San Diego

SUBJECT AREA AND COURSE NUMBER: Mathematics 47

COURSE TITLE: Beginning Algebra and Practical Descriptive Statistics

UNITS: 4.00
Lecture: 3.00
Lab: 1.00

Letter Grade, Student may petition for Credit/No Credit

CATALOG COURSE DESCRIPTION:
This course is the first of a two course sequence in the study of statistical methods integrated with algebraic tools to prepare students to analyze statistical processes encountered in society and the workplace. The course covers an introduction to algebra and descriptive statistics in an integrated approach. Topics include data collection, organizing and interpreting data graphically, qualitative and quantitative data sets, measures of central tendency and measures of dispersion, bivariate data and scatter plots, linear functions and their graphs, nonlinear functions and their graphs, and applying technology to calculate various types of regressions. Students will be expected to implement technology to perform calculations to organize data in order to make statistical conclusions This sequence of courses is intended for students that are not planning on majoring in a science, technology, engineering or mathematics related disciplines. This course only meets general education requirement. (FT)

REQUISITES:
Prerequisite: MATH 38 with a grade of "C" or better, or equivalent.

ADVISORY:
ENGL 043 with a grade of "C" or better, or equivalent or Assessment Skill Level W4
&
ENGL 048 with a grade of "C" or better, or equivalent or Assessment Skill Level R5

FIELD TRIP REQUIREMENTS: May be required

TRANSFER APPLICABILITY: Associate Degree & Transfer to CSU and private colleges. CSU General Education.

LECTURE HOURS PER WEEK: 3.00
LAB HOURS PER WEEK: 3.00

STUDENT LEARNING OBJECTIVES:
Upon successful completion of the course the student will be able to:

1. Understand the meaning between observational versus experimental studies, and identify their differences.
2. Collect, identify and categorize different data sample sets.
3. Apply the rules for order of operations and rules of exponents to simplify arithmetic real numbered expressions.
4. Translate written expressions including percents, ratios, rates, and scientific notation problems into algebraic expressions and simplify them.
5. Translate written expressions into equations, such as proportion problems, and solve them:
6. Add, subtract, multiply and divide simple rational expressions.
7. Solve applications that require direct and indirect variation.
8. Analyze and interpret qualitative and quantitative data
9. Identify the various types of levels of measurement data.
10. Understand and implement the meaning of a sampling error, and statistically determine when a statistic is misleading.

11. Identify important geometric shapes and properties involving lines, angles, and polygons.

12. Develop ways of describing data graphically to include: histograms, frequency tables, bar graphs, or pie charts.

13. Interpret and summarize organized data when it is presented in graphical form as needed.

14. Determine measures of central tendency, including the mean, median, mode and midrange.

15. Apply summation notation and sums of sequences to calculate measures of variation.

16. Identify the properties of a linear equation in two variables including the slope and intercepts.

17. Determine the different forms of a linear equation and their graphs.

18. Create box plots and measures of location to describe the distribution of a data set.

19. Determine when a two variable relationship exists and subsequently plot it on a Cartesian-coordinate system.

20. Identify and interpret the meaning of a point in a scatter-plot and identify trends from the scatter plots.

21. Solve linear equations and inequalities including those having absolute values, and solve application problems involving these types of expressions.

22. Identify linear versus non-linear functions, and use appropriate notation to determine the domain and range for a function and a relation.

23. Apply the algebra of functions to finding inverses of one-to-one functions.

24. With the use of technology graph non-linear functions, and learn to identify the exponential and logarithmic pattern distributions.

25. Perform linear and non-linear regressions using technology to a set of bivariate data.

SECTION II

1. COURSE OUTLINE AND SCOPE

A. OUTLINE OF TOPICS:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

Statistical Studies and Overview of Data Analysis

I. Data Collection
- A. Design of experiments
  - 1. Observational studies
  - 2. Experimental studies
- B. Collecting samples
  - 1. Random sampling
  - 2. Other types of sampling (convenience, cluster, systematic, stratified)

II. Types of Data
- A. Real numbers

1. Properties
2. Operations (including absolute values, exponents, square roots)
3. Order of operations
4. Percents, decimals, and fractions
5. Ratios, rates, and proportions
6. Rules of exponents
    i. Scientific notation

B. Qualitative vs. Quantitative
1. Discrete vs. continuous data
2. Interpreting and ordering integers and decimals

III. Data Analysis
A. Levels of measurement of data (nominal, ordinal, interval, ratio)
B. Sampling error
C. Misleading statistics

Summarizing Data Graphically and Numerically (Descriptive Statistics?)

I. Summarizing Data Graphically
A. Geometric shapes and properties
1. Properties of polygons and circles
2. Area, perimeter, circumference
3. Similarity, congruence, and symmetry
4. Application problems
B. Charts and graphs
1. Histograms
2. Frequency tables and polygons
3. Bar graphs
4. Pie charts

II. Summarizing Data Numerically
A. Algebraic expressions and equations
1. Translation of verbal expressions and equations
2. Simplification and evaluation of expressions
3. Summations of sequences, sigma notation
B. Rational expressions
1. Basic arithmetic operations
    i. Rules of exponents
2. Complex rational expressions
3. Applications including variation
C. Measures of central tendency
1. Mean
2. Median
3. Mode
4. Midrange
D. Measures of variation
1. Range
2. Variance
3. Standard deviation

III. Comparing Distributions
A. Measures of location
B. Box plots

Bivariate Data: Linear Relationships and Regressions

I. The Cartesian-Coordinate System
A. Ordered pairs
1. Graphing and interpreting ordered pairs

2. Two variable relations

B. Applications in data organization
   1. Scatter-plots

II. Lines in a Plane
   A. Slope of a line
   B. Equations in standard form
   C. Equations in point-slope form
   D. Equations in slope-intercept form
   E. Relationship between linear graphs
      1. Parallel and perpendicular lines
   F. Linear correlations between two sets

III. Functions and Notation
   A. Linear functions
      1. Vertical line test
      2. x- and y-intercepts
   B. One-to-one functions
      1. Horizontal line test
      2. Inverse functions
   C. Patterns of ordered pairs in a data set

IV. Applications of Lines in Modeling
   A. Linear least squares method
   B. Using technology to find linear regressions

V. Solving Equations and Inequalities
   A. Absolute value equations
   B. Compound inequalities
   C. Absolute value inequalities
   D. Systems of linear equations

Modeling Nonlinear Relationships

I. Properties of Linear and Nonlinear Functions
   A. Domain and range
   B. Absolute value function
   C. Square root function
   D. Polynomial functions
   E. Exponential and logarithmic functions
   F. Vertical and horizontal shifts

II. Nonlinear Data Distribution Patterns
   A. Exponential growth
   B. Exponential decay
   C. Logarithmic

III. Best Fit of Statistical Data Using Technology
   A. Quadratic
   B. Cubic
   C. Power
   D. Exponential
   E. Logarithmic