Probability and Statistics-MTH 2401

Notice: This is a Tentative Syllabus and Subject to Change at the Instructor's Discretion during the Semester

Course Description

This course presents techniques and basic results of probability and

statistics at a rigorous level. It describes sampling techniques, measures of central tendency and dispersion, probabilistic models for and properties of random variables and vectors, common probability distributions, variance, expectation, correlation, covariance, confidence intervals, hypothesis testing, estimation theory, prediction for common parametric models, simple linear regression, an introduction to Bayesian analysis, and reliability.

Course Objectives

This course will provide students a solid background in the basic principles of probability/statistics and its applications. It builds on basic knowledge of probability to gain a deeper understanding of statistical reasoning. This course will focus on understanding statistical concepts and on interpreting and communicating the results of a statistical analysis. Emphasis will not be placed on memorizing formulas, but instead will be placed on applying probability and statistics to real world problems. The course will also introduce the use of R, an elegant and comprehensive statistical and graphical programming language.

Course Topics

Sample Spaces; Set Notation; Probability of an Event
Multiplication Rule; Permutation; Combination
Conditional Probability and the Independence of Events
The Law of Total Probability and Bayes' Rule
Numerical Events and Random Variables; Random Sampling
Discrete Random Variables and Their Probability Distributions
Continuous Random Variables and Their Probability Distributions
Multivariate Probability Distributions
Sampling Distributions and the Central Limit Theorem
Estimation
Hypothesis Testing
Linear Models and Estimation by Least Squares