Degree Applicable   Glendale Community College
Course ID 003260   March 2015

COURSE OUTLINE

Mathematics 136 (C-ID Number: MATH 110)
Statistics (C-ID Title: Introduction to Statistics)

I.   Catalog Statement

Mathematics 136 is a one-semester course designed for students whose major requires a course   in statistics. Topics in this course include the nature of statistical methods, types of data, introductory probability, sampling theory, experimental design, confidence intervals, hypothesis testing, regression analysis, and decision making. Emphasis is placed on the application of statistical concepts to real world data, development of statistical reasoning, and the interpretation of results.

Total Lecture Units: 4.0
Total Laboratory Units: 0.0
Total Course Units: 4.0

Total Lecture Hours: 64.0
Total Laboratory Hours: 0.0
        Total Laboratory Hours To Be Arranged**:** 0.0
Total Faculty Contact Hours: 64.0

Prerequisite: Placement is based on a composite of test scores and academic background or satisfactory completion of MATH 101, 120, 131, 220B, or 2 units of MATH 220.

II.   Course Entry Expectations

Prior to enrolling in the course, the student should be able to:
- use formulas to compute, up to and including logarithms;
- calculate permutations and combinations;
- understand summation notation;
- solve algebraic equations;
- graph functions in the Cartesian coordinate system;
- recognize and interpret the slope and intercept of a linear function;
- apply mathematical techniques to word problems.

III.   Course Exit Standards

Upon successful completion of the required coursework, the student will be able to:

- describe and analyze realistic data sets both large and small from disciplines including business, social science, psychology, life science, health science and education using graphs and statistics;
- analyze real world results, interpret the output of a technology-based statistical analysis and identify flaws in statistical reasoning;
- identify the standard methods of obtaining data and identify advantages and disadvantages of each;
- calculate probability using the normal distribution, the t distribution and the basic laws of probability;
- describe sampling distributions, distinguish them from population distributions and analyze the role played by the Central Limit Theorem;
- compute confidence intervals of population means, proportions and standard deviations;
- identify the basic concept of hypothesis testing including Type I and II errors, finding and interpreting levels of significance including p-values, selecting the appropriate techniques for testing a hypothesis from one and two populations and interpreting the result;
- perform chi-square tests using chi-square tables and statistical software or calculator;
- use linear regression and ANOVA analysis for estimation and inference, and interpret the statistics;
- calculate and present results using sound statistical reasoning, accurate statistical terminology and technology such as spreadsheets, graphing calculators or StatCrunch;

IV. **Course Content**   **Total Faculty Contact Hours = 64**

A. Descriptive Statistics **(18 hours)**
   1. Graphical descriptions of data
   2. Measures of center: mean, median, and mode
   3. Measures of spread; standard deviation/variance, quartiles, and range
   4. Density curves, including normal distributions
   5. Linear regression, including residual analysis
   6. Correlation
   7. 2-Way Tables
   8. Data set analysis using statistical software and or statistical calculators
   9. Identification of confounding and lurking variables and other possible misinterpretations of statistical conclusions

B. Producing Data **(5 hours)**
   1. Design of sampling procedures
   2. Design of experiments
   3. Strengths and limitations of experimental designs

    C. Probability and Sampling Distributions **(11 hours)**
1. Probability models
2. Computing probabilities using the addition and multiplication rules
3. Expected value
4. The Central Limit Theorem
5. Binomial distributions

    D. Inferences Using Sample Means, Proportions, and Standard Deviations **(30 hours)**
1. Confidence intervals for the population proportion and mean
2. One and two-sample hypothesis tests of population proportions and means; Z-test and Student's t-test
3. Type I and Type II errors
4. Chi-square distribution
5. Linear regression and ANOVA analysis for estimation and inference
6. Accurate presentation of inferential conclusions

V.   Methods of Instruction

The following methods of instruction may be used in the course:
- classroom lecture/discussion;
- small group work/discussion;
- computer software and/or graphing calculator demonstrations.

VI.   Out of Class Assignments

The following out of class assignments may be used in the course:
- projects involving analysis of real-world data using statistical software (e.g. collect data and create a written report including graphical displays and numeric summaries.)

VII.   Methods of Evaluation

The following methods of evaluation may be used in the course:
- four to five chapter exams;
- a two-and-a-half hour comprehensive final examination to test problem solving.

VIII.   Textbook(s)

Sullivan, Michael. *Statistics: Informed Decisions Using Data*. 4th ed. Boston: Pearson, 2013.
    Print.
10th Grade Textbook Reading Level. ISBN #000-0321757270

IX.   Student Learning Outcomes

Upon successful completion of the required coursework, the student will be able to:

- design and analyze studies that produce sound statistical results;
- compute basic statistics for a variable, including mean, variance, standard deviation, mode and 5 number summaries;
- describe the distribution of a quantitative variable in terms of its shape, center and spread, using graphical techniques;
- perform regression analysis to make informed predictions about the relationships between quantitative variables;
- apply confidence intervals and hypothesis testing (Z-test, t-test, Chi-square, ANOVA and regression) to form conclusions about realistic data;
- employ and demonstrate an understanding of the rules of probability, including properties of the normal distribution.