

NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY MTH 246 – STATISTICS II (3 CR.)

Course Description

Presents an overview of statistics, including descriptive statistics, elementary probability, probability distributions, estimation, hypothesis testing, correlation, and linear regression. Part II. Lecture 3 hours. Total 3 hours per week.

General Course Purpose

To serve as a second course in statistics that focuses on multivariate and nonparametric techniques useful to business, science, and social science majors.

Course Prerequisites/Corequisites

Prerequisite: Completion of MTH 245 or equivalent with a grade of C or better.

Course Objectives

- Review of Hypothesis Testing
 - Conduct hypothesis tests for population means and proportions.
 - Conduct a hypothesis test for the equality of two population means where:
 - The samples are independent and the population variances are assumed unequal.
 - The data consists of matched pairs.
 - Conduct a hypothesis test for the presence of correlation.
- Experimental Design
 - Define and apply the basic principles of design, including randomization, replication, and treatment/control groups.
 - Explain single and double blinding.
 - Describe the placebo and experimenter effects and describe how they can be countered using blinding.
 - Design experiments using the following methods:
 - Completely randomized.
 - Randomized block.
 - Matched pairs.
 - Explain the concept of confounding.
- Correlation and Regression
 - Construct and interpret the residual plot related to a simple least-squares regression model.
 - Conduct hypothesis tests related to the coefficients of a simple least-squares regression model.
 - Construct and Apply a logistic regression model.
 - Calculate the coefficient of determination, the adjusted coefficient of determination, and overall P-value for a multiple regression model and use them to construct a best-fit multiple regression equation.
- Categorical Data Analysis
 - Conduct chi-squared tests for:
 - Goodness of fit.
 - Independence between rows and columns of a two-way contingency table.
 - Homogeneity of population proportions.
- Analysis of Variance (ANOVA)
 - Conduct one-way ANOVA to test the equality of two or more population means for both equal and unequal sample sizes and recognize its relationship to the pooled two sample t-test.
 - Conduct a multiple comparison test, such as Tukey's HSD, to determine which of the three or more population means differs from the others.
 - Conduct two-way ANOVA on sample data categorized with two fixed factors.

- Nonparametric Methods
 - Determine the rank of each element of a sorted data set.
 - Identify the relationship between a nonparametric test and its corresponding parametric technique.
 - Conduct a Wilcoxon signed-ranks test for a single sample.
 - Conduct a Wilcoxon signed-ranks test for matched pairs.
- Technology Application
 - Construct statistical tables, charts, and graphs using appropriate technology.
 - Perform statistical calculations using an appropriate statistical software package.
 - Complete statistical project. Students are required to complete some form of semester project in their course that is worth a significant portion of the student's grade. This could be either an individual or group effort, and could be completed in stages through the semester or as a single, stand-alone exercise. As a minimum, the project should require students to manipulate and draw statistical inferences from a large, realistic data set using a statistical software package.

Major Topics to be Included

- a) Hypothesis Testing
- b) Experimental Design
- c) Correlation and Regression
- d) Categorical Data Analysis
- e) Analysis of Variance
- f) Nonparametric Methods