

STA 4032 – Probability and Statistics for Engineers
Common Course Syllabus

Catalog Data: 3 CREDITS, Basic concepts of probability; random variables; discrete and continuous probability distributions; functions of random variables; estimation theory; tests of hypotheses.

Goals: Student should be able to manipulate data, derive statistical distribution, and have the ability to translate to information. Have knowledge of statistics and be ready for subsequent classes such as experimental design and design for manufacturing.

Prerequisites:

1. Calculus II – MAC 2312 or Calculus for Engineers II - MAC 2254

Topics:

1. Treatment of data: Pareto Diagrams; Frequency distributions; Graphs; Descriptive measures; Software applications; Excel; SPSS; MATLAB. (4hrs)
2. Probability: Samples spaces and events; Axioms of probability; Theorems; Conditional Probability; Mathematical expectations and decision making. (15hrs)
3. Probability Distributions: Random variables; Binomial and hypergeometric distributions; Mean and variance; Chebyshev's theorem; Poisson distribution; Multinomial distribution. (5 hrs)
4. Probability Densities: Continuous random variables; Normal distribution; Uniform, Log-Normal, Gamma, Beta, Weibull distributions; Joint distributions - Discrete and continuous. (5 hrs)
5. Inference: Inference about Means; Inference about variances; Inference about Proportions; Bayesian estimation. (13 hrs)

Optional Topics:

1. Nonparametric Tests: Sign test; Rank-Sum test; Tests of randomness; Kolmogorov-Smirnov and Anderson-Darling tests.
2. Curve Fitting: Least Square; Inference based on the Least Squares estimators; Linear Regression and Multiple Regressions; Model Adequacy.
3. Analysis of Variance: Completely randomized Designs; Randomized Block Designs; Multiple Comparisons; Factorial Experimentation.

Course Outcomes: (numbers in parentheses indicate correlation of the outcome with the appropriate program outcomes 1-7)

1. The students will understand probability density and distribution functions. (1,2,6)
2. The students will understand central tendency and variability. (1,2,6)
3. The students will be able to perform hypothesis testing. (1,2,6)
4. The students will be able to carry out error analysis. (1,2,6)

Design Content:

This course has no formal design projects.