

INTRODUCTION TO PROBABILITY AND STATISTICS II
MATH 4750/8756

1.0 Course Description

- 1.1 Overview of Content and Purpose:** (3 hours) Theory and methods of statistical inference including estimators, statistical hypotheses, multivariate estimation, chi-square tests, linear models, analysis of variance, and statistical software. The student should gain a solid foundation in the following fields of statistical inference: significance tests, point estimation, and confidence intervals.
- 1.2 Prerequisite:** MATH 3740

2.0 Content and Organization

- 2.1 Topics:**
1. Estimation
 - a) Maximum likelihood estimators
 - b) Unbiased estimators
 - c) Minimum variance estimators
 - d) Sufficient statistics
 2. Tests of Statistical Hypotheses
 - a) Tests of variances and differences of means
 - b) Power
 - c) Test for randomness
 - d) Kolmogorov-Smirnov goodness of fit test
 3. Multivariate Distributions
 - a) Correlation coefficient
 - b) Conditional distributions
 - c) Bivariate normal distribution
 4. Chi-square Test of Models
 5. Linear Models
 6. Analysis of Variance
 7. Statistical Software

3.0 Teaching Methodology

- 3.1 Methods to be Used:** The course will be presented by lecture, class discussion and questions. To receive graduate credit for this course, a student must do work not required of undergraduates. To meet this requirement the graduate students will be assigned more difficult homework and/ or computer projects than the undergraduate students.

4.0

Evaluation

- 4.1 **Basis for Evaluating Student Performance:** Evaluation will be based on examination results and outside projects including homework and/ or computer projects.

5.0

Resource Material

- 5.1 **Textbook(s) or Other Required Readings:** Miller & Miller, *John E. Freund's Mathematical Statistics and Applications*, Pearson Prentice-Hall, 2003.

- 5.2 **Current Bibliography of Resources:**

1. Hogg, R., and Tanix, *Probability and Statistical Inference*, MacMillan, 1982.
2. Mendelhall, Schaeffer and Wackerly, *Mathematical Statistics with Applications*, Duxbury Press, 1981.
3. Ross, Sheldon, *A First Course in Probability*, MacMillan, 1984.
4. Sredecor, G., and Chochran, W., *Statistical Methods*, Iowa State University Press, 1980.
5. Woodroofe, Michael, *Probability with Applications*, McGraw-Hill, 1975.