MATH 2700.008 Linear Algebra (Fall 2021)

Instructor Contact
Name: Isaac Bancroft
Class Time: MW 5:30 – 6:50PM
Class Location: LANG 310
Office Location: GAB 442D
Office Hours: MW 2-3:30PM, TR 3:30-4:30PM
Email: isaacbancroft@my.unt.edu

Course Description: Vector spaces over the real number field; applications to systems of linear equations, linear transformations, matrices, determinants, and eigenvalues.

Required Text/Materials: The textbook is Linear Algebra and Its Applications by David Lay, Stephen Lay, Judi MacDonald (5^{th}edition).

Grading
Homework – 10%
Quizzes – 10%
Project – 15%
Midterm Exams – 40%
Final Exam – 25%

Late work will not be accepted in this course.

Office Hours:

Office hours are at the hours listed above in my office GAB 442D. Please be aware that there may be multiple students in the office hours meeting. If you would like to discuss yourgrade privately, you can email me or make an appointment. If you make an individual office hours appointment with me, we can meet over Zoom if you prefer.

Homework:

At the beginning of the week I will assign a homework assignment over the sections to be covered that week. The homework will be due on Monday of the following week. Your lowest 2 homework scores will be dropped at the end of the semester. The average of your remaining homework scores will account for 10% of your course grade.

Quizzes:

Unless there is an exam during the week, you should expect to have a quiz whenever homework is due. As with the homework, your lowest 2 quizzes will be dropped at the end of the semester and the remaining quiz scores will account for 10% of your grade

Project:

There will be a class project assigned which will be 15% of your course grade. You will pick one of 3 project options, complete the questions, convert your project to pdf and turn it in through Canvas. The project will be officially assigned at the beginning of Week 6 of the semester and will be due at the end of Week 12. This is not a group project and if you choose to work with another student on your project, you must each write up your solutions separately. Identical projects will not be graded.

Exams:

There will be 3 regular exams and a final exam. These will be administered during class and are scheduled for:

September 15 (Exam 1, Chapter 1)
October 20 (Exam 2, Chapters 2 – 4)
November 22 (Exam 3, Chapters 5 – 6)
December 6 (Final Exam, Chapters 1 – 6)

You will have 90 minutes to complete each regular exam and (probably) 2 hours for the final exam.

If you miss an exam, you receive a zero for that exam, there are no make-up exams. However, if the student has a university approved absence and provides documentation with 48 hours of the missed exam, then the zero will be replaced by the final exam grade. You may ask me to go over exam problems with you. However, all decisions on partial credit are final and not open for discussion. Your 1 lowest midterm exam score will be dropped at the end of the semester. The remaining 2 midterm scores will be 40% of your semester grade

Attendance:

Attendance is important and required. In this class, this means being on time and attentive during lecture. It is assumed you will do this. I will not repeat whole lectures or offer personal lessons in office hours or email. These venues are for specific questions / problems.

Course Prerequisites or Other Restrictions:

- Math 1720 (Calculus II)
- A willingness to put in several hours of work each week to absorb each the material in each module. In math courses, especially this one, the content will build upon itself making it very difficult to catch up if you fall behind.
- Academic Dishonesty:
- Cheating will not be tolerated. You can work with another student on homework assignments but you should not be copying another students paper directly. You are expected to work alone on exams. Any students suspected of working together on exams can expect to automatically fail the course and be reported to the UNT Office of Academic Integrity.

Course Objectives:

Upon successful completion of this course, students will be able to:

- Solve linear systems of equations using a variety of different methods.
- Identify linear independent (or dependent) sets of vectors.
- Apply methods of solving linear systems to a variety of science, engineering, and business problems.
- Perform matrix operations such as addition and multiplication.
- Find matrix inverses and determinants.
- Identify invertible (or non-invertible) matrices and understand equivalent properties.
- Recognize vector spaces, subspaces, and bases.
- Compute the dimension of subspaces and find bases for subspaces.
- Change coordinates from one basis to another.
- Find the eigenvalues and eigenvectors of matrices and use this information to diagonalize matrices if possible.
- Use eigenvalues and eigenvectors to solve application problems.
- Identify orthogonal set and find orthogonal projections.
- Create an orthogonal basis from an arbitrary basis.

Technical Requirements & Skills:

Minimum Technology Requirements

- Computer, tablet, or laptop.
- Reliable internet connection.
- A scientific or basic graphing calculator (TI-84 or equivalent) is recommended.

