Business Statistics

Course Text

- Lind, Douglas A., Marchal, William A. and Samuel A. Wathen. Basic Statistics for Business and Economics, 8th edition, McGraw-Hill/Irwin, 2013, ISBN: 9780073521473

Required Computing Software

Several types of computer software will perform the type statistical analyses taught in this class. For this course, the only required software is Microsoft Excel.

Course Description

This course familiarizes students with the basic concepts of business statistics and provides a comprehensive overview of its scope and limitations. Students perform statistical analyses of samples, compute the measures of location and dispersion, and interpret these measures for descriptive statistics. Other sections review linear regression, multiple regression, and correlation analysis, as well as model building, model diagnosis, and time series regression using various models. After a review of the basic concepts of probability, students apply discrete and continuous distributions of probability. Other topics include constructing a hypothesis on one and two samples, performing one-way and two-way analyses of variance, and applying nonparametric methods of statistical analysis.

Course Objectives

After completing this course, students will be able to:

- Define statistics and identify its scope and limitations.
- Describe and apply the basic concepts in statistics.
- Apply the sampling methods and the Central Limit Theorem to perform statistical analyses of samples and to predict population behavior.
- Compute and interpret measures of location and dispersion.
- Represent the statistical data in different forms and interpret the different representations.
- Perform linear regression and correlation analysis.
- Perform multiple regression and correlation analysis.
- Describe the basic concepts of probability.
- Describe and apply the discrete and continuous distributions of probability.

- Conduct hypothesis tests based on one or two samples.
- Perform one-way and two-way analyses of variance (ANOVA).
- Apply nonparametric methods of statistical analysis.
- Perform model building and model diagnoses.

Course Prerequisites

Successful completion of Introductory and/or Intermediate Algebra courses is recommended before taking Business Statistics.

Important Terms

In this course, different terms are used to designate tasks:

- **Proctoring:** all final exams require proctoring which can be completed conveniently from your home. A webcam is required.
- **Tutoring:** memberships include online tutoring for students to access with any content/subject related questions in the place of faculty. If your tutor is not able to answer your questions please contact a student advisor.
- **Practice Exercise**: A non-graded set of problems that where skills discussed in a topic are practiced.
- **Graded Quiz**: A graded online assessment that is usually shorter than a graded exam.
- **Graded Exam**: A graded online assessment that is comprehensive.

Course Evaluation Criteria

StraighterLine provides a percentage score and letter grade for each course. See Academic Questions section in FAQ for further details on percentage scores and grading scale. A passing percentage is **70%** or higher.

If you have chosen a Partner College to award credit for this course, your final grade will be based upon that college's grading scale. Only passing scores will be considered by Partner Colleges for an award of credit.

There are a total of 1000 points in the course:

Topic	Assessment	Points Available

2	Graded Quiz 1	115
4	Graded Quiz 2	115
6	Graded Quiz 3	115
8	Graded Quiz 4	115
10	Graded Quiz 5	115
12	Graded Quiz 6	115
14	Graded Final Exam	310
	Total	1000

Course Topics and Objectives

Topic	Lesson Topic	Subtopics	Objectives
1	Statistics: An Introduction and Basic Concepts	• Use of Statistics • Types of Variables • Levels of Measurement • Ethics in Statistics • Software and Statistics • Graphical	• Differentiate between the word "statistics" and the science of statistics. • Describe the importance of statistics and situations where statistics are used in business and everyday life; identify business situations in which statistics can be used

		Displays of Categorical Data	appropriately and inappropriately. • Identify qualitative versus quantitative and discrete versus continuous variables. • Discuss the levels of measurement and choose the most appropriate level of measurement for a specified situation. • Explain the role of computer software in statistical analysis and identify some of the most popular software packages. • Construct bar charts to display categorical data.
2	Descriptive Statistics: Numerical Measures	• Arithmetic Mean • Geometric Mean • Median and Mode • Measures of Dispersion • Chebyshev's Theorem and the Empirical Rule • Using Software to Compute Descriptive Statistics	• Calculate the arithmetic mean for a given set of data. • Calculate the geometric mean for a given set of data. • Calculate the median and mode for a given set of data. • Compute and interpret the range, mean deviation, variance, and standard deviation for data observations. • Interpret data using Chebyshev's theorem and the Empirical rule. • Understand how software can be used in computing various measures of location and dispersion.

