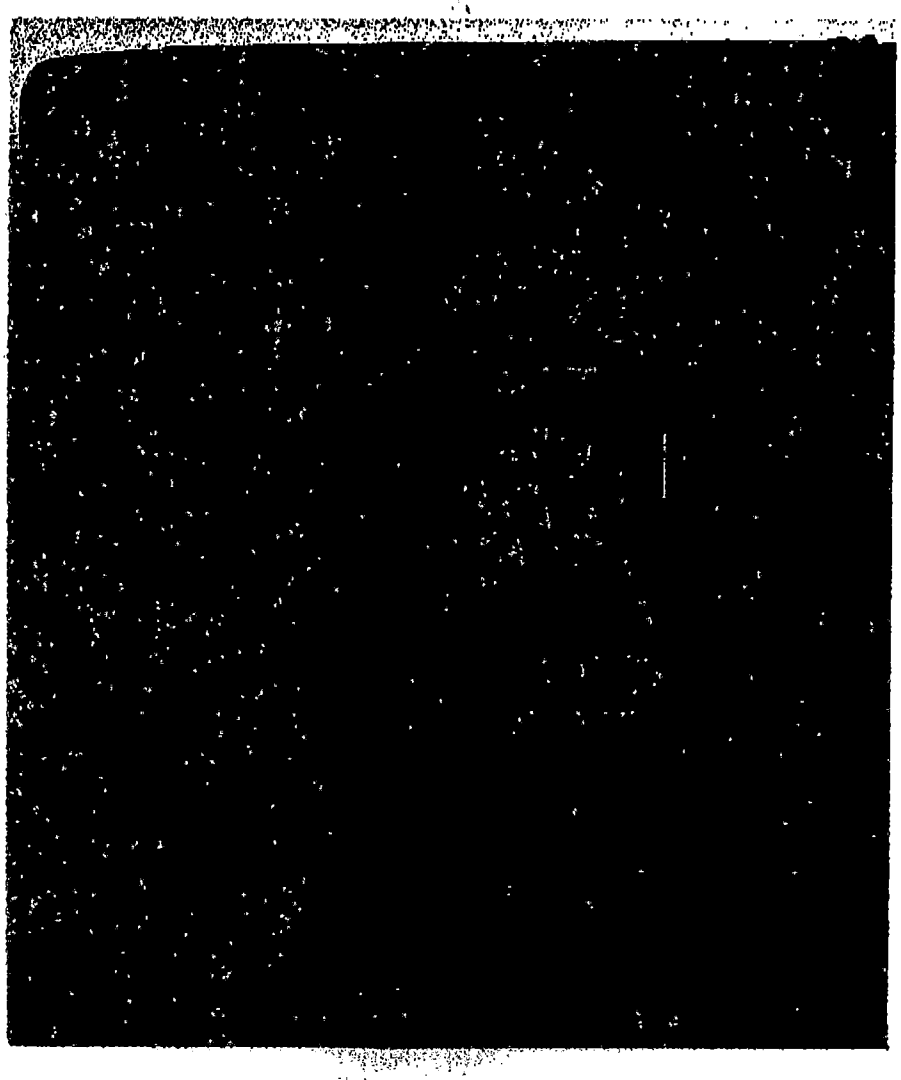


Outreach Magazine Files

The "first sons and daughters of Old Central" came to college facing great personal challenges—both economically (as their help was usually required in a family enterprise), and academically. They came by horseback, buggy and train from places mainly in Oklahoma Territory that today seem unusually near to the campus, but were notably distant then.

The students attended classes each morning. Afternoons were spent in lab, surveying class, military drill or field practicums. Both men and women worked on the college farm planting and harvesting crops as well as taking care of livestock—work required for two hours each day.

Today's students not only come from across the United States, but from countries over the world. Their challenges are different, but their search for a better and more informed life has not changed.





Photos by Tom Johnston

The "first sons and daughters of Old Central" assemble for a photograph (far left). Students of today partake of a horticulture class (immediate left) and hurriedly pass in front of the Edmon Low Library on their way to various class rooms (below). Willa Adams' turn-of-the-century scrapbook (lower left) reminds us that students' character has not changed a great deal over the years.



The early faculty comprised practical and progressive men and women with hopes of change for a better future. They steered the college toward service in teaching, extension and research.

Such scholars as Dr. Angelo Scott, president from 1899-1908, were concerned with the success of their students and became extremely popular with the small student body. Harry Thompson, an early headmaster of the preparatory department, was demanding but fair. These professors held tenuous positions, often being replaced suddenly as the political winds changed. Thompson, like most of the other faculty, would be dismissed without notice by a political board of regents in 1895. Scott resigned before he could be fired. The faculty of today enjoy greater tenure and continue to teach and conduct research according to the fine tradition set in those early years.



Photo Courtesy of C. C. Cook



Courtesy of Special Collections, OSU Library

Harry Thompson, head of the preparatory department, and George Holter, chemistry professor, were photographed in a rare moment of horse-play (above). Memorabilia of Angelo Scott (right) include a music baton present from his students, pocket watch and lapel pin surrounding his portrait. OSU's current faculty (facing page), in addition to their other duties, have proven to be prolific researchers, propelling the university over the last five years from 82nd to 61st in its ranking among research universities as reported by the National Science Foundation.



