MATH G103: STATISTICS FOR ELEMENTARY TEACHERS

Item	Value
Curriculum Committee Approval Date	03/20/2018
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
Grading Policy	Standard Letter (S)
Local General Education (GE)	• GWC Mathematic Competency (GB2)
California State University General Education Breadth (CSU GE-Breadth)	• 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. Demonstrate an understanding of the use of probability to make predictions and use this knowledge to solve problems.
- 7. Use a calculator and/or computer software for probability/ statistics tasks.
- 8. Use least squares regression as a technique for modeling the relationship between two variables.

Lecture Content

Data and Variables In class experiments performed to discover different classifications of data categorical data binary data continuous data 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 Popular 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 Predictions Basic laws of probability Combinations and permutations Hypothesis testing and scientific method Appropriate choice of null hypothesis Level of significance Interpretation

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

A. Required Reading such as:Course textbook, which provides explanations, worked examples and problems to be solved.

Writing Assignments

Homework, quizzes, and examinations covering topics presented in the course.

Out-of-class Assignments

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, quizzes, and examinations covering topics presented in the course.

Eligible Disciplines

Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Rick Billstein,Shlomo Libeskind, Johnny W. Lott. A Problem Solving Approach to Mathematics for Elementary School Teachers, 11th ed. Pearson/Pearson-Addison-Wesley, 2017 2. Required Dan Dolan, Him Williamson, Mati Muri. Mathematical Activities for Elementary School Teachers, 11th ed. Pearson Addison Wesley, 2017