Math 476 – Statistics

Course Description from Bulletin: Estimation theory; hypothesis tests; confidence intervals; goodness-of-fit tests; correlation and linear regression; analysis of variance; non-parametric methods. Credit given only for one of MATH 425, MATH 476, MATH 525 or MATH 563. (3-0-3) (C)

Enrollment: Elective for AM and other majors.

Textbook(s): Dennis D. Wackerly, William Mendenhall III and Richard L. Scheaffer, *Mathematical Statistics with Applications*, 7th Ed., Brooks/Cole, 2008.

Other required material:

Prerequisites: MATH 475 Probability or MATH 474 Probability and Statistics for Engineers

Objectives:

1. Students will learn the concept of statistical inference and the difference between population characteristics and sample estimates.
2. Students will learn the probabilistic basis for statistical inference and the qualities of a good estimator.
3. Students will learn how to correctly perform hypothesis tests and construct confidence intervals.
4. Students will learn how to use statistical software to facilitate the calculations involved.
5. Students will learn how to communicate the statistical analyses of substantial data sets through explanatory text, tables and graphs.

Lecture schedule: 3 50 minutes (or 2 75 minutes) lectures per week

Course Outline: Hours

1. Introduction 3
    a. What is statistical inference and why do we need it?
    b. Review of sampling distributions and the Central Limit Theorem
2. Estimates 10
    a. Bias of estimates
    b. Confidence intervals
    c. Relative efficiency, consistency and sufficiency
    d. Minimum variance unbiased estimation
    e. Moment Estimators
    f. Maximum Likelihood Estimates
3. Hypothesis testing 16
    a. Common tests for means and variances
    b. Relationship between hypothesis tests and confidence intervals
    c. Power of tests
    d. Likelihood ratio tests
    e. Comparison of more than two means

f. Analysis of categorical data

4. Linear Models and Least Squares 10
    a. Linear Model
    b. Method of Least Squares
    c. Inferences concerning regression coefficients
    d. Hypothesis testing and model selection
    e. Correlation
5. Nonparametric Statistics 6
    a. Matched pairs of experiments
    b. Comparison of two populations
    c. Comparison of more than two populations

Assessment:	Homework	10-30%
	Project	10-20%
	Quizzes/Tests	20-50%
	Final Exam	30-50%

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