**Probability and Statistics with Applications**

Department: MATH

Course Number: 3771

Hours - Lecture: 3

Hours - Lab: 0

Hours - Recitation: 0

Hours - Total Credit: 3

Typical Scheduling:

Every semester

Description:

Introduction to probability, probability distributions, point estimation, confidence intervals, hypothesis testing, linear regression and analysis of variance.

Prerequisites: MATH2401, MATH2411, MATH24X1, MATH2605, or School Approval

Course Text:   
At the level of *Probability & Statistics for Engineering and the Sciences*, 8th edition, Devore, Thomson Learning

Topic Outline:

* Probabilities of Events (4 lectures) Random experiments, events, sets, and probabilities; Probabilities for equally likely outcomes, elementary counting; Independent events; Conditional probability, Bayes theorem; Applications: failure identification, series/parallel networks, ...
* Random Variables and Their Distributions (9 lectures) Discrete random variables: Binomial, geometric, Poisson, multinomial; Continuous random variables: Exponential, normal, gamma, Weibull; Poisson process, waiting times; Applications: random partitioning of populations, shapes and volumes, measurement of errors, job completion times, ...
* Expected Values and Functions of Random Variables (8 lectures) Expectations and variances of standard random variables Expectations of functions of random variables; Chi-square as the square of a normal, sums of independent random variables and reproductive properties of standard distributions; Central limit theorem; Applications: sums of costs, traffic flows, system reliability, parallel processing times, ...
* Descriptive Statistics (2 lectures) Random samples: data collection and presentation Sample statistics: mean, median, quantiles
* Statistical Estimation (6 lectures) Point estimates and their properties Probability distributions for estimator, the t and F distributions; Confidence intervals; Applications: temperature sensing, computer reaction times, ...
* Hypothesis Testing (6 lectures) Single sample tests, means, variances; Comparison of two populations, means and variances; Applications: radar detection, fluid comparisons, ...
* Simple Linear Regression and Correlation (6 lectures) Fitting a regression line; Inferences on the regression; Predictions for future responses; Correlation; Applications: resource consumption, stress levels, ...