



El Camino College
COURSE OUTLINE OF RECORD – Official

Subject:	MATH
Course Number:	150
Descriptive Title:	Elementary Statistics with Probability
Division:	Mathematical Sciences
Department:	Mathematics
Course Disciplines:	Mathematics
Catalog Description:	The focus of this course is the basic practice of statistics, including descriptive statistics, inferential statistics, and the role probability plays in statistical analysis. Students calculate and interpret various descriptive statistics using graphing calculators with statistical testing capabilities and statistical software, as well as by hand. Major topics include methods of data collection and simulation; measures of central tendency, variability, and relative position; graphical summaries of data; linear regression and correlation; distributions, including normal and binomial distributions; probability theory; and inferential statistical methods. Students choose, justify, use, and interpret the results of inferential techniques, such as confidence intervals, hypothesis tests, goodness of fit, analysis of variance, and nonparametric tests.
Prerequisite:	Intermediate algebra or equivalent or placement by appropriate assessment
Co-requisite:	
Recommended Preparation:	
Enrollment Limitation:	
Hours Lecture (per week):	4
Hours Laboratory (per week):	0
Outside Study Hours:	8
Total Hours:	72
Course Units:	4
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	Prior to July 1992
Transfer UC:	Yes
Effective Date:	Fall 1999
General Education:	Area 4B - Language and Rationality: Communication and Analytical Thinking, Area 6 - Mathematics Competency

Term:	
Other:	
CSU GE:	Area B4 - Physical Universe and its Life Forms: Mathematics/Quantitative Reasoning
Term:	
Other:	
IGETC:	Area 2A - Mathematical Concepts and Quantitative Reasoning
Term:	
Other:	
Student Learning Outcomes:	<p>SLO #1 Computing and Interpreting Various Measures</p> <p>From data or bivariate data, compute statistics and develop displays of the data that illustrate the measures of central tendency, variation, relative position, and correlation. Interpret the displays in context.</p> <p>SLO #2 Probability</p> <p>Compute probability of an event by applying the basic assumption in classical probability and using addition rule and multiplication rule for contingency tables.</p> <p>SLO #3 Central Limit Theorem</p> <p>Use the Central Limit Theorem to compute probabilities concerning the distribution of the sample means and comparing these to the probabilities of the related random variable.</p> <p>SLO #4 Confidence Intervals and Hypothesis Testing</p> <p>Compute the confidence intervals and conduct hypothesis testing for a variety of parameters, and perform non-parametric hypothesis testing.</p>
Course Objectives:	<ol style="list-style-type: none"> 1. Identify, compare and contrast various types of data and sampling techniques. 2. Create appropriate displays of data, including histograms, frequency distributions, stem and leaf plots, box plots, bar graphs and pie charts. Use the displays to interpret and answer questions in the context of the data. 3. Calculate appropriate measures of central tendency, variation and relative position. Use the measures to interpret and answer questions in the context of data. 4. Calculate the probability of a given event using elementary probability techniques. 5. Calculate and interpret confidence interval estimates of various parameters. Justify the choice of confidence interval by demonstrating that the necessary criteria are met. 6. Perform parametric and non-parametric hypothesis tests using the classical (critical region) and probability (P-value) methods and interpret the results in context. Justify the choice of test by demonstrating that the necessary criteria are met. 7. Describe the role probability and the central limit theorem play in confidence intervals and hypothesis testing. 8. Create appropriate scatterplots for a given set of bivariate data. Calculate the regression line and correlation coefficient, interpret the results and use the regression line to calculate predicted values.