Photo by Jim Knowles

Photo by Jim Thomas

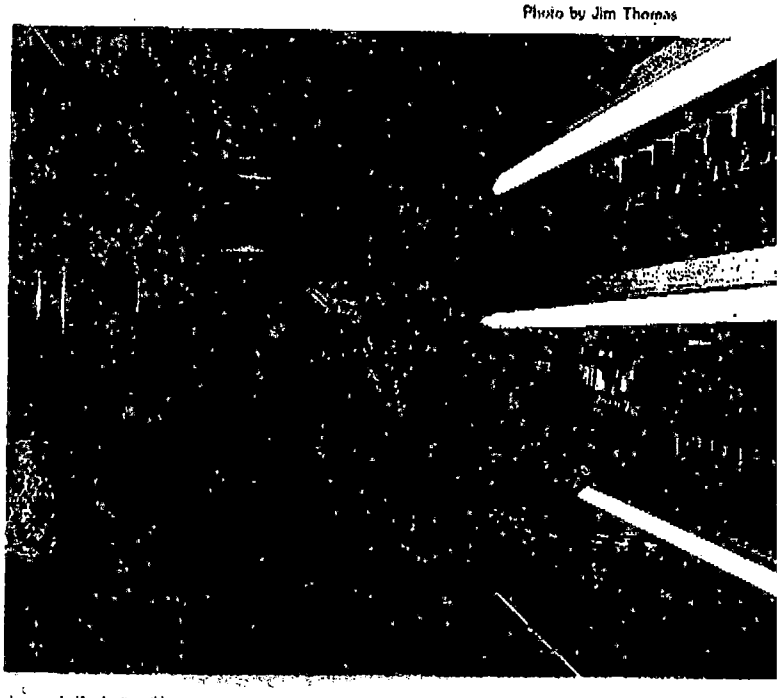


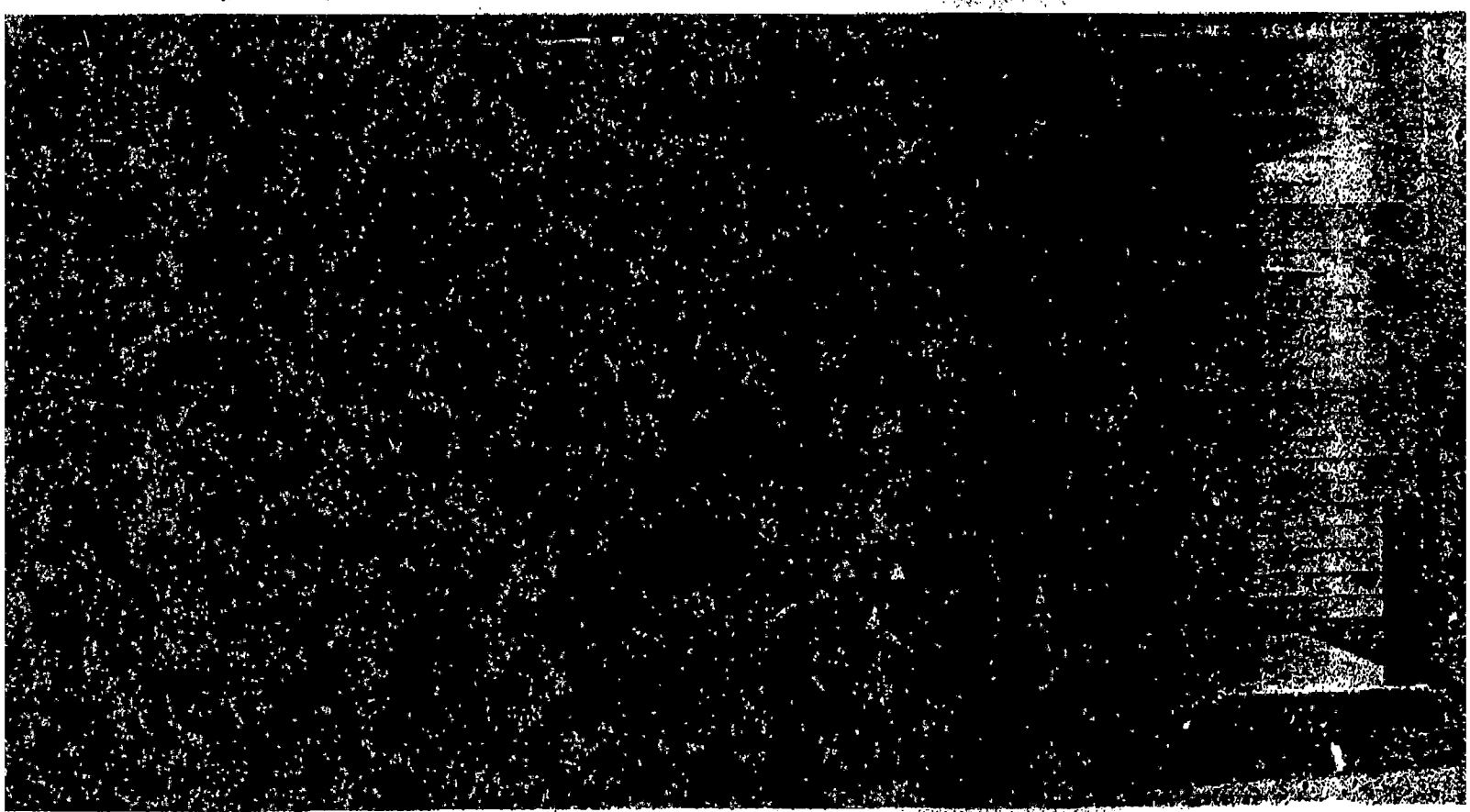


Photo by Jim Thomas



Photo by Tom Johnston

Photo Courtesy of T. Holmes-Shook



The college's first dormitory was not built until 1910. Families often moved to Stillwater when children became ready to attend OAMC. And for students who came alone, there were houses where room and board could be purchased for a small amount.

Each fall, Stillwater residents and college faculty met incoming students at the train station. Newcomers who had no place to stay were invited home by the town's citizens until more permanent lodging could be found. Such a sojourn, however, was only made after an instructor had vouched for the integrity of each host.

Ingenious students often formed clubhouses. Several students would rent furnished rooms and hire a professional cook. Usually, one boy would serve as a manager and another as a treasurer, each getting his room and board free.