Technical Skills & Digital Literacy

- Navigate Canvas
- Scan documents and create pdf files (there are several free scanning apps for phones / tablets like Adobe Scan or Office Lens)
- Upload documents to Canvas

Weekly Modules / Schedule:

Week 1: Systems of Linear Equations, Row Reduction and Echelon Forms, and VectorEquations
Week 2: The Matrix Equation Ax=b, Solution Sets of Linear Equations, and LinearIndependence
Week 3: Introduction to Linear Transformations, The Matrix of a Transformation,Applications of Linear Systems, and Linear Models
Week 4: **Exam 1,** Matrix Operations, and The Inverse of a Matrix
Week 5: Characterizations of Invertible Matrices, Partitioned Matrices, and MatrixFactorizations
Week 6: The Leontief Input-Output Model, Subspaces, Dimension, and Rank
Week 7: Introduction to Determinants, Properties of Determinants, Cramer's Rule, Volume,and Linear Transformations
Week 8: Generalized Vector Spaces
Week 9: Change of Basis, **Exam 2**
Week 10: Eigenvectors, Eigenvalues, and the Characteristic Equation
Week 11: Diagonalization, Eigenvectors and Linear Transformations, and Complex Eigenvalues
Week 12: Discrete Dynamical Systems, Inner Product, Length, and Orthogonality
Week 13: Orthogonal Sets, Orthogonal Projections, and The Gram-Schmidt Process
Week 14: **Exam 3**, Prepare for the Final Exam
Week 15: Prepare for the Final Exam, Final Exam

Summary of Key Dates – Fall 2021:

August 23, 2021	First class day (Monday)
August 20-27, 2021	Student-requested schedule changes may be made during add/drop.
August 27, 2021	Last day for change of schedule other than a drop. (Last day to add a class.)
September 6, 2021	Labor Day (university closed)
October 1, 2021	Last day for change in pass/no pass status.
November 12, 2021	Last day to drop a course.
November 12, 2021	Last day to withdraw from the semester. Process must be completed by 5 p.m. in the Dean of Students Office. Grades of W are assigned.
November 13, 2021	Beginning this date a student who qualifies may request a grade of I, incomplete. (See "Grading system" in the Academics section of this catalog.)
November 25-26, 2021	Thanksgiving break (university closed)
December 1-2, 2021	Pre-finals days
December 2, 2021	Last regular class meeting
December 3, 2021	Reading day (no classes)
December 4-10, 2021	Final examinations
December 10, 2021	Last day of term
December 10-12, 2021	Commencement ceremonies
December 24, 2020 – January 1, 2021	Winter break (university closed)

Getting Help

Technical Assistance:
Here at UNT we have a Student Help Desk that you can contact for help with Canvas or other technology issues.

UIT Help Desk: UIT Student Help Desk site (http://www.unt.edu/helpdesk/index.htm)
Email: helpdesk@unt.edu
Phone: 940-565-2324
In Person: Sage Hall, Room 130
Walk-In Availability: 8am-9pm
Telephone Availability:Sunday: noon-midnight
Monday-Thursday: 8am-midnight
Friday: 8am-8pm
Saturday: 9am-5pm
Laptop Checkout: 8am-7pm
For additional support, visit Canvas Technical Help (https://community.canvaslms.com/docs/DOC-10554-4212710328)

Student Support Services:
UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:
Student Health and Wellness Center (https://studentaffairs.unt.edu/student-health-and-wellness-center)
Counseling and Testing Services (https://studentaffairs.unt.edu/counseling-and-testing-services)
UNT Care Team (https://studentaffairs.unt.edu/care)
UNT Psychiatric Services (https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry)
Individual Counseling (https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling)
Other student support services offered by UNT include
Registrar (https://registrar.unt.edu/registration)
Financial Aid (https://financialaid.unt.edu/)
Student Legal Services (https://studentaffairs.unt.edu/student-legal-services)
Career Center (https://studentaffairs.unt.edu/career-center)
Multicultural Center (https://edo.unt.edu/multicultural-center)
Counseling and Testing Services (https://studentaffairs.unt.edu/counseling-and-testing-services)
Pride Alliance (https://edo.unt.edu/pridealliance)
UNT Food Pantry (https://deanofstudents.unt.edu/resources/food-pantry)

Academic Support Services

Academic Resource Center (https://clear.unt.edu/canvas/student-resources)
Academic Success Center (https://success.unt.edu/asc)
UNT Libraries (https://library.unt.edu/)
Writing Lab (http://writingcenter.unt.edu/)
MathLab (https://math.unt.edu/mathlab)

UNT Policies:

Academic Integrity Policy:
Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. [Insert specific sanction or academic penalty for specific academic integrity violation.]

ADA Policy:
UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the ODA website (https://disability.unt.edu)

Emergency Notification & Procedures:
UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.