MATH 0013 - ELEMENTARY STATISTICS

SECTION A

1. Division: Sciences & Mathematics
2. Subject Code: MATH
3. Course Number: 0013
4. Course Title: ELEMENTARY STATISTICS
5. Semester of First Offering: FALL 2013

SECTION B General Course Information

1.Units: 4.0 **Variable Units:** N/A
2.This Course is: Degree-Applicable Credit - Transferable
3A. Cross-List: **3B. Formerly:**

Course Format and Duration

4. Standard Term Hours per Week		**5. Standard Term Total Semester Hours**	
Lecture/Discussion:	4	Lecture/Discussion:	72
Lab:		Lab:	
Activity:		Activity:	
By Arrangement:		By Arrangement:	
Total Hours per Week:	4	**Total Hours :**	72

6. Minimum hours per week of independent work done outside the class: 8

Course Preparation - (Supplemental form B required)

7a. Prerequisite(s): (Course and/or other preparation/experience that is REQUIRED to be completed previous to enrollment in this course.)

Two years of high school algebra or MATH D with grade of "C" or better, or placement by matriculation assessment process

7b. Co-requisite(s): (Courses and/or other preparation that is REQUIRED to be taken concurrently with this course.)

7c. Advisory: (MINIMUM preparation RECOMMENDED in order to be succesful in this course. Also known as "Course Advisory".)

Catalog Description And Other Catalog Information:

8. Repeatability: **Not Repeatable**

Please note: Repeatability does not refer to repeating courses because of substandard grades or a lapse of time since the student took the course. A course may be repeated only if the course content differs each time it is offered and the student who repeats it is gaining an expanded educational experience as stipulated in Title V.

- ☐ Skills or proficiencies are enhanced by supervised repetition and practice within class periods.
- ☐ Active participatory experience in individual study or group assignments is the basic means by which learning objectives are attained.
- ☐ Course content differs each time it is offered.

Explanation for above repeatability selection:

9a. Grading Option: Standard Grade

9b. Catalog Description:

Introduction to the basic concepts of statistics. Emphasis on statistical reasoning and application of statistical methods. Areas included: graphical and numerical methods of descriptive statistics; basic elements of probability and sampling; binomial, normal, and Student's t distributions; confidence intervals and hypothesis testing for one and two population means and proportions; chi-square tests for goodness-of-fit and independence; linear regression and correlation; and one-way analysis of variance (ANOVA).

Course Outline Information

10. Student Performance Objectives: (Performance objectives for all credit courses must indicate that students will learn critical thinking and will be able to apply concepts at college level.Performance objectives must be related to items listed in Section 11.)

Upon successful completion of this course, students will:
1. Identify the population and sample in a scenario where statistics is employed.
2. Identify the method of sampling utilized in a scenario where statistics is employed.
3. Classify a particular data item by type and level of measurement.
4. Operate a statistically enabled scientific calculator or computer software package to assist in the application of statistical methods.
5. Construct a distribution table, histogram, stem-and-leaf plot, Pareto chart, pie chart, and scatter diagram from raw data and describe the result.
6. Calculate the mean, median, and mode from raw data and interpret the result.
7. Calculate the standard deviation from raw data and interpret the result.
8. Calculate the standard score of a data value and interpret the result.
9. Use the standard score to identify unusual data values.
10. Calculate the percentile of a data value and interpret the result.
11. Determine the data value for a particular percentile and interpret the result.
12. Use the basic rules of probability to calculate probabilities for simple and compound events.
13. Calculate conditional probabilities.
14. Use probabilities to determine if events are independent.
15. Construct a probability distribution for a discrete random variable and calculate the expected value.
16. Calculate probabilities based on the binomial probability distribution.
17. Calculate the mean and standard deviation of a binomial probability distribution.
18. Calculate probabilities based the normal probability distribution.
19. Apply the central limit theorem to determine probabilities concerning the mean of a sample.
20. Construct a confidence interval estimate for one population mean and interpret the result.
21. Construct a confidence interval estimate for one population proportion and interpret the result.
22. Conduct a hypothesis test involving one population mean and interpret the result.
23. Conduct a hypothesis test involving one population proportion and interpret the result.
24. Conduct a hypothesis test involving the difference between two population means and interpret the result.
25. Construct a confidence interval estimate for the difference between two population means and interpret the result.
26. Construct a confidence interval and conduct a hypothesis test with dependent paired samples and interpret the result.
27. Conduct a hypothesis test involving the difference between two population proportions and interpret the result.
28. Construct a confidence interval estimate for the difference between two population proportions and interpret the result.
29. Conduct a one-way analysis of variance (ANOVA) and interpret the result.
30. Conduct a chi-square goodness-of-fit test and interpret the result.
31. Conduct a chi-square test for independence and interpret the result.
32. Calculate the linear correlation coefficient for a set of paired data and interpret the result.
33. Calculate the least squares regression line for a set of paired data and interpret the result.
34. Use the linear regression model when appropriate to make a prediction.

