TAFT COLLEGE
West Kern Community College District

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Statistics (STAT) 1510 Elementary Statistics (5 Units) CSU:UC
[formerly Statistics 10]

Prerequisite: Successful completion in Mathematics 1060 or the equivalent

Prerequisite knowledge/skills: Before entering the course the student should be able to:

1. identify numbers as belonging to specified sets, and graph discrete and continuous sets of real numbers,
2. perform the basic arithmetic operations with positive and negative real numbers,
3. know and apply the rules of exponents and the order of operations in algebraic expressions,
4. use the properties of addition and multiplication for real numbers,
5. solve linear equations and inequalities in one variable,
6. solve and graph the solutions of compound inequalities or absolute value inequalities in one variable,
7. perform addition, subtraction, multiplication and division of polynomials,
8. factor simple polynomials, with special emphasis on quadratic trinomials, and solve related polynomial equations,
9. add, subtract, multiply and divide rational algebraic expressions, and reduce to lowest terms,
10. solve equations involving rational algebraic expressions, and analyze and solve word problems leading to such equations,
11. simplify radical expressions involving numbers and/or variables,
12. use fractional exponents,
13. perform addition, subtraction, multiplication and division of expression involving radicals and complex numbers and simplify the results, including rationalization of denominators,
14. solve equations that involve radicals,
15. solve quadratic equations in one variable, and quadratic equations by factoring, completing the square, and the quadratic formula,
16. analyze and solve application problems requiring the use of quadratic equations,
17. solve and graph quadratic inequalities in one variable,
18. graph points in the rectangular coordinate system, and straight lines from ordered pairs obtained from a linear equation,
19. determine the slope of the line between any given pair of points,
20. know the slope formulas for the equation of a straight line, and be able to determine the equation of a particular straight line from specified input information,
21. solve and graph linear inequalities in two variables,
22. solve linear systems of equations in two or three variables algebraically, and solve two dimension systems graphically,
23. analyze and solve application problems requiring the use of linear systems of equations in two or three variables,
24. evaluate determinants and use them to solve linear systems of equations,

25. determine whether or not a specified relation is a function,
26. for a function, compute the value of the function given the value of the independent variable, and be able to construct the inverse of simple functions in numeric or algebraic terms,
27. identify the quadratic equation representing a specific conic section, and be able to draw the graph of a conic section by analyzing its equation, or to write the equation of a specified conic section,
28. solve nonlinear systems of equation involving the intersection of two conic sections or a conic section and a straight line,
29. compute and graph specified exponential and logarithmic functions,
30. know the properties of logarithms (product, quotient, power and change of base rules) and be able to use them in practical numerical computations using a table of common logarithms or a calculator, and
31. solve simple exponential and logarithmic equations.

Total Hours: 80 hours lecture

Catalog Description: This course emphasizes descriptive statistics including the use of probability techniques, hypothesis testing, and predictive techniques to facilitate decision-making. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Applications using data from disciplines including business, social sciences, psychology, life science, health science, and education, sampling, sampling distributions, measures of central tendency and measures of dispersion, introductory treatment of probability and statistical inference with one and two sample problems, confidence intervals and hypothesis testing regarding means and proportions, and correlation and linear regression, ANOVA and nonparametric techniques such as the one-sample sign test, Wilcoxon rank-sum, Spearman's correlation, odds ratios and Kruskal-Wallis.

Type of Class/Course: Degree Credit

Text: Jean, Brian, David Meyers, Rene Sporer. *Data Analysis - An Applied Approach to Statistics With Technology*. 2nd ed. Bakersfield, CA: 3Ring Publishing, 2008. Print.

Jean, Brian, David Meyers, Rene Sporer. *Data Analysis With The TI-83 Graphing Calculator*. 2nd ed. Bakersfield, CA: 3Ring Publishing, 2005. Print.

Additional Instructional Materials:

Course Objectives:

By the end of the course, a successful student will be able to:

1. perform a statistical experiment,
2. present data in a variety of ways,
3. do descriptive analysis on single and bivariate data,
4. apply the rules of probability,
5. perform hypothesis tests,
6. calculate confidence intervals,
7. test inferences involving one and two populations,

8. perform chi-square tests and analysis of variance,
9. perform linear regression analysis, and
10. perform selected nonparametric statistical tests.
11. Distinguish among different scales of measurement and their implications;
12. Interpret data displayed in tables and graphically;
13. Apply concepts of sample space and probability;
14. Calculate measures of central tendency and variation for a given data set;
15. Identify the standard methods of obtaining data and identify advantages and disadvantages of each;
16. Calculate the mean and variance of a discrete distribution;
17. Calculate probabilities using normal and student's t-distributions;
18. Distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem;
19. Construct and interpret confidence intervals;
20. Determine and interpret levels of statistical significance including p-values;
21. Interpret the output of a technology-based statistical analysis;
22. Identify the basic concept of hypothesis testing including Type I and II errors;
23. Formulate hypothesis tests involving samples from one and two populations;
24. Select the appropriate technique for testing a hypothesis and interpret the result;
25. Use linear regression and ANOVA analysis for estimation and inference, and interpret the associated statistics; and
26. Use appropriate statistical techniques to analyze and interpret applications based on data from disciplines including business, social sciences, psychology, life science, health science, and education.

Course Scope and Content:

Unit I Statistics
- A. Basic terms
- B. Random Sampling

Unit II Descriptive Analysis - Single Variable Data
- A. Measurements of Central Tendency
- B. Measurements of Dispersion
- C. Graphical Displays of Data

Unit III Descriptive Analysis - Bivariate Data
- A. Linear and nonlinear (monotonic) correlation
- B. Linear Regression

Unit IV Probability
- A. Simulation
- B. Empirical Probabilities
- C. Theoretical Probabilities
- D. Rules of Probability

Unit V Probability Distributions
- A. Random Variables
- B. Mean and Variance of a Discrete Distribution

Unit VI Binomial Probability Distribution

A. Probabilities
B. Mean and Standard Deviation

Unit VII Normal Probability Distribution
A. Properties
B. Standard Normal Distribution
C. Non-Standard Normal Distribution

Unit VIII Sample Variability
A. Central limit theorem
B. Sampling Distributions

Unit IX Statistical Inference
A. Hypothesis testing and confidence intervals for:
1. one population mean
2. two population means
3. one proportion
4. two proportions
5. one variance
6. two variances
7. odds ratios
B. Inferences Based on Non-Parametric Techniques

Unit X Chi Square
A. Tests of independence
B. Contingency tests
C. Goodness of Fit

Unit XI Analysis of Variance
A. Variance Stabilizing Transformations
B. Multiple Comparisons
C. Kruskal-Wallis

Unit XII Linear Correlation and Regression Analysis
A. Parameter Estimates
B. Using The Regression Line

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 10 hours per week outside of the regular class time doing the following:

1. Studying,
2. Answering questions,
3. Skill practice,
4. Completing required reading, and
5. Problem solving activity or exercise.

Methods of Instruction:

1. Lecture-demonstrations and sample problems solved by the instructor
2. Occasional lab activities on the computer

Methods of Evaluation:

1. Computational or non-computational problem-solving demonstrations, including:
   a. exams,
   b. homework problems, and
   c. quizzes.