



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

**CSE-209 - Probability Methods in Engineering**

**General Information**

<b>Instructor</b>	Dr. Safdar Nawaz Khan Marwat
<b>Credit Hours</b>	3 Units
<b>Course Delivery</b>	Lecture: 3 hours/wk
<b>Prerequisite(s)</b>	NIL
<b>Semester</b>	4 <sup>th</sup> Semester, Spring 2020
<b>Lecture Hours</b>	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)
<b>Yahoo Group</b>	2020_PME_spring@googlegroups.com
<b>Contact</b>	safdar@uetpeshawar.edu.pk, DCSE FYP Lab

**Statement**

To develop basic concepts of probability, random variables, random processes, analysis and processing of random signals

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## CSE 209: Probability Methods in Engineering

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**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 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 like MATLAB.

### 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
<b>Midterm Examination</b>	
Week 9	Discrete Random Variable
Week 10	Expected Value Variance

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

### 3. CLOs and its Mapping with PLOs

<b>CLO #</b>	<b>CLO</b>	<b>Cognitive Domain</b>	<b>PLOs</b>
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