COLLIN COLLEGE EXPANDED GENERIC COURSE SYLLABUS

COURSE INFORMATION

Course Number: MATH 1342
Course Title: Elementary Statistical Methods I
Credit Hours: 3
Lecture Hours: 3
Lab Hours: 0

Prerequisite

MATH 0314 with a grade of C or better, or MATH 0324 with a grade of C or better, or MATH 0342 with a grade of C or better, or MATH 0305, or MATH 0406, or meet TSI college-readiness standard for Mathematics; or equivalent.

Course Description

Collection, analysis, presentation and interpretation of data, and probability. Analysis includes descriptive statistics, correlation and regression, confidence intervals and hypothesis testing. Use of appropriate technology is recommended.

Textbook/Supplies

Statistics – Informed Decisions Using Data, 7th Edition by Michael Sullivan III, Pearson.

The statistics classes are on First Day Access with Pearson, so students should not need the ISBN. However, if a student opts out and needs to purchase at the bookstore, they will use the following ISBN 9780138317300.

Supplies: Graphing calculator may be required.

Note: At least one of the following is required: TI-83 or TI-84 graphing calculator, StatCrunch, or the program R. The instructor will specify which are required for their own course. Access to MyLab|Statistics is required. Once you have access to MyLab|Statisics, then you will have full access to the ebook and to StatCrunch

Online courses: Desktop or laptop computer, microphone, and web cam are required. Students must be able to download software (Chrome books may not be adequate). Other materials may be required.

STUDENT LEARNING OUTCOMES (SLO)

Upon completion of this course the students should be able to do the following:

1. Explain the use of data collection and statistics as tools to reach reasonable conclusions.
2. Recognize, examine and interpret the basic principles of describing and presenting data.
3. Compute and interpret empirical and theoretical probabilities using the rules of probabilities and combinatorics. (Empirical and Quantitative)
4. Explain the role of probability in statistics.
5. Examine, analyze and compare various sampling distributions for both discrete and continuous random variables.
6. Describe and compute confidence intervals.
7. Solve linear regression and correlation problems. (Communication)
8. Perform hypothesis testing using statistical methods. (Critical Thinking)

REQUIRED CORE OBJECTIVES FOR MATHEMATICS

As per the Texas Higher Education Coordinating Board, mathematics students must develop and demonstrate the following three required core objectives:

- Critical Thinking Skills - creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.
- Communication Skills - effective development, interpretation and expression of ideas through written, oral and visual communication.
- Empirical and Quantitative Skills - manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

METHOD OF EVALUATION

Course requirements

Attending class**,** completing homework assignments**,** completing labs, and completing required exams.

Course format

Lecture, lab, and guided practice.

A minimum of three proctored exams, three core assessments, and a proctored comprehensive final exam are required. The final exam must be comprehensive (i.e., include questions from all chapters) and count for at least 20% of the total course grade. Online homework is required and must count for a minimum of 5% of the total course grade. Graded core assessments will count for 5%–10% of the overall course grade. The specific weight of each evaluation component will be detailed in the individual instructor's syllabus. Credit for all out-of-class coursework—including homework assignments, service-learning projects, and other assessments and learning activities—may not exceed 25% of the total course grade. At least 75% of a student's grade must consist of proctored exams. No student may retake any of these exams.

Core Assessment Statement

Core assessments consist of problems or tasks that measure student achievement of state required core objectives – Critical Thinking Skills, Communication Skills, and Empirical and Quantitative Skills. These assessments are designed to be meaningful and require students to extend and apply course concepts. Students should be able to clearly see how these assessments reflect both the skills they are developing and the outcomes of the course.

COURSE POLICIES

College-wide policies are pre-loaded into the Concourse Syllabi and are not duplicated in the Expanded Generic Syllabi for each course.

Instructor specific policies should be added to the Concourse Syllabus.

COURSE CONTENT

Module 1: Introduction and Descriptive Statistics

The student will be able to:

1. Give examples of the beneficial uses of statistics and common ways statistics is used to deceive. SLO 1, 2
2. Determine if data is qualitative or quantitative and if the data provide parameters or statistics. SLO 1, 2
3. Distinguish inferential from descriptive statistics. SLO 1, 2
4. Decide if a given sample is random. SLO 1, 2
5. Identify observational and experimental designs in statistical studies. (Optional, but definitions are necessary for Chapter 4) SLO 1, 2
6. Determine if a statistical study suffers from bias. SLO 1, 2
7. Construct a frequency table and a relative frequency table from given data. SLO 2
8. Construct and analyze histograms and boxplots. SLO 2
9. Compute, interpret and determine appropriate uses for measures of central tendency and variation. SLO 2
10. Calculate weighted averages. SLO 2
11. Identify possible shapes of distributions using measures of central tendency. SLO 2
12. Compute percentages using the Empirical Rule. SLO 2
13. Interpret and calculate measures of position including z-scores, percentiles, & quartiles. SLO 2
14. Identify unusual values and outliers using measures of position. SLO 2
15. Obtain statistics and graphs by using a graphing calculator or StatCrunch. SLO 2