11. Course Content Outline: (Provides a comprehensive, sequential outline of the course content, including all major subject matter and the specific body of knowledge covered.)

1. Fundamental Statistical Concepts and Terms
a) Population, Census, and Sample
b) Methods of Sampling: Simple Random, Stratified, Cluster, and Systematic
c) Types of Data: Qualitative, Quantitative, Continuous, and Discrete
d) Levels of Measurement: Nominal, Ordinal, Interval, and Ratio
2. Descriptive Statistics
a) Graphical Methods: Distribution Table, Histogram, Stem-and-Leaf Plot, Pareto Chart, Pie Chart, and Scatter Diagram
b) Measures of Central Tendency: Mean, Median, and Mode
c) Measures of Dispersion: Standard Deviation and Variance
d) Measures of Position: Standard Scores and Percentiles
3. Introduction to Probability
a) Definition of Probability
b) Basic Rules of Probability
c) Conditional Probability and Independent Events
d) Random Variables, Probability Distributions, and Expected Values
e) Binomial Probability Distribution
f) Normal Probability Distribution
g) Central Limit Theorem
4. Inferential Statistics
a) Confidence Interval Estimate for One Population Mean
b) Confidence Interval Estimate for One Population Proportion
c) Hypothesis Testing Procedure and P-Values
d) Hypothesis Test Involving One Population Mean
e) Hypothesis Test Involving One Population Proportion
f) Hypothesis Test Involving Difference between Two Population Means
g) Confidence Interval Estimate of Difference between Two Population Means
h) Confidence Interval and Hypothesis Test with Dependent Paired Samples
i) Hypothesis Test Involving Difference between Two Population Proportions
j) Confidence Interval Estimate of Difference between Two Population Proportions
k) One-Way Analysis of Variance (ANOVA)
l) Chi-square Goodness-of-Fit Test
m) Chi-square Test for Independence
5. Introduction to Regression Analysis
a) Linear Regression Model
b) Linear Correlation Coefficient
c) Regression Model Predictions

12. Typical Out-of-Class Assignments: (Credit courses **require** two hours of independent work outside of class for each lecture hour, less lab/activity classes. List type of assignments including library assignments.)

a. Reading Assignments: (Submit at least 2 examples.)
1. Read section of the textbook on standard scores and be prepared to discuss in class.
2. Read section of the textbook on the binomial probability distribution and apply the information in course examinations.

b. Writing, Problem Solving or Performance: (Submit at least 2 examples)

1. A woman wrote to Dear Abby and claimed that she gave birth 308 days after a visit from her husband, who was in the Navy. Length of pregnancies have a mean of 268 days and a standard deviation of 15 days. Is such a length unusual? What do you conclude?
2. Air America has a policy of booking as many as 15 persons on an Airplane that can seat only 14. Past studies have revealed that only 85% of the booked passengers actually arrive for the flight. Find the probability that if Air America books 15 persons, not enough seats will be available. Is this probability low enough so that overbooking is not a real concern for passengers?

c. Other (Term projects, research papers, porfolios, etc.)

13. Required Materials:

a. All textbooks, resources and other materials used in this course are college level?

- ☑ Yes
- ☐ No

b. Representative college-level textbooks (for degree applicable courses) or other print materials:

Book 1:

Author:	Triola, Mario F.
Title:	Elementary Statistics, California Edition
Publisher:	Pearson Learning Solutions
Date of Publication:	2011
Edition:	First

c. Other materials and/or supplies required of students:

A statistically enabled scientific calculator or a computer with a statistical analysis software package installed.

14.Check all Instructional methods used to present course content:

- ☑ Lecture
- ☐ Discussion Semminar
- ☐ Lab
- ☑ Directed Study
- ☐ Activity
- ☑ Distance Education (requires supplemental form)
- ☐ Work Experience
- ☐ Tutoring

Other:

Give detailed examples of teaching methodology that relate to the course performance objectives:

1. Instructor will use an interactive lecture style, requesting participation from all students in developing the concepts from the course content (similar to the Socratic Method).

2. The instructor will guide the students in a demonstration of the the Central Limit Theorem by having each student roll a standard six sided die four times. Each student will calculate the mean of their four sample rolls of the die and share their result with the class. The students will work together to construct histograms which will depict the distribution of the combined class sample means and the population results of roll a standard six sided die. Students will also calculate the mean and standard deviation of this population and combined sample means. The instructor will involve the students in a discussion and comparison of the results. The discussion will be concluded by illustrating the relationship between the results of the classroom demonstration and the results of the Central Limit Theorem.

