

**Effective Date** Summer 2005-2006

**Course Description**

(Also offered as MATH 3012 and PSYC 3012) Prerequisite: A grade of “C” or better in MATH/STAT/PSYC 2011. Math majors may not take as a Math elective, but may take as a free elective. A continuation of MATH/STAT/PSYC 2011. Descriptive statistics, confidence intervals and hypothesis testing based on one or more samples, various Chi-Square tests, regression, one-way analysis of variance (ANOVA), and non-parametric statistics.

**Course Objectives**

Students will:

1. Understand the fundamentals of statistics as represented in the topical outline.
2. Develop critical thinking and problem solving skills, particularly with hypotheses claims.
3. Be able to interpret and create graphs and charts.

**Procedures to Evaluate these Objectives**

1. In-class problems after concept presentation
2. In-class exams
3. Cumulative final exam

**Use of Results of Evaluation to Improve the Course**

1. Student responses to in-class problems will be used to immediately help clarify any misunderstandings and to later adjust the appropriate course material.
2. All exams will be graded and examined to determine areas of teaching which could use improvement.
3. All evaluation methods will be used to determine the efficacy of the material presentation.

**Detailed Topical Outline**

1. Descriptive Statistics
  - a. Measures of Central Tendency (mean, median, mode and midrange)
  - b. Measures of Variation (range, variance and standard deviation)
2. Normal Probability Distribution
  - a. Finding Probabilities when z-scores or x-values are given
  - b. Finding z-scores or x-values when Probabilities are given
  - c. Central Limit Theorem (finding probabilities when mean and standard deviation are given)
3. Inferences Based on a Single Sample
  - a. Confidence Intervals and Testing a Population Mean (z-test and t-test)

- b. Confidence Intervals and Testing a Proportion
- c. Confidence Intervals and Chi-Square test for a Variance or Standard Deviation

- 4. Inferences Based on Two Samples
  - a. Confidence Intervals and Testing the Difference between two Means: Large Samples
  - b. Confidence Intervals and Testing the Difference between two Variances
  - c. Confidence Intervals and Paired and Non-Paired t-test
  - d. Confidence Intervals and Testing the Difference between Proportions
- 5. Simple Linear Regression
  - a. Test for Significance of Correlation
  - b. Discuss Multiple Regression
- 6. Other Chi-Square Tests
  - a. Goodness of Fit test
  - b. Tests using Contingency Tables
- 7. One-way Analysis of Variance (ANOVA)
  - a. Using one-way Analysis of Variance techniques to test the equality of more than two population means
  - b. Discuss Sheffe' Test and Tukey Test
- 8. Overview of Nonparametric Statistics
  - a. Introduction of Nonparametric Statistics
  - b. Sign Test (single sample and paired sample)