Department of Computer Systems Engineering
University of Engineering and Technology, Peshawar

CSE-209 - Probability Methods in Engineering

General Information

Instructor	Dr. Safdar Nawaz Khan Marwat
Credit hours	3 Units
Course delivery	Lecture: 3 hours/wk
Prerequisite(s)	NIL
Semester	4th Semester, Spring 2021
Lecture hours	Sec A: Mon, 09:30-11:00 (CR 5) & Tue, 12:30-02:00 (CR 5) Sec B: Mon, 08:00-09:30 (CR 5) & Tue, 09:30-11:00 (CR 5) Sec C: Mon, 12:30-02:00 (CR 5) & Tue, 11:00-12:30 (CR 5)
Online resources	Google Classroom, Google Groups, Google Team, Google Drive
Contact	safdar@uetpeshawar.edu.pk, DCSE FYP Lab

Statement

This course is designed to develop concepts of probability, random variables and random processes.

CSE 209: Probability Methods in Engineering

Credit Hours: 3

Contact Hours: 3

Grading: As per UET rules

1. COURSE OUTLINE:

Probability Methods in Engineering (PME) course provides an introduction to Probability theory and underlying concepts. Axioms of probability and counting methods are taught with illustrations. Probability concepts like conditional probability, total probability, Bayes' rule etc. are covered with examples of practical importance.

The main focus of this course is the notion of Random Variables and its relevance in state-of-the-art research. Related concepts like expected value, standard deviation, functions, transforms and entropy of Random Variables are also part of this course. Students are also trained to generate Random Variable based values using software tools.

2. Weekly Plan

Week	Contents
Week 1	Introduction to Mathematical Models Deterministic Models Probabilistic Models
Week 2	Basic Concepts of Probability Axioms of Probability
Week 3	Computing Probabilities using Counting Methods Conditional Probability
Week 4	Law on Total Probability Bayes' Rule
Week 5	Independence of Events Sequential Experiments
Week 6	Binomial Probability Law Geometric Probability Law
Week 7	Sequences of Dependent Experiments Random Variables Notation of a Random Variable
Week 8	Types of Random Variable Probability Mass Function
Midterm Examination	
Week 9	Discrete Random Variable
Week 10	Expected Value Variance

	Standard Deviation
Week 11	Functions of a Random Variable Expected Value of Function of Random Variables
Week 12	Entropy Continuous Random Variables
Week 13	CDF PDF Memoryless Property
Week 14	Multiple Random Variables Joint CDF and PDF Conditional CDF and PDF CCDF
Week 15	Software tools for Generation of Pseudo Random Values
Week 16	Course Revision
Final Term Examination	

3. CLOs and its Mapping with PLOs

CLO #	CLO	Cognitive Domain	PLOs
CLO-1	Use essential concepts of probability and apply analytical methods for solving engineering problems.	C3 (Application)	PLO1 (Engineering Knowledge)
CLO-2	Use the concepts of random variables and solve mathematical problems related to stochastic systems.	C3 (Application)	PLO3 (Design)
CLO-3	Apply mathematical skills and demonstrate the use of software tools for implementation of probabilistic models.	C3 (Application)	PLO5 (Modern Tool Usage)

4. CLOs Assessment Mechanism

Assessment Tools	CLO1	CLO2	CLO3
Assignments	✔	✔	✔
Quizzes			
Mid Term	✔		
Final Term		✔	✔
Semester Project			

5. Resources

- TEXT BOOK
  1. Alberto Leon-Garcia, “Probability and Random Processes for Electrical Engineering”, 3rd Edition, Pearson Prentice Hall, 2008
- REFERENCE BOOKS
  1. Dimitri Bertsekas and John N. Tsitsiklis, “Introduction to Probability”, 2nd Edition, Athena Scientific, 2008
  2. Hossein Pishro-Nik, “Introduction to Probability, Statistics, and Random Processes”, Kappa Research, 2014