

MATH G103: STATISTICS FOR ELEMENTARY TEACHERS

- 8. Use least squares regression as a technique for modeling the relationship between two variables.

Item	Value
Curriculum Committee Approval Date	11/05/2024
Top Code	170100 - Mathematics, General
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
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)
Local General Education (GE)	<ul style="list-style-type: none"> • Area 2 Mathematics (GB2)
California State University General Education Breadth (CSU GE-Breadth)	<ul style="list-style-type: none"> • CSU B4 Math/Quant.Reasoning (B4)

Course Description

Formerly: Elem. Teachers Math: 3-Probability and Statistics. This course is an activity-based exploration of statistics aligned with the California State Mathematics Standards designed for prospective K-12 teachers. Topics include data representation and analysis, randomization and sampling, measures of central tendency and variability, hypothesizing, and statistical inference. PREREQUISITE: Course taught at the level of intermediate algebra or appropriate math placement. Transfer Credit: CSU; UC: Credit Limitation: BIOL G260, ECON G160, MATH G103, MATH G160, MATH G160S, STAT C1000, STAT C1000E, PSYC G140, and SOC G125 combined: maximum credit, 1 course.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Apply valid statistical inference methods to appropriate applications and data.
3. Use tables, graphs, spreadsheets and statistical techniques to organize, interpret and present numerical information.
4. 3 Illustrate statistical ideas through graphs, numerical summaries, manipulatives, and written explanations

Course Objectives

- 1. Formulate and answer questions by collecting, organizing, and displaying relevant data.
- 2. Select and use appropriate statistical methods to analyze data.
- 3. Develop and evaluate inferences and predictions that are based on data.
- 4. Use tables, graphs, spreadsheets and statistical techniques to organize, interpret and present numerical information.
- 5. Determine the validity of statistical results.
- 6. Use probability to make predictions and solve problems.
- 7. Use a calculator and/or computer software for probability/statistics tasks.

Lecture Content

Data and Variables Experiments performed to discover different classifications of data Categorical data Binary data Continuous data Boxplots Discovery of the distribution of a variable Visually display a distribution Bar graph Stemplot Histogram Verbal description of key features of data Data Collection Data collection designs for meaningful conclusions Population vs. sample Parameter vs. statistic Bias in sampling methods Measures of Center Mean, median, and mode for summarizing center of a data distribution Properties of these summary statistics Misunderstandings of these measures Measure of Spread Five number summary Standard deviation using technology Normal Distribution Empirical rule Comparing Distributions Side-by-side stemplots Modified box plot Calculation of z-scores to compare distributions of different variables Correlation Graphical display of association Correlation coefficient Least squares linear regression using technology Regression lines to make predictions Distinction between association and causation Introduction to Probability Experiments to determine number of possible outcomes Basic laws of probability Combinations and permutations Hypothesis testing and scientific method Appropriate choice of null hypothesis and alternative hypothesis Level of significance Interpretation p-values and Interpretation Drawing valid conclusions in context

Lab Content

A. Introducing Probability 1.Counting and probability 2.Definition and properties of probability 3.Assigning probabilities 4.Mutually exclusive events, Independent events, The Multiplication Principle 5.Multistage experiments with tree diagrams and geometric probabilities 6.Simulations in probability 7.Odds, Conditional probability 8.Expected value, Law of large numbers B. Data Analysis/Descriptive Statistics 1.Collecting, representing, and analyzing data 2.Measures of central tendency 3.Measures of variations 4.Characterizing and comparing distributions 5.The normal distribution, The standard normal distribution and z-scores C. Statistical inference and Estimation 1.Sampling and the central limit theorem 2.Hypothesis Testing 3.Correlation and regression

Method(s) of Instruction

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

Reading Assignments

Text and instructor handouts.

Writing Assignments

Homework and class assessments covering topics presented in the course.

Out-of-class Assignments

Homework Students may serve as assistants or tutors in local elementary or middle schools.

Demonstration of Critical Thinking

Analysis and application of mathematical techniques presented in the course; mathematical modeling and computational methods.

Required Writing, Problem Solving, Skills Demonstration

Homework and class assessments covering topics presented in the course.

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 Billstein, R., Libeskind, S., Lott, J., Boschmans, B . A Problem Solving Approach to Mathematics for Elementary School Teachers, 13th ed. Pearson, 2020 2. Required Dolan, D., Williamson, J., Muri, M. Mathematical Activities for Elementary School Teachers, 13th ed. Pearson (latest), 2019 Rationale: .