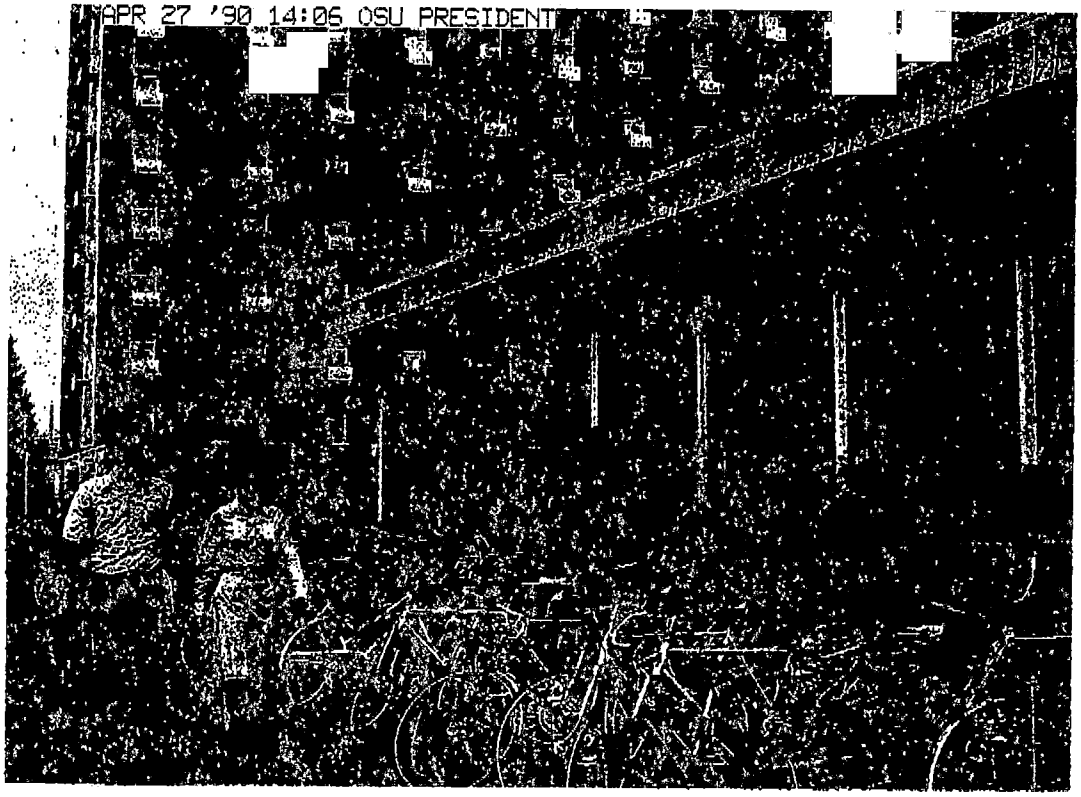


Photo by Russ Grove

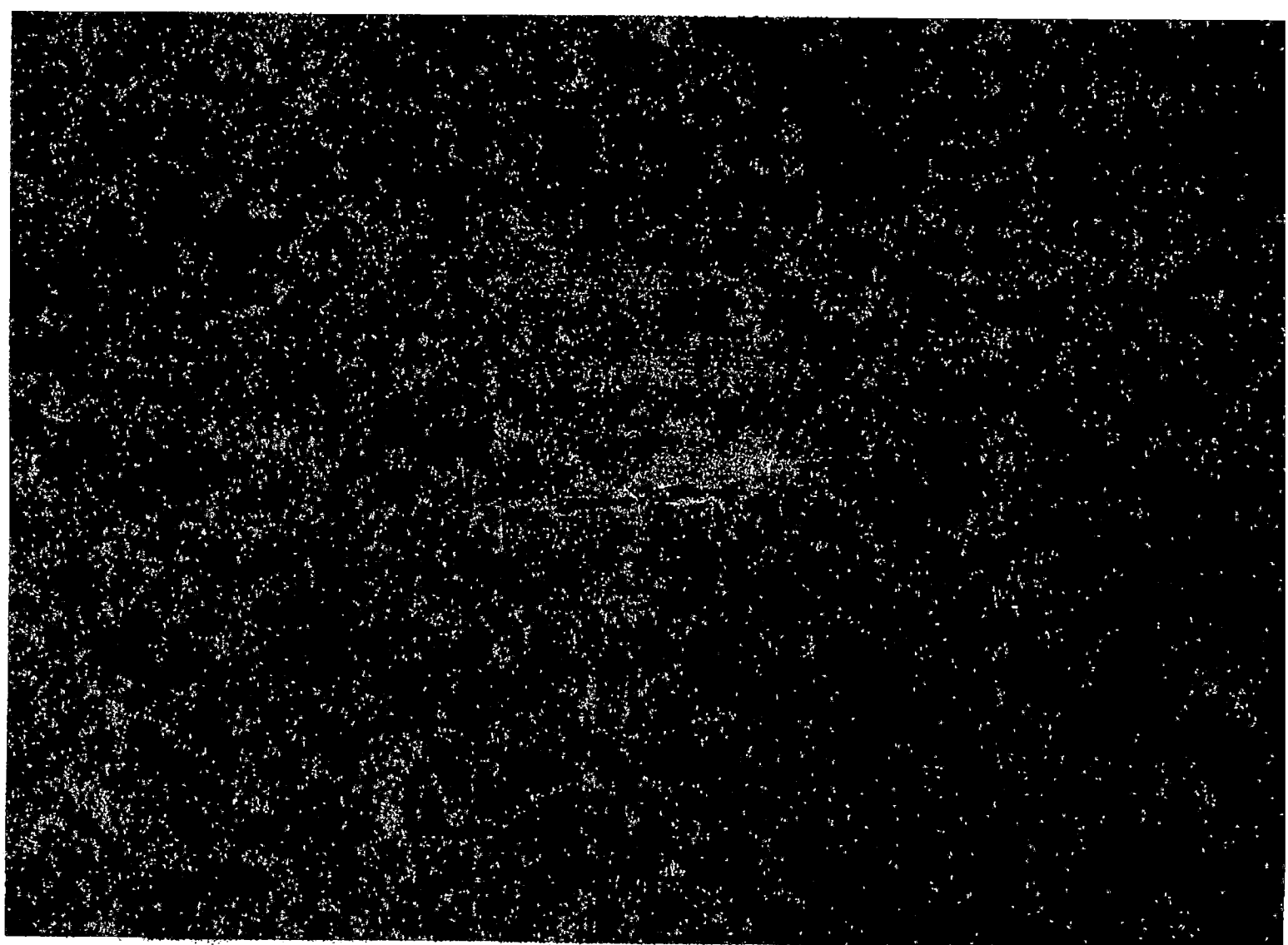


Photo by Russ Grove

Residence hall rooms of today (far left) were undreamt of by early students who lived at home or in boarding houses like that operated by Mrs. Worthington (lower left). Kerr-Drummond (immediate left) and other on-campus complexes below have in recent years been financed through public bonds issued by the OSU Regents.

In 1920, Dad's Place, located just off campus, was a favorite for fine candies, soft drinks, ice cream, cigars and tobacco, and chili (lower left). The Student Union Food Mart (below) offers a wide-ranging selection of merchandise and the picturesque setting of the Union is always a favorite conversation spot (right).

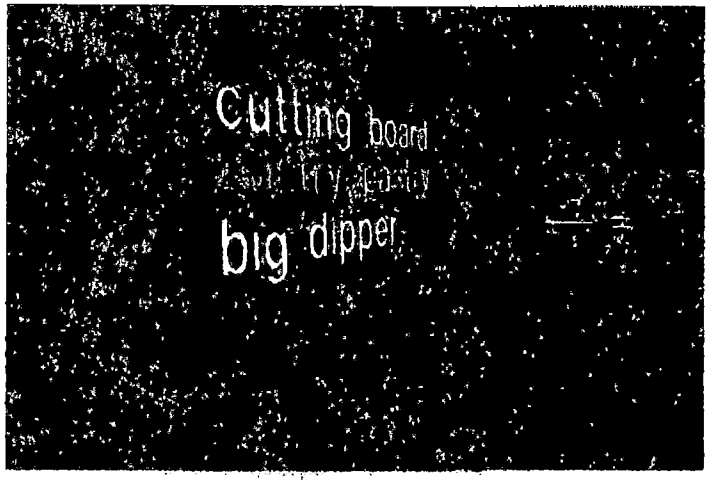


Photo by Jim Knowles

Photo by Tom Johnston

Off-campus spots such as Dad McGrew's were always popular gathering places, but early students found few facilities on campus.

As dormitories became a familiar sight, many students began to eat in the college cafeteria, located where the College of Business Administration now stands. They could purchase a meal in the main dining room for a small amount. Students on the economy college plan could select a separate dining room in which an earlier day's leftovers were served at a greatly reduced rate.

Today, the university's campus is virtually a home away from home.



Osureach Magazine Files



The earliest athletic events were spontaneous games played by the students. Baseball was a favorite and competition among classes became keen.

In 1895, the first organized activity consisting of a track and field day was held to celebrate the Land [illegible]

Photo Courtesy of Special Collections, OSU Library





The first OAMC basketball team, belonged to the women (above) who also stitched up their own uniforms in the A&M sewing laboratory. Current track events for women at OSU (right) make quite a contrast to those early days.

OKLAHOMA!

OKLAHOMA PRESENTS a blustering, macho image of cowboys and Indians and oil wells pumping easy wealth from the ground. Its reality, however, is of an extraordinarily youthful and fragile society, at the mercy of the outside world's whims in pricing its three basic commodities—oil, gas, and wheat—and management decisions controlling its many branch plants.

