

**College of San Mateo**  
**Official Course Outline**

1. **COURSE ID:** BUS. 123    **TITLE:** Business Statistics  
**Units:** 3.0 units    **Hours/Semester:** 48.0-54.0 Lecture hours; 96.0-108.0 Homework hours; 144.0-162.0 Total Student Learning hours  
**Method of Grading:** Letter Grade Only  
**Prerequisite:** MATH 120, or MATH 190 or equivalent.  
**Recommended Preparation:**  
    Eligibility for ENGL 100, or Eligibility for ENGL 105
  
2. **COURSE DESIGNATION:**  
**Degree Credit**  
**Transfer credit:** CSU; UC  
**CSU GE:**  
    CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B4 -  
    Mathematics/Quantitative Reasoning
  
3. **COURSE DESCRIPTIONS:**  
**Catalog Description:**  
    This course introduces statistics with an emphasis on business applications. Students will learn how to collect, cleanse, analyze, interpret, and present numerical data for the purpose of making effective business decisions. Topics include: collection and presentation of data, measures of central value, probability, sampling and the sampling distribution of the sample average, estimation via confidence intervals, hypothesis testing, and regression and correlation.
  
4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**  
    Upon successful completion of this course, a student will meet the following outcomes:
  1. Organize and interpret raw business data using tables and graphs.
  2. Summarize raw data using measures of central tendency and dispersion to help drive business decisions.
  3. Use the appropriate hypothesis test for making inferences about one or more population parameters, and interpret the results to arrive at a data-driven business decision.
  4. Analyze the relationship between two variables using simple regression and correlation analysis, interpret the results and determine their usefulness in making business decisions.
  
5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**  
    Upon successful completion of this course, a student will be able to:
  1. Calculate and interpret the mean, median, midrange, mode, range, z-scores, standard deviation, variance, percentiles, and quartiles.
  2. Use the Empirical Rule to analyze data that are bell shaped.
  3. Construct a discrete probability distribution and find the mean, variance, and standard deviation
  4. Distinguish between population and sample distributions and explain the significance of the Central Limit Theorem.
  5. Investigate whether there is a linear relationship between two variables and use regression analysis to determine the equation of the least-square line.
  6. Calculate and interpret the correlation coefficient and coefficient of determination.
  7. Use appropriate statistical techniques to analyze data and interpret results from applications based on data from business cases.
  8. Use statistical software to compile and analyze data.
  
6. **COURSE CONTENT:**  
**Lecture Content:**
  1. Use technology throughout the course, which may include spreadsheet, StatCrunch, or statistical software like SPSS or Minitab
  2. Applications using data from disciplines including business, social sciences, health sciences, life sciences, psychology, and education.
  3. Data collection
    - A. Introduction to the practice of statistics
    - B. Sample versus population

- C. Sampling techniques, their advantages and disadvantages
  - D. Qualitative and quantitative data
  - E. Levels of measurement
  - F. Observational studies and Experiments
4. Descriptive Statistics
- A. Frequency and relative frequency tables.
  - B. Bar graphs and histograms
  - C. Stem-and-leaf plots
  - D. Polygons
  - E. The mode, mean, and median
  - F. Range, variance, and standard deviation
  - G. Measures of position and outliers
  - H. Quartiles and five-number summary
  - I. Boxplots
5. Introduction to Basic Probability Ideas
- A. The sample space
  - B. Classical, empirical, and subjective probabilities
  - C. The two basic properties of probability
  - D. Complement of an event
  - E. Mutually exclusive events
  - F. The Addition Rule
  - G. Independent events
6. Discrete Probability Distributions
- A. Discrete and continuous random variables
  - B. The mean, expected value, and standard deviation
  - C. Binomial distribution and experiments
7. Normal Probability Distributions
- A. Areas under the uniform probability distribution
  - B. Areas under a normal curve
  - C. The probabilities for random variables with normal distributions
  - D. Standard z scores
  - E. Areas under the standard normal curve
  - F. Probabilities for normally distributed variables
8. The Central Limit Theorem
- A. The Sampling Distribution of the sample means
  - B. Applications of the Central Limit Theorem
9. Confidence Intervals
- A. Confidence interval for a population mean using the Student's t-distribution
  - B. Confidence intervals for a population proportion
10. Hypothesis Testing for One Sample Mean or Proportion
- A. Null and alternative hypotheses
  - B. One-tailed and two-tailed tests
  - C. Type I and Type II errors
  - D. Interpreting the test statistic (t- and z-tests)
  - E. The p-value approach and significance levels
  - F. The classical approach using critical values
  - G. Reject/Fail to Reject, writing conclusion
11. Hypothesis Testing for Two Sample Means or Proportions
- A. Inference about two means (t-test): Dependent Samples (matched-pairs)
  - B. Inference about two means (t-test): Independent Samples
  - C. Inference about two population proportions (z-test): Independent Samples
12. Chi-Square Analysis
- A. The Chi-Square Distribution
  - B. Goodness of fit test
  - C. Test for independence
13. Correlation and Regression Analysis
- A. Scatter-plots and correlation
  - B. Interpreting the correlation coefficient
  - C. The Least-Squares Regression Line
  - D. Interpreting the Slope and y-Intercept

- E. The difference between correlation and causation
  - F. The coefficient of determination
  - G. Prediction
14. Hypothesis Testing for Three or More Population Means - ANOVA
- A. One-Way ANOVA techniques
  - B. The f-distribution

**7. REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

- A. Lecture
- B. Activity
- C. Discussion
- D. Guest Speakers
- E. Other (Specify): Lecture/demonstrations emphasizing the basic concepts and methodologies of statistical analysis, which encourage an interactive dialogue with the teacher and with other students.

**8. REPRESENTATIVE ASSIGNMENTS**

Representative assignments in this course may include, but are not limited to the following:

**Writing Assignments:**

- A. Discussion posts, including peer evaluation, of key statistical concepts and statistical statements in business.
- B. Chapter practice problems.

**Reading Assignments:**

- A. One chapter of college level statistics textbook per week.
- B. Weekly chapter study guide including key concepts, videos, and additional support documents (approximately one hour per week).

**Other Outside Assignments:**

- A. Online textbook homework exercises to reinforce course concepts (one to two hours per week).
- B. Group presentations to articulate technical analysis to a non-technical audience.

**9. REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

- A. Class Participation
- B. Class Work
- C. Exams/Tests
- D. Group Projects
- E. Homework
- F. Oral Presentation
- G. Quizzes

**10. REPRESENTATIVE TEXT(S):**

Possible textbooks include:

- A. Holmes, A. *Introductory Business Statistics*, ed. OpenStax, 2021
- B. Lind, D. *Basic Statistics in Business and Economics*, 10th ed. McGraw Hill, 2022

**Origination Date:** September 2021

**Curriculum Committee Approval Date:** December 2021

**Effective Term:** Fall 2022

**Course Originator:** Philip Tran