	9. Perform tasks corresponding to objectives 1 through 8 using statistical software.
Major Topics	<p>I. Overview of Statistics - Descriptive and Inferential (2 hours, lecture)</p> <p>II. Collection of Data and Sampling Techniques (2 hours, lecture)</p> <p>III. Data Description (8 hours, lecture)</p> <ul style="list-style-type: none"> A. Frequency Distributions and Graphs B. Measures of Center, Spread and Relative Position <p>IV. Probability (8 hours, lecture)</p> <ul style="list-style-type: none"> A. Subjective (Informal) Probability B. Empirical (Experiential) Probability C. Classical (Theoretical) Probability D. Addition and Multiplication Rule <p>V. Probability Distributions (8 hours, lecture)</p> <ul style="list-style-type: none"> A. General Probability Distributions B. Binomial Distributions <p>VI. Normal Distributions (8 hours, lecture)</p> <ul style="list-style-type: none"> A. The Standard Normal Distribution B. Applications of Normal Distributions C. Binomial Distributions Approximated by Normal Distributions <p>VII. Central Limit Theorem (6 hours, lecture)</p> <p>VIII. Confidence Intervals for Parameters (6 hours, lecture)</p> <ul style="list-style-type: none"> A. Estimating Population Proportion B. Estimating Population Mean C. Difference of Parameters <p>IX. Hypothesis Testing for Parameters (8 hours, lecture)</p> <ul style="list-style-type: none"> A. Testing a Claim About a Proportion B. Testing a Claim About a Mean C. Testing a Claim About the Difference of Parameters <p>X. Correlation and Regression (8 hours, lecture)</p> <ul style="list-style-type: none"> A. Scatter Plots B. Correlation Coefficient C. Regression Line D. Predicted Values <p>XI. Other Statistical Tests (8 hours, lecture)</p>

	<p>A. Chi-Squared</p> <ol style="list-style-type: none"> 1. Tests of Independence 2. Tests Goodness of Fit <p>B. Analysis of Variance</p> <p>C. At least one Nonparametric Test</p>
Total Lecture Hours:	72
Total Laboratory Hours:	0
Total Hours:	72
Primary Method of Evaluation	2) Problem solving demonstrations (computational or non-computational)
Typical Assignment Using Primary Method of Evaluation:	A random sample of 49 shoppers showed that they spent an average of \$23.45 per visit at a grocery store. The standard deviation of the sample was \$2.80. Decide what type of confidence interval is appropriate to estimate the true mean and justify your choice. Then find a 90% confidence interval estimate of the true mean.
Critical Thinking Assignment 1:	<p>A researcher claims that students in a private school have an IQ that is 8 points higher than that of students in public schools. Random samples of 60 students from each type of school are selected and given an IQ exam. The results are shown below. Justify why performing a test comparing the two population means is appropriate. Set up the null and alternate hypotheses. At a significance level of 0.05, test the claim and interpret the results in the context of the problem.</p> <p>Private Schools</p> <p>$\bar{x} = 110$</p> <p>$s = 15$</p> <p>$n = 60$</p> <p>Public Schools</p> <p>$\bar{x} = 104$</p> <p>$s = 18$</p> <p>$n = 120$</p>
Critical Thinking Assignment 2:	In a sampling of 200 surgeons, 15% felt that the government should control health care. In a sample of 200 dentists, 21% felt this way. At a significance level of 0.10, decide if there is a difference in the proportions. Explain and justify what test you used and explain how probability played a role in your conclusion.
Other Evaluation Methods:	Homework Problems, Laboratory Reports, Other Exams, Quizzes, Written Homework
Instructional Methods:	Discussion, Lecture
If other:	Computer assignments using statistical software
Work Outside of Class:	Answer questions, Problem solving activity, Required reading, Study

If Other:	
Up-To-Date Representative Textbooks:	Michael Sullivan III. <u>Statistics - Informed Decisions Using Data</u> . 6th ed. Pearson, 2021.
Alternative Textbooks:	
Required Supplementary Readings:	
Other Required Materials:	
Requisite:	
Category:	
Requisite course(s): List both prerequisites and corequisites in this box.	
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite:	Intermediate algebra or equivalent or placement by appropriate assessment
Requisite and Matching Skill(s): Bold the requisite skill(s). If applicable	<p>Solve algebraic equations.</p> <p>Carry out numerical operations and manipulate algebraic expressions, including expressions with rational and negative exponents.</p> <p>Graph linear functions.</p> <p>Graph a variety of functions and relations and draw connections between these graphs and solutions to problems.</p> <p>Perform numerical calculations involving powers and roots.</p> <p>Solve problems involving a variety of function types, including linear, quadratic, polynomial, rational and radical functions, as well as the absolute value function</p>
Requisite course:	
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Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	H. Jones, R. Maier, H. Pickett
Date:	02/01/1956
Original Board Approval Date:	
Last Reviewed and/or Revised by:	Benjamin Mitchell
Date:	02/01/2022
Last Board Approval Date:	06/20/2022