Here is a state so young that it has recently buried the last of its founding patriarchs, including E.K. Gaylord, who arrived in Oklahoma City in 1902 whilst Oklahoma was still a territory, prospered for decades as publisher of the *Daily Oklahoman* and *Times*, and celebrated his 101st birthday before his death in 1974. Indeed, less than a century ago it was the announced policy of the U.S. Government that the land now Oklahoma be pure and simple "Indian Territory," free of white men altogether and for all time. That was not to be, of course, and the "run" that brought Oklahoma its first white settlement in 1889 ranks among the most celebrated events of American frontier history. Statehood did not come until 1907, and even to this day Oklahoma remains in large part an open frontier society, where status is based on recent accomplishment rather than lineage or history.

From the beginning Oklahoma's economic base has been insecure. Its agriculture has often been ravaged by the vagaries of prairie weather, most notably in the 1930s when the "Okies" of the Dust Bowl became the subjects of great Depression-era photographers and John Steinbeck's *Grapes of Wrath*—the years when topsoil and black blizzards choked cattle and crops, and some 350,000 farmers fled the state. Oklahoma's greatest wealth, however, was discovered in oil, which brought with it the buccaneer culture of wildcatting and speculating. Industrialization began in the late 1950s, yet it has always been oil that makes Oklahoma booms and busts. In the 1970s, oil boosted Oklahoma to affluence without precedent in its history. But the volatility of oil as an economic base was demonstrated anew in 1982 with the failure of Oklahoma City's Penn Square Bank, involved in a series of questionable oil and gas deals. In the early 1980s, Oklahoma's unemployment rate remained one of the lowest in the nation, and the economy appeared one of the healthiest. But Dale Mitchell, president of the Citizens National Bank and Trust Company of Oklahoma City, warned us that a strong percentage of the money raised by get-rich-quick tax shelters of the 1970s had not been invested in stable "asset-building" companies but in fly-by-night firms that spent too much money on promotion, office buildings, inflated salaries, and even jewelry. Such spending, Mitchell noted, permeates a community with prosperity

but creates a big setback when it disappears. An even more sobering future looms: a time not too many decades distant when Oklahoma's black gold will be exhausted forever.

Oklahoma's political reputation is conservative Democrat, but its dependence on outside markets for its minerals and farm products has fostered colorful streaks of populism and independence. In this atmosphere, it produced humorist Will Rogers, who never shied away from poking fun at politicians of all stripes, and has elected a spicy assortment of lawmakers, ranging from rambunctious old "Alfalfa Bill" Murray and that amiable pirate Robert S. Kerr, to the dimunitive man who became speaker of the U.S. House, Carl Albert, and the super-serious chairman of the House Budget Committee, James Jones.

Oklahoma law has been marked by a social conservatism rooted in the beliefs of the Baptist Church. Into the 1980s, Oklahoma maintained an antique statute forbidding liquor by the drink. The law did not keep mixed drinks from flowing like water in the Wild West atmosphere of Oklahoma, but it did produce an elaborate subterfuge of private clubs, daily violations of the law, and occasional raids that embarrassed prominent people. One night in Oklahoma City, we were served drinks on the presentation of our out-of-state drivers' licenses (tantamount to club membership) while an Oklahoman was refused—until he produced his business card stating he worked for the state legislature.

"As Long As the Grass Grows and the Waters Run"

But the Indians were first. Even the name Oklahoma is Indian, from the Choctaw words *okla* (people) and *homma* (red). It was coined by Allen Wright, a Choctaw chief, in 1866. Nomadic Indians remained Oklahoma's only permanent inhabitants, disturbed only rarely by trappers or traders, for two centuries and more after 1541 when deSoto and Coronado both ventured through, finding not gold but great reaches of tall prairie grass and full rivers. In 1803 the land passed into U.S. control as part of the Louisiana Purchase. Soon America's Old South states put pressure on the federal government to relocate the "Five Civilized Tribes"—Cherokee, Seminole, Choctaw, Creek, and Chickasaw—who still disturbed the peace within their borders through occasional uprisings, not to mention occupying land the white men coveted. Oklahoma was a great and unknown no-man's land, and the red men could be safely dispatched there. And so it was that the tribes were obliged to agree to their "removal" to what would be an inviolate "Indian Territory": a land the U.S. Government solemnly promised would be theirs and theirs alone "as long as the grass grows and the waters run."

The "Trail of Tears" by which the Five Tribes were herded westward from the Old South remains a dark blot in American history. When Army troops

came in to round up the people, many were totally unprepared; it is recorded that women left meals cooking over fireplaces, men dropped their plows, children forgot their toys as they were hurried away from their ancestral homes. Hunger, cold, tuberculosis, pneumonia, all took a ferocious toll along the way, and of the Cherokees, 4,000 out of 15,000 perished before they reached Oklahoma. But the Five Civilized Tribes, already a largely literate and Christian group, soon reestablished themselves into quite successful communities in their newly ceded territory in eastern Oklahoma.

The tide of white aggrandizement was not to be so easily satisfied. Stagelines, then railroads, and finally the Chisholm Trail began to criss-cross the territory. The nations found themselves involved in the Civil War, a conflict in which they suffered much and gained nothing. White settlers began to sift westward and squat on Indian lands. The railroads sent out parties to destroy the buffalo, thus destroying the livelihood of the Plains Indians. In response to violent disputes and sporadic raids by Indian hotheads, the U.S. Army in the 1860s and '70s carried on a bloody "pacification" campaign strikingly similar in some of its basic aspects to the Vietnam War a century later, including near massacres of entire villages in which rebellious Indians were thought to be taking shelter among the more peaceable.

The Five Civilized Tribes perfected sophisticated "nation" governments, ran excellent schools having a number of white teachers, and published newspapers. When land-hungry whites suggested the Civilized Tribes were holding more land than they really occupied or needed, the Indians reacted with strong initial hostility—seeing, understandably, the first step down another Trail of Tears. Educators, churchmen, and other groups across the United States opposed any expropriation of surplus Indian lands in Oklahoma. But the pressure of white settlers for fresh land increased constantly. By the 1880s large camps of "Boomers" were settling around the fringes of Oklahoma, waiting for a chance to enter and homestead. Finally, the Creeks offered in 1889 to sell land they owned in central Oklahoma, and the federal government quickly agreed on a price. President Benjamin Harrison announced that on April 22, 1889, a big chunk of territory in central Oklahoma—the "Unassigned Lands"—would be opened for white settlement.

Oklahoma histories glow with excitement when they talk of that day. Thousands of hardy young settlers and their families surrounded the Unassigned Lands. Federal troops formed a fence between the homeseekers and the land, but even so some settlers ventured out earlier, thus giving birth to the nickname "Sooner." Most, however, waited behind the lines, and then at noon on April 22 a cannon was fired and the legal Boomers went rushing across the lines. On foot they came, or on race horses, or driving two-wheeled racing sulkies or farm wagons or high bicycles—or jumping off the steps of a special Santa Fe Railway train. Quickly the flagged stakes, marking out homesteads or plots, formed their patterns. That morning the Unassigned Lands had an official population of zero; that night it was some 20,000. Among the cities that sprouted from the prairie in a single day were Oklahoma City, Guthrie, Norman, and Stillwater.

