Title: Probability and Statistics for Engineers

Code Number: EE2202

Credit Hours: 3 (3+0)

Prerequisites: Nil

Semester: 4th

Course Objectives

The course will enable students to:

1. Apply foundational principles of statistics and data analysis techniques to analyze and interpret data effectively for engineering applications.
2. Use statistical regression and curve fitting techniques to interpret relationships between variables in engineering data, facilitating informed decision-making.
3. Develop fundamental probability concepts for analyzing both discrete and continuous variables uncertainties in engineering.

Contents

Unit 1: Basic Statistical Parameters and Data Representation

1. Importance of statistics, population, sample, variables, and measurement
2. Primary and secondary data,
3. Frequency distribution, stem, and leaf display.
4. Histogram, frequency polygon, cumulative frequency polygon,
5. Simple & Multiple Bar diagrams

Unit 2: Measure of Central Tendency and Dispersion

1. Measures of central tendency, AM, GM, HM
2. Quantiles, Mode, Applications of averages
3. Quartile and mean deviation, Variance, Standard deviation,
4. Moments, Moment ratios, Skewness, Kurtosis
5. Applications of Measure of dispersion in Engineering

Unit 3: Regression, Correlation and Curve Fitting

1. Regression theory, Simple linear regression line
2. Correlation, coefficient of correlation,
3. Fitting of a first- and second-degree curves
4. Principle of least squares.

Unit 4: Fundamental Concepts of Probability

1. Set Operation
2. Sample Space
3. Events and Probabilities
4. Probability Axioms
5. Conditional Probability
6. Independence
7. Bayes' Theorem

Unit 5: Discrete Random Variables

1. Probability Mass Function
2. Bernoulli, Geometric, Binomial and Poisson Random Variable
3. Variance and Standard Deviation
4. Conditional Probability Mass Function

Unit 6: Continuous Random Variables

1. CDF of Continuous Random Variables
2. Probability density function.
3. Expected Value
4. Uniform, Gaussian, Standard Normal Random Variables
5. Probability Models
6. Error Functions and Q-Functions
7. Finding probabilities of a normally distributed random variable by using Standard Normal Curve.

Assignments/Types and Number with calendar:

A minimum of four assignments to be submitted before the written exams for each term.

Assessment and Examinations:

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Sessional Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Recommended Books:

1. Probability, Statistics and Random Processes for Electrical Engineering by Alberto Leon Garcia, 3rd Edition
2. Probability and Stochastic Processes - A friendly introduction for Electrical and Computer Engineers by Roy D. Yates & David J. Goodman, John Wiley and Sons Inc., 2005, Ed: 3rd
3. Probability, Random variables and Stochastic Processes by Papoulis and Pillai, Ed: 4th
4. Statistical Methods and Estimations by M. Anwar Solangi
5. Applied Statistics and Probability for Engineering by Douglas C. Montgomery 6. A First Course in Probability by Sheldon Ross 9th Edition, Prentice Hall