CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Statistics C1000 – Introduction to Statistics

4 hours lecture, 4 units

Catalog Description
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.

Formerly MATH 160. Not open to students with credit in MATH 160, PSY 215.

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.

Entrance Skills
Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
1) Working with Algebraic Expressions:
    a. Simplify and evaluate algebraic expressions
    b. Have a thorough understanding of order of operations
    c. Understand and use essential terminology
    d. Evaluate equations written in function notation
2) Graphing:
    a. Plot points in the X-Y plane
    b. Graph the equation of a line
    c. Write the equation of a line given its slope and y-intercept
    d. Interpret graphical representations such as points and lines
3) Solving:
    a. Solve formulas for a specific variable
    b. Evaluate formulas with multiple independent variables
    c. Solve real-world problems using problem-solving strategies and techniques
4) Radicals and Exponents:
    a. Simplify radical expressions using the basic operations
    b. Simplify and evaluate expressions involving integer exponents
    c. Use scientific notation

Course Content
Part 1:
1. Introduction to statistical thinking and processes
2. Technology-based statistical analysis
3. 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
4. Units (subjects/cases) and variables in a data set, including multivariable data sets

5. Categorical and quantitative variables
6. Sampling methods, concerns, and limitations, including bias and random variability
7. Observational studies and experiments
8. Data summaries, visualizations, and descriptive statistics
9. Probability concepts
10. Probability distributions (e.g., binomial, normal)
11. Sampling distributions and the Central Limit Theorem
12. Estimation and confidence intervals
13. Hypothesis testing, including t-tests for one and two populations, Chi-squared test(s), and ANOVA; and interpretations of results
14. Regression, including correlation and linear regression equations

Part 2:
15. Summarizing data graphically and numerically
16. Random variables and expected value

Course Objectives
Part 1:
Objectives/Outcomes:
At the conclusion of this course, the student should be able to:
1. Assess how data were collected and recognize how data collection affects what conclusions can be drawn from the data.
2. Identify appropriate graphs and summary statistics for variables and relationships between them and correctly interpret information from graphs and summary statistics.
3. Describe and apply probability concepts and distributions.
4. Demonstrate an understanding of, and ability to use, basic ideas of statistical processes, including hypothesis tests and confidence interval estimation.
5. Identify appropriate statistical techniques and use technology-based statistical analysis to describe, interpret, and communicate results.
6. Evaluate ethical issues in statistical practice.

Part 2:
After this course, the student should be able to:
7. Distinguish among different scales of measurement and their implications;
8. Identify the standard methods of obtaining data and identify advantages and disadvantages of each;
9. Calculate the mean and variance of a discrete distribution;
10. Calculate probabilities using normal and student's t-distributions.

Method of Evaluation
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.

Part 2:
1) Computer laboratory assignments in which students will apply concepts of probability, display and analyze data using computer software, and analyze two-variable data using regression/correlation concepts along with appropriate computer software.

Special Materials Required of Student
Access to computer lab with SPSS software or equivalent.

Minimum Instructional Facilities
1) Smart classroom with whiteboards covering three walls, graphing utility and view screen, software (state of the art statistical software such as SPSS, word processing, and other workplace software)
2) Smart math lab with computers, whiteboards, software (state of the art statistical software such as SPSS, word processing, and other workplace software)

Method of Instruction
1) Lecture and discussion
2) Teamwork
3) Distance learning
4) Computer-facilitated instruction

Out-of-Class Assignments
1) Problem sets
2) Lab activities
3) Exploratory activities and/or projects
4) Reading and/or writing assignments

Representative Texts, Manuals, and/or OER that is equivalent, Other Support Materials:
Part 1:
  - Introduction to Modern Statistics 2e, Çetinkaya-Runde, M., Hardin, J., OpenIntro, 2024 ($025): https://www.openintro.org/book/ims/

  - Statistics: Learning From Data 3e, Peck, R., Case, C., Cengage, 2024 ($57-250): https://www.cengage.com/c/new-edition/9780357758298/

  - Introductory Statistics: Exploring the World Through Data 4e, Gould, R., Wong, R., Ryan, C., Pearson, 2025 ($65-80): https://www.pearson.co   m/en-us/subject-catalog/p/introductorystatistics/P200000011641/9780138242145

  - Introductory Statistics 2e, Illowsky, B., Dean, S., OpenStax, 2023 ($0): https://openstax.org/details/books/introductory-statistics-2e

  - Introductory Statistics: Analyzing Data with Purpose, The Dana Center Mathematics Pathways, Charles A. Dana Center, University of Texas at Austin, 2021 ($0): https://www.utdanacenter.org/products/introductory-statistics

Part 2:
  - Other Support Materials: Statistical software, such as SPSS

  - Supplemental: None

Exit Skills
Students having successfully completed this course exit with the following skills, competencies and/or knowledge:
1) Summarize data graphically and numerically.
2) Use descriptive statistics (measures of central tendency, variation, relative position, and levels/scales of measurement) to describe a population and compare populations when appropriate.
3) Identify the sample space of an experiment or random trial.
4) Find and interpret the expected value and standard deviation of a Random variable.
5) Recognize the sampling distribution as a distribution of a sample statistic, the mean of the sampling distribution as the population mean, and the standard error of the sampling distribution as the standard deviation for the population (the Central Limit Theorem).
6) Construct and interpret confidence intervals.

7) Use hypothesis tests and inference (including t-tests for one and two populations and Chi-square test) to determine if a result is statistically significant for discrete (binomial) and continuous (normal) distributions.
8) Use analysis of variance (ANOVA) to analyze the differences between group means and their associated procedures such as variation among and between groups.
9) Perform statistical analysis using technology such as SPSS or other equivalent statistical software.

Student Learning Outcomes
Upon successful completion of this course, students will be able to:
1) Use analytical, numerical, and graphical methods to solve statistics problems.
2) Solve multi-disciplinary application problems and interpret the results in context.
3) Perform statistical analysis using technology such as SPSS or other equivalent statistical software.
*For the complete list of **learning objectives**, please see the **Course Objectives** section