Number: MATH G103       TITLE: Statistics For Elementary Teachers

ORIGINATOR: Pete Bouzar       EFF TERM: Fall 2018
FORMERLY KNOWN AS: Elem. Teachers Math.       DATE OF
3-Probability & Statistics       OUTLINE/REVIEW: 03-20-2018
CROSS LISTED COURSE: TOP NO: 1701.00

SEMESTER UNITS: 3.0
HRS LEC: 54.0       HRS LAB: 18.0       HRS OTHER: 0.0
CONTACT HRS TOTAL: 72.0
STUDY NON-CONTACT HRS RECOMMENDED: 108.0

CATALOG DESCRIPTION:
This course is designed for prospective teachers. This course is an activity-based exploration of statistics aligned with the California State Mathematics Standards. Topics include data representation and analysis, randomization and sampling, measures of central tendency and variability, hypothesizing and statistical inference. UC Credit Limitations: Math G103, G104 and G106 combined--maximum credit, one course; no credit for G103 if taken after G160/G160H.

JUSTIFICATION FOR COURSE:

PREREQUISITES:
- GWC Math Placement Level of 50 or higher.
- MATH G030: Intermediate Algebra with a minimum grade of C or better
  or
- MATH G040: Accelerated Elementary and Intermediate Algebra with a minimum grade of C or better
  or
- MATH G080: Pre-Statistics with a minimum grade of C or better

COREQUISITES:

ADVISORIES:

ASSIGNED DISCIPLINES:
Mathematics

MATERIAL FEE: Yes [ ] No [X] Amount: $0.00
CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]
GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]
OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]
TRANSFER STATUS: CSU Transferable[ ] UC/CSU Transferable[X] Not Transferable[ ]
BASIC SKILLS STATUS: Yes [ ] No [X] LEVELS BELOW TRANSFER: Not Applicable
CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable
NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course
OCCUPATIONAL (SAM) CODE: E
REPEATABLE ACCORDING TO STATE GUIDELINES: No [X] Yes [ ] NUMBER REPEATS:
REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]
Elementary Teacher Education(Associate in Arts for Transfer)
Elementary Teacher Education(Associate in Arts for Transfer)
Liberal Arts: Emphasis in Mathematics(Associate in Arts)
Liberal Arts: Emphasis in Science(Associate in Arts)
Liberal Studies for Elementary Education(Associate in Arts)

GE AND TRANSFER REQUIREMENTS MET:
CSU GE Area B: Scientific Inquiry and Quantitative Reasoning
   B4 - Mathematics/Quantitative Thinking

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:

1. Apply valid statistical inference methods to appropriate applications and data.
2. Use tables, graphs, spreadsheets and statistical techniques to organize, interpret and present numerical information.
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.

COURSE CONTENT:

LECTURE CONTENT:

A. Data and Variables
   1. In class experiments performed to discover different classifications of data
      a. categorical data
      b. binary data
      c. continuous data
   2. Discovery of the distribution of a variable
   3. Visually display a distribution
      a. bar graph
      b. stemplot
      c. histogram
   4. Verbal description of key features of data

B. Data Collection
   1. Data collection designs for meaningful conclusions
   2. Popular vs. sample
   3. Parameter vs. statistic
   4. Bias in sampling methods

C. Measures of Center
   1. Mean, median, and mode for summarizing center of a data distribution
2. Properties of these summary statistics
3. Misunderstandings of these measures

D. Measure of Spread
1. Five number summary
2. Standard deviation using technology
3. Normal Distribution
4. Empirical rule

E. Comparing Distributions
1. Side-by-side stemplots
2. Modified box plot
3. Calculation of z-scores to compare distributions of different variables

F. Correlation
1. Graphical display of association
2. Correlation coefficient
3. Least squares linear regression using technology
4. Regression lines to make predictions
5. Distinction between association and causation

G. Introduction to Probability
1. Experiments to determine number of possible outcomes
2. Predictions
3. Basic laws of probability
4. Combinations and permutations

H. Hypothesis testing and scientific method
1. Appropriate choice of null hypothesis
2. Level of significance
3. Interpretation

LABORATORY 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

METHODS OF INSTRUCTION:

A. Lecture:
B. Lab:
C. Independent Study:

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

Out-of-class Assignments
Students may serve as assistants or tutors in local elementary or middle schools.

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

METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Short Quizzes
Written Assignments
Essay Examinations
Objective Examinations
Report
Projects (ind/group)
Problem Solving Exercises
Oral Presentations
Skills Demonstration

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.

TEXTS, READINGS, AND RESOURCES:
TextBooks:
   Elementary School Teachers, 11th ed. Pearson/Pearson-Addison-Wesley, 2017
2. Dan Dolan, Him Williamson, Mati Muri. Mathematical Activities for Elementary School Teachers, 11th
   ed. Pearson Addison Wesley, 2017

LIBRARY:
Adequate library resources include:

Comments:

Attachments:
Attached Files