Probability and Statistics for Engineers

Code	Credit Hours
EE-326	3-0

Course Description

This course covers probability theory and various descriptive statistical techniques for collecting analyzing and interpreting data. The course also covers inferential statistics that includes sampling, estimation of parameters and testing of hypothesis.

Text Book:

- Advanced Engineering Mathematics (9th Edition) by Ervin Kreyszig.
- Probability and Statistics for Engineers & Scientists, Seventh Edition by Walpole Myers.
- Introduction to Statistical Theory (Part I & II), Seventh Edition by Prof Sher Muhammad Chaudhry& Dr. Shahid Kamal.

Reference Book:

- Probability and Random Processes for Electrical Engineers, 2nd Edition, by L. Garcia
- Probability and Statistics by Murray R. Spiegel.
- Probability and Statistics for Engineers, Sixth Edition by Richard A. Johnson Calculus (6th Edition) by Swokowski, Olinick and Penc

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	5-10%
Assignments	10-15%
Mid Semester Exam	25-35%
ESE	40-50%

Teaching Plan

Week No	Topics	Learning Outcomes
1	Set theory, Axioms of Probability	Introduction to Probability, Random Experiments and Sample Space, Set theory, Axioms of Probability, Discrete and Continuous Sample Space

2	Bayes Theorem	Conditional Probability, Bayes Theorem, Independence, Sampling with and without replacement
3	Permutations and Combinations	Permutation, Combination, Binomial Probability Law, Geometric Probability Law, Dependent Sequential Experiments
4-5	Distributions	Introduction to Random Variables, Cumulative Distribution Function, Probability Density Function, Probability Mass Function
6-7	Gaussian Random Variable, Mean and Variance	Important Discrete and Continuous Random Variables, Gaussian Random Variable, Mean and Variance, Function of Random Variable
8	**MID TERM EXAM**	
9-10	Joint CDF, Joint PDF, Correlation, Covariance	Multiple Random Variables, Joint CDF, Joint PDF, Independence of Random Variables, Correlation, Covariance, Central Limit Theorem
11	Stem-and-Leaf Plot, Histogram, Boxplot	Statistics, Random Sampling, Data Representation
12-13	Maximum Likelihood Estimation (MLE)	Point Estimation, Maximum Likelihood Estimation, Interval Estimation, Confidence Intervals
14-15	Testing and Hypothesis	Testing and Hypothesis, Goodness of Fit, Chi-square test
16-17	Linear Regression	Errors in Decision Theory, Introduction to Linear Regression
18	**End Semester Exam**	