The 1889 Run broke the dike; soon the Indians were obliged to surrender more and more of the territory once held inviolate. Three more runs between 1889 and 1895 opened up 10 million additional acres. The Indian nations struggled for several years to remain independent of the Oklahoma Territory, but gradually they lost virtually all of their land. Then came the final glimpse of Camelot for the Indians—a proposal by the Five Civilized Tribes, in 1905, for a new Indian state of the Union, in eastern Oklahoma, to be called the "State of Sequoyah." But Congress spurned the idea, authorizing a single state of the Oklahoma and Indian Territories in 1906. On November 16, 1907, Oklahoma became the 46th state of the Union; the only four still younger are Arizona, New Mexico, Alaska, and Hawaii.

Today Oklahoma's Five Civilized Tribes, stripped of most powers except ceremonial, continue with their own councils, chiefs, structures, and cultures in eastern Oklahoma. Out in the state's western reaches there are still many Plains Indians, including Cheyennes, Apaches, and Arapahoes. Oklahoma in 1980 had 169,464 Indians—more than any other state except California, yet because of the expanding white population over the years, only 5.6 percent of the state's population.

History was made in the 1960s when for the first time there was a joint meeting of the chiefs of both the Five Tribes and the Plains Indians. In terms of living standards, the Civilized Tribes are said to be more fortunate than most native Americans. And there have been reports of Indians near Oklahoma City who have become millionaires overnight because their gas holdings have been exploited. But all this is relative. Ten percent of Indians in Oklahoma were still on welfare in the early 1980s. True unemployment among Indians, it was estimated, might be as high as 60 percent.

The White Man's Oklahoma

For the white man, Oklahoma since the 1960s has been one of the most hospitable states in the nation. Thousands of young Americans, many straight off farms that were becoming mechanized and often without the highest skills, have found jobs and homes in Oklahoma. Some were the descendants of people who left during the Depression. The economic growth in the 1970s was so strong that Oklahoma added 465,803 new people (reaching 3,025,266 in all). All those newcomers found wages slightly below the national average, but also a lower cost of living. Over the years, Oklahoma had remained slightly poorer than Texas but several degrees better off than the Deep South states to the east, and had materially improved its position vis-à-vis its northern neighbors, the Plains States. Agriculture—especially when one took into account food processing and other related "agribusiness"—remained the single largest element in the economy. But the number of farmers and farms had continued to drop while the average size grew from 194 to 479 acres. Oklahoma in the early '80s was among the leading five states in wheat production and also ranked high in cattle.

Oklahoma's oil history began with the first wildcatting, in 1880, and the first producing well, in 1897. The big pools started coming in a decade later, and with them the problems of ruthless exploitation of a natural resource. No attempt was made at conservation, and the life of every important field was shortened by waste of millions of barrels of oil and billions of cubic feet of gas. The courts gave landowners total discretion over the use of the oil and gas and even ruled that the owner "may crowd the adjoining farms so as to enable him to draw the oil and gas from them. What then can the neighbor do? . . . Nothing; only go and do likewise." Among the landowners profiting handsomely from the sale of oil leases on their land were the Osage Indians, made the world's richest race of people per capita by 1921 oil leases that were still earning them $76 million in royalties in 1981.

Hard times came in the 1930s when the opening of the East Texas oil fields and the Depression drove the price of Oklahoma crude down to as low as 10 cents a barrel. Even though Governor Murray sent in the National Guard to close down the oil fields, there was a widespread traffic in "hot oil" smuggled out of the state. Since then, the Oklahoma Corporation Commission has administered an effective proration program. The decline of Oklahoma petroleum reserves forced the state's two big homegrown oil companies—Phillips Petroleum and Kerr-McGee—to survey the world for additional sources. Kerr-McGee, founded by the late Senator Kerr and a partner in 1929, eventually became a pioneer in seismic exploration work and drilling far off the Louisiana coast and moved heavily (and profitably) into petrochemical manufacturing, uranium mining, and enrichment. Kerr-McGee's nuclear operations have undergone intense scrutiny since 1974 when Karen Silkwood, a Kerr-McGee employee and union activist, was killed in an automobile accident while on her way to meet a *New York Times* reporter to talk about safety in a plant near Oklahoma City. There were immediate allegations that Kerr-McGee or its agents had been involved in the death. A federal court jury found Kerr-McGee guilty of her contamination by highly radioactive plutonium and awarded her family $10.5 million in punitive damages. The award was overturned by an appeals court, and the Silkwood family took the case to the U.S. Supreme Court.

Phillips was a Nebraska-born barber who made his way to Bartlesville in 1904, telling a brother, "I think people are going to buy quite a passel of these gasoline buggies, and they need gasoline to make 'em go. It may be this thing has a future." When he died, in 1950, Phillips Petroleum was worth $660 million and operating in more than half the states. Neither Kerr-McGee nor Phillips has ever been shy in flexing its political muscle. One incredible success: bankrolling (and winning) 1930s referenda to permit drilling of the fabulously rich oil field underlying residential areas of Oklahoma City and even the State Capitol grounds. We will not soon forget the surprise, on a first visit to Oklahoma City, of seeing an oil well (painted gold for its special location) pumping close to the Capitol's front entrance, and bearing the sign of one of Oklahoma's oil companies.

When world oil prices rose in the 1970s, Oklahoma boomed. Oil fields long

considered uneconomic suddenly became worth exploring. Explorers, wildcatters, and drillers swarmed into small towns such as Elk City and Hammon in southwest Oklahoma's Anadarko Basin. Some farmers became overnight millionaires (known locally as "oileys") and stopped worrying about wheat and cotton prices. The oil boom also fueled a construction boom. "It's almost like a reverse 'Grapes of Wrath,' " Danny George, assistant city manager of Elk City, told a visiting reporter.

Industrialization, even in remote rural Oklahoma, was an equally amazing economic miracle to many "Okies"—the nickname Governor Dewey Bartlett, pushing economic development in the '60s, declared was an acronym for "Oklahoma, Key to Industrial Expansion." Hundreds of small communities used general revenue bonds to build plants to which they lured small factories. The U.S. Economic Development Administration and the Ozarks Regional Commission helped out in the most depressed areas. Bartlett became what General Electric board chairman Gerald L. Phillippe called an "aggressive bearcat of a governor," and annual new investments in the state did more than double, and then triple previous levels. Bartlett was criticized, however, for the "giveaway" gimmick of excusing new businesses from property taxes for 30 years, an issue used to defeat him in the 1970 campaign. In the 1970s industrialization appeared to be continuing of its own accord in computers, metal fabricating, and aerospace. Some of these plants were technically owned by a tax-exempt state agency, the Oklahoma Industries Authority, until populist Attorney General Jan Eric Cartwright issued an opinion that such ownership arrangements to avoid taxation were contrary to the state constitution, a lengthy document written in the era of Grange and Populist radicalism. Directors of the authority had also used the tax schemes for their personal benefit, Cartwright charged. General Motors and other companies that faced millions of dollars in tax obligations argued that they had made a deal with the state of Oklahoma; Cartwright was unfazed, however, asking if no one on GM's huge staff of attorneys could read the state constitution and figure out the tax breaks were illegal. The Supreme Court agreed with the attorney general, to the horror of insiders such as Edward L. Gaylord, son of the founder of the *Daily Oklahoman.* Into the 1980s Gaylord served as president and editor of the newspaper *and* chairman of the Oklahoma Industries Authority, an arrangement once common in the Old West but now seen in many other states as a conflict of interest.

