

ENGINEERING SCIENCES DEPARTMENT
ES 303 – STATISTICAL METHODS FOR ENGINEERS

Catalog Data : ES 303 Statistical Methods for Engineers. (3-0) 3.

Descriptive statistics, histograms, central tendency, dispersion and correlation measures. Basic probability concepts, random variables, probability density and mass functions. Hypothesis testing, confidence intervals. Law of large numbers and central limit theorem. Regression analysis. Applications in engineering.

Prerequisite : MATH 158 Basic Calculus II.

Textbook (s) : (suggested)

- Ang, A.H.S. and Tang, W.H., Probability Concepts in Engineering Planning and Design, Vol. 1- Basic Principles, John Wiley & Sons.
- Montgomery, D.C. and Runger, G.C., Applied Statistics and Probability for Engineers, John Wiley & Sons.
- Milton J.S. and Arnold, J.C., Introduction to Probability and Statistics, McGraw-Hill.

Objectives :

This course is mainly designed to give undergraduates in engineering relevance and practical significance of probability concepts in their fields through essential mathematical principles and applications.

Topics :

- 1) Introduction to probability and statistical concepts: Descriptive statistics: organisation and description of data, histograms, frequency and box diagrams. Measures of location and variability.
- 2) Basic probability concepts: possibilities and probability, axioms of probability, conditional probability, statistical independence, theorem of total probability and Bayes theorem.
- 3) Random variables and distributions: probability mass, density and cumulative distribution functions; descriptors of a random variable. Some useful distributions: uniform, binomial, Poisson, geometric, hypergeometric, normal, lognormal, and exponential.
- 4) Multivariate distributions: joint mass, density and cumulative distributions, marginal distributions. Independence, covariance, correlation, conditional mean and variance.
- 5) Functions of random variables, sum and difference of normal variates, mean and variance of a general function.
- 6) Statistical inferences: estimation of parameters , properties of estimators, method of maximum likelihood, interval estimation for the mean and variance , hypothesis testing for the mean and variance; testing validity of assumed distribution.
- 7) Introduction to regression and correlation analyses.

Activities : Exam # 1
Exam # 2
Final

Instructor : Prof. Dr. Hakan I. Tarman
Office Hours : By appointment
Room : MM 905
Phone : 210-2385