3. After reading about the standard deviation in the textbook, students will write a paragraph on when the standard deviation should be used in statistics and how to interpret the result.

4. Students are expected to take written notes in class for use while working on assignments.

15. Methods of Assessing Student Learning
15a. Methods of Evaluation:

- ☐ Essay Exam
- ☑ Objective Exam
- ☑ Projects
- ☐ Class Discussion
- ☐ Reports
- ☑ Problem Solving Exam
- ☐ Skill Demonstration
- ☐ Other

15b. (All courses must provide for measurement of student performance in terms of stated student performance objectives, Area 10, and culminate in a formal recorded grade based on uniform standards. Submit at least 2 examples.)

1. In a recent Harris Interactive poll, 51 out of 188 Americans living in the west said that they attend church regularly. Whereas, 58 out of 145 Americans living in the south said that they attend church regularly. Based on these results, can one conclude that the proportion of Americans who attend church regularly is lower in the west than in the south? Justify your answer using statistics.

2. Before the semester began, Professor Wright predicted that 20% of her business students would receive an A, 40% a B, 25% a C, 10% a D, and 5% an F. At the end of the semester, 6 of Professor Wright's business students earned an A, 17 a B, 11 a C, 3 a D, and 1 an F.

Use the Chi-Square test and a 0.05 level of significance to determine if Professor Wright's predicted percentages were accurate. Show your work.

SECTION C

1. Program Information:

- ☑ In an approved program
- ☐ Part of a new program
- ☐ Not part of an approved program

2. TOP Code Information

Program Title: Mathematics, General 170100

3. Course SAM Code:

- ☐ A - Apprenticeship Course
- ☐ B - Advanced Occupational
- ☐ C - Clearly Occupational
- ☐ D - Possibly Occupational
- ☑ E - Non-Occupational

4. Faculty Minimum Qualifications/Degrees:

Mathematics

Comments:

SECTION D

General Education Information:

1. College Associate Degree GE Applicability:
Communication & Analytic Thinking
Math Competency

2. CSU GE Applicability:
B-4 Mathematics/Quantitative Reasoning

3. IGETC Applicability:
2: Mathematical Concepts & Quantitative Reasoning

4. CAN :

5. LDTP:

SECTION E

1. Articulation Information: (Required for Transferable Courses Only)

- ☑ CSU Transferable
- ☑ UC Transferable
- ☐ CSU/UC Major Requirement.

If CSU/UC major requirement, list campus and major. (Note: Must be lower division)

2. List at least one community college and its comparable course. If requesting CSU and/or UC transferability also list a CSU/UC campus and comparable lower division course

Sacramento City College: STAT 300
CSU Sacramento : STAT 1
UC Davis : STAT 13

SECTION F

Planning and Resources: Please address the areas below:

1. Evidence of Need or Potential: recommendations of advisory committee, connection to existing or planned degrees/certificates, or regional/national developments, transfer university requirements.

This course is a lower division, degree applicable credit, transfer level mathematics course which meets the requirements of numerous majors and fields of study. This course is also an option to satisfy a requirement of an Associate degree in Mathematics.

2. Appropriateness to Mission: connection to basic skills, transfer, career technical education, or lifelong learning; relationship

This course is a lower division, degree applicable credit, transfer level mathematics course which meets the requirements of numerous majors and fields of study. This course is also an option to satisfy a requirement of an Associate degree in Mathematics.

3. Place in Program/Department: relationship to student learning outcomes identified by program, connection to general education, or articulation with other institutions.

Aspects of this course involve each of the four Student Learning Outcomes proposed by the Mathematics Program (Equations and Expressions Visual Models, Applied Problems, and Communication). This course articulates as a lower division, transfer level mathematics course with both the California State University and University of California educational systems and satisfies the General Education requirements for Mathematical Concepts and Quantitative Reasoning as well as Communication and Analytical Thinking.

4. Availability of Faculty and Facilities: minimum qualifications to teach course, special training for instructors, or long-term physical impact of course.

Instructors must meet the minimum qualifications in the discipline of Mathematics to teach this course. Instructors should also have adequate academic preparation in Statistics.

5. Potential Impact on Resources: impact on library, computer support, transportation, equipment, or other needs

This course must be taught in a classroom with an instructional presentation system with access to the internet and appropriate statistics enabled software applications.

SECTION G

1. Maximum Class Size (recommended): 35

2. If recommended class size is not standard, then provide rationale: