MATH 441
Probability and Statistics II

Prerequisites

MATH 340 with a grade of C or better.

Bulletin Description

Continuation of MATH 340. Sampling distributions, estimation of parameters, hypothesis testing, goodness-of-fit tests, linear regression, and selected non-parametric methods.

Course Objectives

- o Construction of estimators
- o Goodness of estimators
- o Development of interval estimation using pivot method
- o Constructing tests and test statistics using estimators and GLR
- o Study of sampling distribution and their use
- o Study of Chi-Square test
- o Discussion of Linear regression and its applications
- o Review of basic nonparametric tests

Evaluation of Students

Instructors' assessment is usually based on homework, quizzes, computer assignments, in class exams, and in class final.

Course Outline

- Methods of estimation; maximum likelihood estimators, method of moment estimators(1 week)

- Properties of estimators; unbiasedness, efficiency, Cramer-Rao Lower Bound, sufficiency, Fisher-Neyman Lemma, Rao-Blackwell Theorem, consistency, completeness, exponential families (3 weeks)

- Sampling distributions; normal distribution, chi-square distribution, t distribution; F distribution (1 week)

- Interval estimation; mean(one and two sample normal), variance(one and two sample normal), proportion(one and two sample Binomial)(2 weeks)

- Hypothesis testing; mean(one sample normal and t tests), two samples (normal, t ,and F tests), two sample binomial tests (normal and exact tests), GLR, UMP tests (3 weeks)

- Chi-Square tests; Goodness of fit with known and unknown parameters, contingency tables, tests of independence, tests of homogeneity (1.5 weeks)

- Regression; Linear models, method of least square formulae for slope and intercept, maximum likelihood method formulae for slope and intercept, drawing inference about the slope, intercept, mean of dependent variable, and predicted value, covariance, correlation, inference about correlation coefficient and bivariate normal distribution (1.5 weeks)

- Nonparametric statistics; Sign test, Wilcoxon Signed rank test(1 week)

Textbooks and Software

Mathematical Statistics and Its Applications, Larson and Marx, Prentice Hall
Probability and Statistics Inference, Hogg and Tanis, Prentice Hall

Submitted by: M. R. Kafai   Date: July 8, 2003