Introduction to Statistics

Course Text

This course does not require a textbook.

Course Description

In this course, students will look at the properties behind the basic concepts of probability and statistics and focus on applications of statistical knowledge. Students will learn about how statistics and probability work together. The subject of statistics involves the study of methods for collecting, summarizing, and interpreting data. After finishing this course, students should be comfortable evaluating and author's use of data and be able to extract information from articles and display that information effectively. Students will also be able to understand the basics of how to draw statistical conclusion. This course will begin with descriptive statistics and the foundation of statistics, move onto probability and random distributions, the latter of which enables statisticians to work with several aspects of random events and their applications. Finally students will examine a number of ways to investigate the relationships between various characteristics of data.

Course Objectives

After completing this course, students will be able to:

- Define the meaning of *descriptive statistics* and *statistical inference*, describe the importance of statistics, and interpret examples of statistics in a professional context.
- Distinguish between a population and a sample.
- Explain the purpose of measures of location, variability, and skewness.
- Apply simple principles of probability.
- Compute probabilities related to both discrete and continuous random variables.
- Identify and analyze sampling distributions for statistical inferences.
- Identify and analyze confidence intervals for means and proportions.
- Compare and analyze data sets using descriptive statistics, parameter estimation, hypothesis testing.
- Explain how the central limit theorem applies in inference.
- Calculate and interpret confidence intervals for one population average and one population proportion.
- Differentiate between type I and type II errors.
- Conduct and interpret hypothesis tests.
- Identify and evaluate relationships between two variables using simple linear regression.

- Use regression equations to make predictions.

Course Prerequisites

Successful completion of College Algebra is recommended before taking Introduction to Statistics.

Important Terms

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

- **ADAPTivities**: Adaptive exercises designed to help you retain important content and information. There are generally two types identified by name.
  - **Learn By Doing activities**: Learn By Doing activities give you the chance to practice the concepts that you are learning, with hints and feedback to guide you if you struggle.
  - **Did I Get This? activities**: Did I Get This? activities are your chance to do a quick "self-check" and assess your own understanding of the material before doing a graded activity.
- **StatTutor**: StatTutor is an interactive learning tool that provides you with a data analysis problem, supports you as you attempt to solve it, and gives you hints and feedback along the way.
- **Checkpoint**: A graded online assessment or "Quiz" covering a full module.
- **Final Exam**: A comprehensive proctored final examination.

Academic Integrity Statement

Academic integrity is the pursuit of scholarly activity in an honest, truthful and responsible manner. Violations of academic integrity include, but are not limited to, plagiarism, cheating, fabrication and academic misconduct. Failure to comply with the Academic Integrity Policy can result in a failure and/or zero on the attempted assignment/examination, a removal from the course, disqualification to enroll in future courses, and/or revocation of an academic transcript.

Course Completion Policy

In order for a course to be considered complete, all required coursework must be attempted, submitted, and graded. Required coursework consists of graded assignments. Any Academic Integrity Policy violations may prevent a course from being considered complete.

Course Evaluation Criteria

Your score provides a percentage score and letter grade for each course. A passing percentage is **70%** or higher.

There are a total of 1000 points in the course.

Topic	Assessment	Points Available
	Examining Distributions Checkpoint 1	All non-final exams add up to 70%
	Examining Distributions Checkpoint 2	
	Examining Relationships Checkpoint 1	
	Examining Relationships Checkpoint 2	
	Sampling Checkpoint	
	Designing Studies Checkpoint 1	
	Introduction to Probability	
	Probability Checkpoint 1	
	Probability Checkpoint 2	
	Conditional Probability and Independence Checkpoint 1	
	Conditional Probability and Independence Checkpoint 2	
	Random Variables Checkpoint 1	
	Random Variables Checkpoint 2	
	Random Variables Checkpoint 3	
	Random Variables Checkpoint 4	
	Sampling Distributions Checkpoint 1	
	Sampling Distributions Checkpoint 2	
	Estimation Checkpoint	
	Overview Checkpoint	

Topic	Assessment	Points Available
	Hypothesis Testing for a Population Proportion Checkpoint	
	Hypothesis Testing for a Population Mean Checkpoint	
	Hypothesis Testing Checkpoint	
	Type I and Type II Checkpoint	
	Case C → and Q → Q Checkpoint	
	Inference for Relationships Checkpoint	
	Levels of Measure Checkpoint	
	Goodness of Fit Test Checkpoint	
	Final Cumulative Exam	30%
Total		100%

Course Topics and Objectives

Topic	Topic Title	Module Title
1	Topic 1: Learning Strategies and Big Picture	• Introduction • Module 1: Learning Strategies • The Big Picture
2	Topic 2: Exploratory Data Analysis	• Exploratory Data Analysis Introduction • Module 2: Examining Distributions • Module 3: Examining Relationships • Exploratory Data Analysis Summary
3	Topic 3: Producing Data	• Producing Data Introduction • Module 4: Sampling • Module 5: Designing Studies • Producing Data Summary
4	Topic 4: Probability	• Probability Introduction • Module 6: Introduction (Probability) • Module 7: Finding Probability of Events

Topic	Topic Title	Module Title
		• Module 8: Conditional Probability and Independence • Module 9: Random Variables • Module 10: Sampling Distributions • Probability Summary
5	Topic 5: Inference	• Inference Introduction • Module 11: Introduction (Inference) • Module 12: Inference For One Variable • Module 13: Estimation • Module 14: Hypothesis Testing • Module 15: Inference for Relationships • Module 16: Inference for Relationships • Module 17: The Chi-Square Goodness-of-Fit Test
6	Final Exam	• Study Guide • Practice Examination • Final Examination

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