The Political Scoreboard

"Sooners" have packed more political feudin' and a-fussin' into their brief history since the first Run than many older states can account for in longer, more placid existences. Oklahoma politics are informal, youthful, and personality-oriented. In 1982 we watched Governor George Nigh, dressed in cowboy boots, blue jeans, and a deep-cut purple silk shirt bearing a decal "Keep Me," rally his reelection troops with a plan to fill Oklahoma City's shopping

centers so that rural shoppers would return home with word of the campaign's tremendous momentum in the city.

Oklahoma has been willing to elect its talented youth, even if they are unusually liberal, such as Cleta Detherage, of Norman, who in 1982 at the age of 31 was chairman of the Oklahoma house budget and appropriations committee. But Oklahoma also reveres its old hands. One man, Lloyd Rader, was state welfare director for three decades and controlled a $1.2 billion budget, which was not scrutinized by the state legislature until 1982. Even critics had agreed that Rader had pushed the state forward, beyond its neighbors, in social services. But when he became old, there was tremendous resistance to replacing him or modernizing the governmental system. Oklahomans pay very low taxes, Detherage noted, but the constant national publicity about high taxation has made them think their taxes should be reduced, too. By 1982 the state was raking in more money from its oil and gas severance tax than from any other source—even its personal income tax. The cloud on the horizon was that production declines in future years would force more austerity—or self-taxation.

Oklahoma's biggest recent progress has concerned its prison system. In 1970, state corrections director Arnold Pontesso resigned, charging, "We cage people like animals in a zoo. We not only pay our real zookeepers more than our people working in prisons, we provide bigger and better cages in real zoos." Federal court orders to expand and improve the prisons followed, and by the early 1980s Oklahoma became the first state to see all its adult correctional facilities accredited by the American Correctional Association. Serious problems remained in the juvenile facilities, however, where there were allegations of brutality and the mixing of criminal offenders with youths whose most serious offense had been running away, or in the case of teenage girls (if one can still believe this in the 1980s), sexual promiscuity.

Except for a few "freak" elections, Oklahoma was blindly Democratic until the 1960s, a spinoff of the state's Southern location, its surfeit of down-and-outers, and the fact that Democrats early got a stranglehold on the most posts, including the county rings, that held sway until scandal felled them in the 1970s. Republicans managed their first major breakthrough by electing wheat farmer Henry L. Bellmon as governor in 1962, the result of a statewide organization Bellmon had built as well as the heavy Republican vote that had developed in such cities as Tulsa. Bellmon went on to serve in the U.S. Senate (1968–80), where he confounded other Southwestern Republicans by voting to hold the line on defense spending and farm programs while favoring civil rights legislation. The election of Tulsa oilman Dewey F. Bartlett, the Republicans' second governor (1966–70), was a particular surprise because he was a Roman Catholic and a Princeton graduate—hardly the right credentials in a hard-shell Baptist, distinctly non-Eastern state. Anti-Catholic sentiment was thought to have had a lot to do with the overwhelming Oklahoma defeats suffered by Al Smith in 1928 and John F. Kennedy in 1960.

The innate and growing conservatism of Oklahomans has been best reflected on the presidential level, where Republicans have reigned supreme

since 1952, except for 1964, when Oklahomans rejected Barry Goldwater in favor of Lyndon Johnson. Not even Southerner Jimmy Carter returned Oklahoma to the Democratic column.

The most colorful Oklahoma politico of all time was doubtless William ("Alfalfa Bill") Murray, who wore out three gavels chairing the 1907 state constitutional convention. Murray had been a successful courtroom attorney, showing sharp native intelligence, but when he ran for governor against a wealthy oilman in the hard-times year of 1930, he cultivated a common-man image, letting his long mustache go untrimmed and ragged and the trousers of his old brown suit bag at the knees. "I'm not an extremist. I believe firmly in our capitalistic plan—if capitalism can be forced to restrain its ungodly greed and serve the needs of humanity," Murray declared. In office, Murray was in fact no radical. But colorful he remained throughout. John Gunther recalled that an unsuspecting visitor to the gubernatorial offices, sitting in a chair carefully placed three feet from Murray's desk, might try to hitch himself closer—only to discover that the chair was nailed to the floor and hear Murray shout, "What the hell do you want?" He often went barefoot and kept his socks in his desk.

Robert S. Kerr made it from the Oklahoma log cabin where he was born to become a multimillionaire oilman, the state's first native-born governor, and—along with Lyndon B. Johnson—one of the two most effective power-brokers in the U.S. Senate. Kerr was a great bear of a man (six feet, three inches and 220 to 275 pounds), jovial, exuberant, a formidable opponent. A fervent Baptist and Sunday School teacher, he was depicted to us by Dean A. McGee, his oil industry partner, as "a man of complete integrity, big-hearted, highly intellectual, a great doer, a real Christian gentleman who lived his religion." Others have not been so charitable, suggesting Kerr used his Senate position to defend and profit personally from the 27½ percent oil depletion allowance and other legislation of direct aid to Kerr-McGee with its far-flung interests in petroleum, natural gas, beryllium, boron, helium, potash, and uranium. *Time*'s Capitol Hill correspondent Neil MacNeil reported Kerr had been "one of the most ruthless politicians ever to enter the Senate, . . . exacting a price for every favor he gave, even from the President."

Carl A. Albert, Speaker of the House of Representatives (1971–77), was from "Little Dixie," the poorest part of southeastern Oklahoma, the son of a tenant farmer and sometime coal miner. He didn't live in a house with electricity or running water until he was 16 and wore bib overalls to school. Later he went on to the University of Oklahoma, won a Rhodes scholarship, and after World War II won term after term in Congress, breaking the Oklahoma mold by refusing big campaign contributions from anyone, including oil and labor interests. Albert's district was just across the Red River from the one in Texas that the late Sam Rayburn used to represent, and the two men became close friends in something akin to a father-son relationship. As Speaker, Albert performed admirably during the Watergate crisis and sought to advance congressional reform; criticism came from those who said he was too much of a consensus politician, not a forceful enough leader.

In recent years Oklahoma has sent conservatives of both parties to Washington, but all with an independent streak. Tops in power was Tulsa Congressman James R. Jones, who became chairman of the House Budget Committee in 1981, trying to move the Democratic party away from its big-spending ways. Jones found it difficult, however, to steer a middle course between the Democratic liberals and "Boll Weevil" Democrats supporting President Reagan's budget. Senator and former Governor David L. Boren, Yale graduate and former Rhodes Scholar, was the most active Democratic supporter of President Reagan's tax cuts but also retained a Populist streak, railing on the Senate floor against high interest rates. Oklahoma's junior senator, Republican Don Nickles, could give pause to anyone who equated the baby boom generation with social liberalism: born in 1948, he won election in 1980 as the favorite of the Moral Majority and as founder of a hawkish organization called the Oklahoma Coalition for Peace Through Strength.*

That it was dangerous in Oklahoma politics to turn too far to the left had been learned by Fred Harris, Democratic senator during the '60s, member of the Kerner Commission on racial disorders (which cited "white racism"), and Democratic national chairman for a year. After he shifted from hawk to dove on the Vietnam War, Harris realized he had moved far beyond the Oklahoma pale. He declined, at age 40, to seek reelection to the Senate, moving to Albuquerque, N.M., to teach and write. He ran a short-lived, deficit-plagued "New Populist" campign for the Presidency in 1976.

