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Course Outline for MATH 42B

STATISTICAL ANALYSIS

Effective: Fall 2009

I. CATALOG DESCRIPTION:

MATH 42B — STATISTICAL ANALYSIS — 4.00 units

Statistical analysis, including comparisons of two populations, chi-square applications, analysis of variance, non-parametric, regression and correlation. Use of a computer software package to complete statistics problems.

3.00 Units Lecture 1.00 Units Lab

Prerequisite

MATH 42A - Intro to Prob and Statistics
with a minimum grade of C

Grading Methods:

Letter Grade

Discipline:

	MIN
Lecture Hours:	54.00
Lab Hours:	54.00
Total Hours:	108.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. MATH42A

1. Define different types of statistics, how they are used and misused;
2. Take raw data and organize it into tables, charts, and/or graphs;
3. Calculate and understand the meaning of the mean, median, mode range, variance, and standard deviation as they relate to a population, sample or distribution;
4. Determine the fundamental concepts of probability and be able to calculate probabilities using some basic rules of probability;
5. Solve problems involving the binomial, normal or chi-square distribution;
6. Find confidence intervals and perform hypothesis tests for single populations;
7. Introduction to scatter diagrams and correlation;
8. Perform descriptive and inferential statistics using a software package.

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

- A. Find confidence intervals and perform hypothesis tests for two-population comparisons;
- B. Apply concepts of chi-square tests;
- C. Apply concepts of one-way analysis of variance;
- D. Apply concepts of correlation and linear regression;
- E. Apply concepts of non-parametric methods;
- F. Perform descriptive and inferential statistics using a software package.

V. CONTENT:

A. Distributions

1. Binomial
2. Normal
3. Chi-square
4. F

B. Confidence intervals for means, proportions, and variances of two populations

C. Hypothesis tests

1. Confidence intervals for means, proportions, standard deviations, and variances of two independent populations
2. Difference of means and mean of differences of two dependent populations
3. One-way analysis of variance
4. Goodness of fit
5. Contingency tables

- D. Correlation and regression
 - 1. Scatter diagrams
 - 2. Find correlation coefficient and regression equation for a bivariate set of data
 - 3. Graph regression equation
 - 4. Prediction using regression equation
 - 5. Hypothesis test for correlation coefficient
 - 6. Hypothesis tests for slope and y-intercept (optional)
- E. Non-parametric tests
 - 1. Sign tests
 - 2. Wilcoxon rank sum
 - 3. Wilcoxon signed-rank
 - 4. Kruskal-Wallis
 - 5. Spearman's r
 - 6. Runs
- F. Software
 - 1. Learn how to use a statistical software package for statistical analysis.

VI. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. Demonstration in computer lab
- C. Collaborative learning and class projects where applicable
- D. Classroom discussion

VII. TYPICAL ASSIGNMENTS:

A. Problems tend to be long and students struggle to understand basic concepts. A typical assignment in hypothesis testing for two populations might be problems 1 through 11 odd. B. A class project (optional) might be to have students select a two random samples and find confidence intervals or perform hypothesis tests. C. A typical computer lab assignment might be to randomly generate 3 or more samples, and do a one-way analysis of variance. D. Problem solving 1. Perform a goodness of fit test determine if one brand of catsup is preferred over other brands. 2. Determine if a sequence of voters is random.

VIII. EVALUATION:

A. **Methods**

- 1. Exams/Tests
- 2. Quizzes
- 3. Projects
- 4. Home Work
- 5. Lab Activities
- 6. Other:
 - a. Methods of evaluation
 - 1. Examinations
 - a. Questions involving statistical calculations should be open-ended.
 - b. Questions testing properties and definitions may be true/false, multiple choice, completion, or fill-in.
 - c. Types of problems:
 - 1. Use-Analysis of Variance to determine if the average rainfall during the month of January is the same for San Diego, San Francisco, and Sacramento.
 - 2. Test to see if the average miles per gallon is the same for a sample of Fords compared with a sample of Chevrolets.
 - 3. Use Goodness of Fit to determine if a sequence of digits is random.
 - 2. Announce or unannounced quizzes at the option of the instructor.
 - 3. Collect homework at the option of the instructor.
 - 4. Computer homework at the option of the instructor
 - 5. Graphing calculator assignments
 - 6. Term project at the option of the instructor
 - 7. Computer lab final at the option of the instructor

B. **Frequency**

- 1. Frequency
 - a. Minimum of 2 exams plus a comprehensive final
 - b. 4 to 6 computer lab assignments

IX. TYPICAL TEXTS:

- 1. Triola *Introduction to Statistics*. 11th ed., Pearson, Addison-Wesley Publishers, 2009.
- 2. Bluman *Elementary Statistics*. 7th ed., McGraw-Hall Publishers, 2009.
- 3. Sullivan *Statistics: Informed Decisions Using Data*. 2nd ed., Pearson-Prentice Hall Publishers, 2007.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. A scientific or graphing calculator may be required.