STAT A160: INTRODUCTION TO STATISTICS

Item	Value
Curriculum Committee Approval Date	03/20/2024
Top Code	170100 - Mathematics, General
Units	4 Total Units
Hours	72 Total Hours (Lecture Hours 72)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Associate Arts Local General Education (GE)	• Area 1B Communication and Analytical Thinking (OA2)
Associate Science Local General Education (GE)	• Area 1B Communication and Analytical Thinking (OAS2) • Area 2 Mathematical Concepts and Quantitative Reasoning (OMTH)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 2A Math Concepts (2A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 2A Math Concepts (2A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B4 Math/Quant.Reasoning (B4)

Course Description

Formerly: MATH A160. This course is an introduction to statistical thinking and processes, including methods and concepts for discovery and decision-making using data. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi-squared, and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Students apply methods and processes to applications using data from a broad range of disciplines. Applications are taken from natural sciences, social sciences, business, and everyday life. Enrollment Limitation: PSYC A160; students who complete STAT C1000 may not enroll in or receive credit for PSYC A160. PREREQUISITE: Placement as determined by the college's multiple measures assessment process or completion of a course taught at or above the level of intermediate algebra. Transfer Credit: CSU; UC: Credit Limitation: STAT C1000, MATH A160, and PSYC A160 combined: maximum credit, 1 course. C-ID: MATH 110. **Common Course Number:** STAT C1000. **C-ID:** MATH 110.

Course Level Student Learning Outcome(s)

1. Illustrate statistical concepts using graphical, numerical and written explanations.
2. Apply valid statistical methods to appropriate applications.
3. Explore, discover, make conjectures and formulate conclusions in statistics-based applications.

Course Objectives

- I Part 1
- I. 1. Assess how data were collected and recognize how data collection affects what conclusions can be drawn from the data
- I. 2. Identify appropriate graphs and summary statistics for variables and relationships between them and correctly interpret information from graphs and summary statistics.
- I. 3. Describe and apply probability concepts and distributions.
- I. 4. Demonstrate an understanding of, and ability to use, basic ideas of statistical processes, including hypothesis tests and confidence interval estimation.
- I. 5. Identify appropriate statistical techniques and use technology-based statistical analysis to describe, interpret, and communicate results.
- I. 6. Evaluate ethical issues in statistical practice.
- II Part 2 - The list below is a more detailed version of the list in Part 1.
- II. 1. Interpret data displayed in tables and graphically.
- II. 2. Apply concepts of sample space and probability.
- II. 3. Calculate measures of central tendency and variation for a given data set.
- II. 4. Identify the standard methods of obtaining data and identify advantages and disadvantages of each.
- II. 5. Calculate the mean and variance of a discrete distribution.
- II. 6. Calculate probabilities using normal and t-distributions.
- II. 7. Distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem.
- II. 8. Construct and interpret confidence intervals.
- II. 9. Determine and interpret levels of statistical significance including p-values.
- II. 10. Interpret the output of a technology-based statistical analysis.
- II. 11. Identify the basic concept of hypothesis testing including Type I and II errors.
- II. 12. Formulate hypothesis tests involving samples from one and two populations.
- II. 13. Select the appropriate technique for testing a hypothesis and interpret the result.
- II. 14. Use linear regression and ANOVA analysis for estimation and inference, and interpret the associated statistics.
- II. 15. Use appropriate statistical techniques to analyze and interpret applications based on data from disciplines including business, social sciences, psychology, life science, health science, and education.
- II. 16. Utilize technology throughout the semester by implementation of computer software (Excel, SAS, PHStat, Minitab, R, etc.) and/or graphing calculators. For example, complete a course project, weekly exercises, homework, exams, etc.

Lecture Content

Part 1 Introduction to statistical thinking and processes Technology-based statistical analysis Applications using data from four or more of the following disciplines: administration of justice, business, economics, education, health science, information technology, life science, physical science, political science, psychology, and social science Units (subjects/cases) and variables in a data set, including multivariable data sets Categorical and quantitative variables Sampling methods, concerns, and limitations, including bias and random variability Observational studies and experiments Data summaries, visualizations, and descriptive statistics Probability concepts Probability distributions (e.g., binomial, normal) Sampling distributions and the Central Limit Theorem Estimation and confidence intervals Hypothesis testing, including t-tests for one and two populations, Chi-squared test(s), and ANOVA; and interpretations of results Regression, including correlation and linear regression equations

- Lecture (02)
- DE Live Online Lecture (02S)

Instructional Techniques

Lecture, discussion Online computer tutorials

Reading Assignments

Textbook chapters and supplements. 1 hour

Writing Assignments

Short-answer questions (e.g., describe statistical concepts). Essay questions (e.g., interpret statistical test results). Group and/or individual projects involving use of statistical software and/or graphing calculator . 1 hour

Out-of-class Assignments

Out of class assignments may include: Practice problem sets requiring application of course material A data set assignment requiring the organization, analysis, and interpretation of raw data Preparation assignments that reuqire students to answer specific questions that will be discussed in an upcoming class meeting 6 hours

Demonstration of Critical Thinking

Several written tests; a comprehensive final

Required Writing, Problem Solving, Skills Demonstration

Several written tests; a comprehensive final Part 1: Examples of potential methods of evaluation used to observe or measure students achievement of course outcomes and objectives could include but are not limited to quizzes, exams, laboratory work, field journals, projects, research demonstrations, etc. Methods of evaluation are at the discretion of local faculty.

Eligible Disciplines

Mathematics: Master's degree in mathematics or applied mathematics OR bachelor's degree in either of the above AND master's degree in statistics, physics, or mathematics education OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Sullivan III, M.. Statistics Informed Decisions Using Data, 6th ed. Pearson Publishing, 2020

Other Resources

1. Other appropriate textbook as chosen by fulltime faculty.