Oklahomans have some reason to be skeptical about politics and politicians. In the 1920s there were gutter fights over impeachment of governors. The era of cronyism and patronage in virtually all state government jobs, of unsavory highway and election scandals, lasted well into the postwar period. A general cleanup of government was effected by J. Howard Edmondson, a controversial but courageous governor of the late '50s and early '60s. But in 1975 former Governor David Hall was sentenced to three years in prison on four counts of bribery and extortion.

And in 1981 *two-thirds* of Oklahoma's county commissioners—more than 120 persons—pleaded guilty or were found guilty in what turned out to be the largest kickback scandal in U.S. history. For all anyone knew, the kickbacks may have been going on for decades since the "good ol' boys" had held an iron lock on the county governments since statehood was achieved in 1907. The beginning of the end came when Dorothy Griffin, a lumber-yard owner in Farris, got into trouble with the Internal Revenue Service and 'fessed up to federal investigators that she had written more than $1 million in phony invoices for nonexistent transactions between suppliers and county commissioners. "I'm just a dumb old country woman standing out here in my bare

*The *oldest* member of the Oklahoma congressional delegation in the early 1980s was the state's only Republican House member, Mickey Edwards, of Oklahoma City, born in 1937. Edwards was chairman of the American Conservative Union, but also displayed the Oklahoma penchant for independence, wooing organized labor and, after Three Mile Island, expressing a loss of faith in nuclear power.

feet," Mrs. Griffin told the press, "but I do know that you don't do wrong and get by." Another supplier admitted he had paid more than 8,000 kickbacks in 28 years. The scandal resulted in the reform of state purchasing laws although the county commissioners did retain power over road building.

Geographic Oklahoma and the Waterway

Oklahoma is basically a big rectangle—305 miles from east to west, 210 miles from north to south—with an odd 165-mile-long panhandle protruding over Texas from its northwest corner. This shape has been likened to a butcher's cleaver, with the panhandle representing the handle and the line of the Red River, which defines the southern boundary, like an irregular cutting edge. The 98th meridian, where the grassy lowlands of the Mississippi Valley fade into the high and dry Great Plains, slices down through the state a few miles west of Oklahoma City. Annual rainfall ranges up to 50–56 inches in the southeastern corner, a land with bayous and huge water cypress trees like Louisiana's. As far west as Oklahoma City, moist winds blowing up from the Gulf of Mexico deposit enough rainfall for crops of cotton, soybeans, and grains. But in the westernmost reaches, only dry farming of winter wheat and cattle grazing are practicable. On the High Plains at the tip of the Panhandle, precipitation dips to an arid 16 inches a year. This was Dust Bowl territory in the '30s; since then, prosperity has returned due to increased rainfall, massive pumping of underground water, and soil conservation practices.

Southeastern Oklahoma went into deep recession in the 1920s and did not truly recover even as the state flowed with oil money in the 1970s. Despite some better-off farms and income from oil, recreation, and paper milling, travelers through the region still see dilapidated houses and islands of hillbilly poverty. Northeastern Oklahoma, by contrast, has the big and bustling city of Tulsa and an abundance of power-producing natural resources: natural gas, coal, and hydroelectric power from the Arkansas River.

Eastern Oklahoma includes parts of the low-lying Ozark and Ouachita mountain systems, both regions of natural beauty, especially the Ozarks with their hardwoods and flamboyant autumns. But the truly exciting attraction is water. Within little more than a generation, eastern Oklahoma has been transformed from the marginal scrubland to an aquatic paradise. Oklahoma itself built Lake O'The Cherokees, with its 1,300-mile shoreline, but mostly the federal government is to thank for such huge lakes and reservoirs as the Eufaula, Fort Gibson, Tenkiller Ferry, and Thunderbird. They provide hydroelectric power, flood control, irrigation, and municipal water supplies, and of course abundant new playgrounds for boaters, water-skiers, and fishermen. Eastern Oklahoma acquired a ratio of water to land higher than Minnesota's. By the '80s bone dry western Oklahoma was eying the watery bonanza. But eastern Oklahoma was intensely protective of its treasure, and it was not hard to discern a red hot Sooner political issue for the rest of the century.

There have been times when Oklahoma had more water than it liked. Will

Rogers once wrote: "When the Arkansas, Red River, Salt Fork, Verdigris, Caney, Cat Creek, Possum Creek, Dog Creek, and Skunk Branch all are up after a rain, we got more seacoast than Australia." It was the gruesome flooding of the Arkansas that prompted Kerr—risen to the power of chairmanship of the Senate Public Works Rivers and Harbors Subcommittee—to undertake the battle for the Arkansas River navigation and flood-control project. This modest little piece of home state pork barrel eventually cost U.S. taxpayers a staggering $1.2 billion, more than the Panama Canal and the St. Lawrence Seaway combined. The result: a navigable 446-mile channel, running all the way from the Arkansas' mouth on the Mississippi to the Tulsa suburb of Catoosa. The big ditch, up to 300 feet wide and at least 9 feet deep, includes 17 locks and dams to facilitate the movement of ships and barges over the 420-foot elevation differential. Instead of a dangerous, meandering stream, the Arkansas was transformed into a series of placid lakes and canals. Ten of the dams provide hydroelectric power (three billion kilowatt-hours of electricity per year). And seven upstream reservoirs provided the flood protection for which Oklahoma longed.

Urban Oklahoma and the Press

Burgeoning Oklahoma City and Tulsa dominate urban Oklahoma and compete to see which can grow the fastest and bestest. Oklahoma City had the population edge in 1980: 404,213, compared to Tulsa's 360,919. Both metropolitan areas grew mightily in the 1970s: Oklahoma City, 19 percent; Tulsa, 25 percent. Houston's long lead notwithstanding, Tulsa still proclaims itself "Oil Capital of the World." The headquarters of Cities Service and hundreds of small oil companies are there. Phillips is located in Bartlesville, only 40 miles distant. Oklahoma City, on the other hand, has added a long list of blue-chip industrial firms through an aggressive chamber of commerce factory recruiting job.

Oklahoma City is remembered as the city that popped up out of the prairie between noon and sunset on April 22, 1889. Before that, Oklahoma historian George Shirk recorded, the location "was just a dusty depot on the sun-scorched prairie. A stop for Santa Fe trains. No trees. The entire water supply came from a single well, about where Broadway and Main Street meet today." After the famous run, Oklahoma City became a big country cattle town and state capital and prospered as a major city on the Santa Fe main line. It got in on the big and fast money when oil hit in the 1930s.

A touch of the exploitive, get-rich-quick psychology of the world of oil derricks still lingers in Oklahoma City. But there are some new, softer themes. In 1971 voters elected Mrs. Patience Sewell Latting as their mayor—the first woman to head an American city of more than 200,000 people. Mrs. Latting proved to have staying power and was still in office more than 10 years later.