3	Descriptive Statistics: Representational	• Dot Plot, Stem Plot and Histogram • Quartiles, Deciles, and Percentiles • Skewness • Bivariate Data	• Create and interpret dot plot, box plot, and scatter diagrams. • Define and compute quartiles, deciles, and percentiles. • Compute and interpret the coefficient of skewness. • Construct a contingency table.
4	Probability	• Probability Approaches • Probability Calculations • Tools of Analysis • computing the Number of Possible Outcomes	• Discuss the objective and subjective approaches to probability analysis. • Calculate probability using the rules of addition and multiplication. • Use and interpret contingency tables, Venn diagrams, and tree diagrams. • Compute the number of possible outcomes for combinations and permutations using formulae and Excel functions.
5	Discrete and Continuous Probability Distributions	• Discrete Probability Distributions • Binomial Probability Distributions • Poisson Probability Distributions • Uniform Probability Distributions • Normal Probability	• Explain the difference between discrete and continuous distribution. • Compute the mean and the standard deviation for a uniform distribution. • Calculate the mean, variance, and standard deviation of a probability distribution. • Compute probabilities using the binomial probability distribution.

		Distributions • Sampling Distribution of the Sample Mean	• Compute probabilities using the uniform distribution. • Calculate areas under a normal curve using the Empirical Rule. • Compute probabilities using the Poisson probability distribution. • Compute probabilities using the normal probability distribution. • Select a sample and construct a sampling distribution of the mean.
6	Sampling Methods and the Central Limit Theory	• Sampling a Population • Sampling Errors • Central Limit Theorem	• Define the terms population and sample. • Explain the need for sampling. • Use a simple random sampling technique to select members of the general populate. • Understand more complex sampling techniques, such as stratified, cluster, and systematic random sampling. • Identify sampling errors in a given situation. • Explain the importance of the central limit theorem and how it applies to sample distributions.
7	Using Confidence Intervals in the Sampling Process	• Large Sample Confidence Intervals • Small Sample Confidence Intervals • Proportions	• Define the terms confidence interval, point estimate, and degrees of freedom, and explain how they are involved in the sampling process.

		• Sample Size	• Demonstrate the ability to compute a confidence interval for a large sample experiment. • Compute a confidence interval for a small sample experiment. • Compute a confidence interval for a proportion. • Determine an appropriate sample size for small, large, and proportion experiments.
8	Tests of Hypothesis	• Hypothesis Testing: An Introduction • Decision Making in Hypothesis Testing • Hypothesis Testing with Proportions • Two-Sample Test of Hypothesis	• Formulate null and alternate hypotheses, and test the hypothesis using the five steps of the hypothesis testing procedure. • Discuss Type I and Type II errors on a test of hypothesis. • Perform a one-tailed and a two-tailed test of hypothesis. • Perform a test of hypothesis on the difference between two population means using the *z* and *t* statistics. • Perform a test of hypothesis on a population proportion using the z statistic.
9	Analysis of Variance	• Using the F Distribution in Variance Analysis • Analysis of Variance (ANOVA) • Computing the Analysis	• Discuss the general idea of analysis of variance and analyze the given F distribution. • Test a hypothesis to determine whether the variances of two populations are equal. • Test a hypothesis about

		of Variance (ANOVA) - Sum of Squares • Analyzing the Variance • Use of Software in Variance Analysis	three or more treatment means and develop confidence intervals for the difference between treatment means. • Perform an analysis of variance (ANOVA). • Understand how to use statistical software in variance analysis.
10	Regression Analysis	• Correlation Analysis • Coefficient of Correlation • Regression Analysis • Confidence Interval and Prediction Intervals • ANOVA Table	• Discuss the difference between correlation and causation. • Analyze the correlation between two variables in specified situations. • Calculate and interpret the coefficient of correlation, the coefficient of determination, and the standard error. • Calculate and interpret the linear regression line. • Construct and interpret a confidence interval and prediction interval for a dependent variable. • Use an ANOVA table data to compute statistics.
11	Multiple Regression Analysis	• Multiple Regression Analysis Equation • Analyzing ANOVA Table Output • Analyzing Individual Independent Variables	• Analyze the relationships between several independent variables and a dependent variable. • Test to determine whether the regression coefficient for each independent (or explanatory) variable has a significant

			influence upon the dependent variable. • Calculate and interpret multiple regression analysis. • Compute variance of regression using the standard error of estimate and the ANOVA table. • Calculate and interpret the coefficient of determination and the correlation matrix. • Identify the violation of assumptions: homoscedasticity and autocorrelation.
12	Nonparametric Methods	• Chi-Square Test • Contingency Table Analysis	• Test a hypothesis comparing an observed set of frequencies to an expected set of frequencies using the chi-square test. • Identify the limitation of the chi-square test in a specified situation. • Analyze relationships in statistical data using a contingency table.
13	Process Improvement Techniques	• Statistical Process Control • Creating Control Charts • Analyzing Control Charts • Natural Tolerance Limits • p Chart	• Identify the causes of process variation and apply statistical process control to reduce process variation. • Sample a process and use rational sub-grouping to control process. • Use statistical software to create X-bar and R-charts. • Interpret information

			presented in control charts and R-charts to identify assignable causes and analyze patterns. • Calculate and analyze the upper and lower natural tolerance limits to evaluate whether a process is capable of meeting specifications. • Construct p chart for fraction nonconforming.
14	Review	• Course Review	• None