Module 2: Probability

The student will be able to:

1. Calculate probabilities of simple events. SLO 3, 4
2. Identify the sample space for a probability experiment. SLO 3, 4
3. Calculate probabilities using the addition rule. SLO 3, 4
4. Calculate probabilities using the multiplication rule and general multiplication rule. SLO 3, 4
5. Calculate probabilities using the complement rule. SLO 3, 4
6. Compute and interpret empirical and theoretical probabilities using the rules of probabilities and combinatorics. SLO 3
7. Determine if an event is unusual using probability. SLO 3, 4
8. Differentiate between independent, and dependent selections and describe when dependent selections may be treated as if they are independent. SLO 3, 4
9. Calculate various probabilities using a graphing calculator or StatCrunch. SLO 3, 4

Module 3: Probability Distributions

The student will be able to:

1. Classify random variables as either discrete or continuous. SLO 5
2. Calculate the mean and standard deviation of a probability distribution. SLO 5
3. Calculate and interpret the expected value for different applied scenarios. SLO 5
4. Determine if an experiment is binomial. SLO 3, 5
5. Calculate binomial probabilities including at least and at most probabilities. SLO 3
6. Calculate the mean and standard deviation of a binomial distribution. SLO 5
7. Determine if outcomes are unusual based on mean and standard deviation. SLO 5
8. Calculate probabilities from different distributions using a graphing calculator or StatCrunch. SLO 3, 5

Module 4: Normal Probability Distributions

The student will be able to:

1. Calculate and interpret probabilities using standard and non-standard normal distributions. SLO 3
2. Calculate z-scores and data values given a normal distribution. SLO 5
3. Calculate probabilities concerning the distribution of sample means using the Central Limit Theorem. SLO 3
4. (Recommended: Calculate probabilities concerning the distribution of sample proportions using the Central Limit Theorem.) SLO 3
5. Analyze normal probability plots to determine normality. SLO 5
6. Solve problems related to the normal distribution using a graphing calculator or StatCrunch. SLO 3, 5

Module 5: Estimates and Sample Sizes

The student will be able to:

1. Calculate the necessary sample size for a specific confidence interval. SLO 6
2. Estimate the value of a population proportion using the point estimate and confidence interval. SLO 6
3. Estimate the value of a population mean using the point estimate and confidence interval. SLO 6
4. Interpret confidence intervals. SLO 6
5. Optional: Use bootstrapping methods (simulations) to construct confidence intervals. SLO 6
6. Calculate confidence intervals and sample sizes using a graphing calculator or StatCrunch. SLO 6

Module 6: Hypothesis Testing

The student will be able to:

1. Explain the concepts behind hypothesis testing. SLO 8
2. Test claims made about population proportions and means using the P-value approach. SLO 8
3. Write real world conclusions to hypothesis tests using appropriate terminology. SLO 8
4. Use confidence intervals to test hypotheses. SLO 8
5. Distinguish between statistical significance and practical significance. SLO 8
6. Test hypotheses using a graphing calculator or StatCrunch. SLO 8

Module 7: Tests Comparing Two Parameters

The student will be able to:

1. Test claims about the mean for two dependent samples, the means for two independent samples, and the proportions for two independent samples using the P-value approach. SLO 8
2. Calculate confidence intervals and use them to assess the size and importance of a significant difference. SLO 8
3. Write real world conclusions to hypothesis tests using appropriate terminology. SLO 8
4. Test hypotheses using a graphing calculator or StatCrunch. SLO 8

Module 8: Correlation and Regression

The student will be able to:

1. Identify linear relationships between two variables using scatter diagrams and the linear correlation coefficient. (Optional: use P-values to identify linear relationships – only do this after chapter 10) SLO 7
2. Calculate the regression line for bivariate data. SLO 7
3. Test hypotheses about correlation coefficients. SLO 7
4. Identify reasons that correlated data may not have a causal relationship. SLO 7
5. Calculate the best prediction relative to correlation for linear data. SLO 7
6. Test for linear correlations using a graphing calculator or StatCrunch. SLO 7