In the 1960s, Oklahoma City began to rebuild its downtown almost from

scratch: a new civic and convention center, new office buildings, and a refurbishing of the famed Skirvin Plaza hotel with its hand-tooled leather ceiling. The Skirvin was once the home of the late, famed Washington hostess Perle Mesta, whose father owned it. A downtown subterranean tunnel filled with restaurants and boutiques linked 16 buildings, allowing office workers to move between buildings and meet friends for lunch without going outside into the broiling heat that marks Oklahoma City much of the year. Oklahoma City's tunnel is one of the few examples of architectural innovation and adaptation that truly works in the American Southwest. Latting and a group of civic leaders visited Tivoli Gardens in Copenhagen and built their own version in Oklahoma City, connecting it with the 1930 Courthouse and Town Hall. Famed city planner and developer Edmund Bacon has proclaimed Oklahoma City "just a jewel of a little city—going back to its central focus." A visitor could only wish that downtown would grow, creating a critical mass of activity and lessening the office sprawl over the plains.

Tulsa made a start in 1879 as a post office on the pony express route through Indian Territory and as late as 1905 was called Tulsey Town, an unkempt frontier settlement where—in the words of one settler—"we had to dodge roaming hogs, goats, and cows when crossing, and sometimes wild animals would venture into the middle of town." But in 1906 the big break came with the discovery of the high-grade Glenn Oil Pool nearby. Tulsa's canny town fathers persuaded hundreds of oil companies to set up their headquarters in town. Today, Tulsa prospers not only as a prime site of petroleum technology and research but as an aviation-aerospace center (including major operations of American Airlines, McDonnell Douglas and Rockwell International) and through telecommunications and data processing (no other city in the world processes more credit card slips). At one point in 1981 it had the lowest unemployment rate of any U.S. metropolitan area.

Tulsa became the focal point of conservative Republican politics in the Sooner State. The county went overwhelmingly for Barry Goldwater in 1964, gave Nixon and Wallace a combined 77 percent in 1968, and Ronald Reagan 66.2 percent in 1980. The conservative temper of Tulsa is fostered by two rightward-oriented newspapers, the *Tulsa Tribune* and *Tulsa World.* The former is edited by an urbane newsman and syndicated columnist, Jenkin Lloyd Jones.

Tulsa's tail was twisted twice in recent years by the *New York Times,* which suggested in articles by William Stevens and John Herbers that this "robust, conservative town, an upholder of Western individualism," preaching "do-it-yourself values straight off the frontier," was in fact not nearly as independent of the federal government as it let on. In fact, the *Times* ascertained, relying partly on data from University of Tulsa economists, that as much as a quarter of Tulsa-area local government budgets could be traced to the federal treasury, including major grants for big urban renewal projects and $100 million a year in Tulsa County, mostly on behalf of the poor and elderly. The revelations failed to inhibit Tulsa's young Republican mayor, James Inhofe,

from urging the Reagan administration to hack away heavily at federal aid to cities, including many (in contrast to Tulsa) coping with heavy unemployment and huge numbers of poor people.

Tulsa is home base for the famed fundamentalist evangelist Oral Roberts, whose televised religious services and faith healings became known across the continent. Roberts' evangelical empire, built with millions of dollars sent by T.V. watchers, includes Oral Roberts University, complete with a modernistic 200-foot "prayer tower" (Tulsa's biggest tourist attraction) and a 60-story "Christian" medical center, built over the objections of the local medical authorities who said the city had enough hospital beds. That Roberts should prevail over any local objections is a common event. Roberts, a country boy from Pontooc County, Oklahoma, came to Tulsa in the late 1940s with $25 in his pocket and a slogan—"Expect a miracle"—and became a pillar of the Tulsa community, a bank and chamber-of-commerce director. More traditional church leaders and businessmen might have been expected to question Roberts' rather brassy approach. In the medical center, for example, a glass elevator in the manner of a Hyatt Hotel takes visitors to the second floor. The building towers above a man-made "river of life" and a pair of enormous bronze hands. The visitor may pick up a headphone to hear a recorded message from Mrs. Roberts extolling her husband's work. But Roberts' charisma has won over the Tulsa establishment, and the newspapers have supported his projects on the basis of freedom of religion and choice. "Wholesomeness" is the way of life at Roberts University. Church attendance for students is compulsory, they must wear shirts, ties, or dresses to all classes, and they are prohibited from "(a) profanity, (b) smoking, (c) gambling, (d) cheating, (e) drinking alcoholic beverages of any kind, and (f) immorality."

Tulsa takes justifiable pride in an arts tradition that goes back to the early oil days. The city's outstanding institution is the Thomas Gilcrease Institute of American History and Art; its collection of Western American art by Russell, Remington, and lesser known names was started by a part-Indian oil man and is now a city-owned museum. The Philbrook Art Center has also acquired a large Indian collection; and it has many lesser works by famed European and American painters. The grounds of the Philbrook are an extraordinary sight in themselves—a terraced Italian garden on the edge of the prairies. Early Tulsans were determined to bring high culture, and we were told current residents still get more excited about a visiting European or American show than their own treasure trove of Indian and Western art. Tulsa's early prosperity coincided with the Art Deco period in architecture, and many fine examples of the "zigzag" school of the '20s, the "streamlined" '30s, and the chunky classicism of the Depression and New Deal eras still grace downtown Tulsa.

The city's main thoroughfare was largely replaced by the Main Street mall, which limited traffic and increased retail business by 60 percent. In the 1970s the Williams Companies, a diversified energy conglomerate, began a 225-acre mixed-use project, including a Tulsa Performing Arts Center (for which conservative Tulsans twice turned down bonds until private businesses

coughed up a larger share of the cost) complete with music hall, playhouse, and two theaters. Built nearby were The Green, a two-and-one-half acre park, a 400-room hotel, a 3-level shopping center, the 52-story Bank of Oklahoma Tower, and the headquarters of the Williams Companies.

Oklahoma's small-city and rural complexion is emphasized by the lack of large cities other than Oklahoma City and Tulsa. Lawton, in southwestern Oklahoma, was the last of the state's cities to be born overnight. That was in 1901; then in 1903 nearby Fort Sill became the U.S. Army's principal artillery school, and Lawton has lived and prospered under the shadow of that gigantic military reservation ever since. The 1980 population was 80,054. Next in population is Norman (68,020), set close to Oklahoma City and home of the University of Oklahoma. Enid (50,363) is a big wheat and oil center in the northwestern part of the state.

Muskogee (pop. 40,011), in the heart of eastern Oklahoma's one-time Indian Territory, is by Oklahoma standards an old town (1872); it achieved new prosperity because of its strategic location on the Arkansas River Waterway. The town's image is set indelibly by Merle Haggard's *Okie from Muskogee.* When the song was No. 1 on the charts in 1970, it seemed out of sync with the draft card burnings, pot smoking, and long hair of the times. Who would have dreamed the song would still be played more than a dozen years later and that Muskogee and its healthy respect for traditional values would be back in vogue:

> And I'm proud to be an Okie from Muskogee;
> A place where even squares can have a ball.
> We still wave Ol' Glory down at the Court House,
> White lightning's still the biggest thrill of all.
> In Muskogee, Oklahoma, U.S.A.*

*From the song *Okie from Muskogee,* written by Merle Haggard and Roy Edward Burris. Copyright 1969 Blue Book Music, Bakersfield, Calif. Used by permission. All rights reserved.