King Abdullah II School of Engineering
كليـــــة الملك عبد الله الثاني للهندســـة

COURSE OUTLINE

Course Code	20336		
Course Title	Principle of Probability		
Course Prerequisite(s)	20133 Calculus 2 and 20233 Statistical Methods		
Credit Hours	3		
Course Type	Lecture		
Course Delivery Method	Blended		
Required or Elective	Mandatory for computer science program.		
Semester	First semester 2022/2023		
Instructor Name	Dr. Maisa Khader		
Instructor's email	m.khader@psut.edu.jo		
Instructor's Office Number	Department of Basics Science		
Course Schedule	Section 1: 9:00 - 10:30 (Mon) Synchronous, (Wed) Asynchronous		
Office Hours	11:00 - 12:00 (Sun, Tue, Thu) 10:30-11:30 (Mon, Wed)		
Assessment Tools & Grading Policy	Assessment Tool	Weight	Additional Information
	First Exam	25%	
	Second Exam	25%	
	Midterm Exam	N/A	
	Final Exam	40%	
	Homework	N/A	
	Quiz(zes)	10%	No. 5
	Project(s)	N/A	
	Other		
Catalog Description	Distributions of Random Variables, Conditional Probability and Stochastic Independence, Some Special Distributions (Discrete and Continuous Distributions), Univariate, Bivariate and Multivariate Distributions, Distributions of Functions of Random Variables (Distribution Function Method, Moment Generating Function Method, and Transformation Methods), Limiting Distributions.		
General Course Objectives	To teach the concepts of probability, random variables both discrete and continuous, and random processes.		
Textbook and Related Course Materials	1. Fundamentals of Applied Probability and Random Processes, 2014, Oliver C.Ibe, 2nd ed. 2. Statistics for Engineers and Scientists, Navidi, 4th ed. 3. PSUT e-learning: https://elearning.psut.edu.jo/login/index.php		
Topics Covered and Level of Coverage	Basic probability concepts: sample space and events definitions of probability, elementary set theory, properties of probability		Week 1
	Conditional probability, independent of events		Week 2
	Random variables: definition of random variable, events defined by random variables, distribution functions, discrete random variables, continuous random variables		Week 3
	Moments of random variable: expection, expectation of nonnegative random variables, moments of random variables and the variance		Week 4
	Conditional expectations, the Markov inequality, the Chebyshev inequality		Week 5
	Special probability distributions: the Bernoulli trial and Bernoulli distribution, Binomial distribution, Geometric distribution, Poisson distribution		Week 6
	Exponential distribution, Uniform distribution, Normal distribution		Week 7
	Multiple random variables: Joint CDFs of bivariate random variables		Week 8
	Discrete bivariate random variables, continuous bivariate random variables		Week 9
	Determining probabilities from a joint CDF, conditional distributions		Week 10

	Functions of random variables: functions of one random variable, expectation of a function of one random variable			Week 11
	Sums of independent random variables			Week 12
	Transforms: moment-generating function, the s-transform			Week 13
	The z-transform			Week 14
Expected Level of Proficiency for Students Entering the Course	Mathematics	Good		
	Physics	N/A		
	Technical writing	N/A		
	Computer programming	N/A		
Materials Available to Instructor, Students & Department at End of Course		Students	Department	Instructor
	Course Outline	✓	✓	✓
	Lecture Notes	✓	✓	✓
	Samples of Students' Work		✓	✓
	Course Assessment by Students (CAS)			
	Course Assessment by Faculty (CAF)			

No	Course Learning Outcomes (CLOs)	Student Outcomes (SOs)
1	Recognize the basic probability concepts and conditional probability, and use probability rules in real life problems.	1
2	Identify discrete random variables and compute their pmfs, CDFs, means and variances, and apply them to solve various types of problems.	1
3	Identify continuous random variables and compute their pdfs, CDFs, means and variances, and apply them to solve various types of problems.	1
4	Identify multivariate random variables and use their pdf (or pmf), CDF, mean, and variance to solve different types of problems including conditional case.	1
5	Compute s-transform for continuous random variables and z-transform for discrete random variables and apply them to solve several problems.	1
6	Explain the concept of random processes, and solve different problems.	1

ABET – Student Outcomes (1-7)

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

3. An ability to communicate effectively with a range of audiences.

4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

V2.0 - 25/11/2021

Blended Course - Weekly Topics Distribution Plan

Weeks	Topics	Days	Delivery Mode
Week1	Basic Probability Concepts	Review of Calculus 1.2 Sample Space and Events 1.3 Definitions of Probability 1.4 Elementary Set Theory 1.5 Properties of Probability	11/10/2021 Synchronous 13/10/2021 Asynchronous
Week 2		1.6 Conditional Probability 1.7 Independent Events	18/10/2021 Synchronous 20/10/2021 Asynchronous
Week 3	Random Variables	2.2 Definition of Random Variable 2.3 Events Defined by Random Variables 2.4 Distribution Functions 2.5 Discrete Random Variables 2.6 Continuous Random Variables	25/10/2021 Synchronous 27/10/2021 Asynchronous
Week 4	Moments of Random Variables	3.2 Exception 3.3 Expectation of Nonnegative Random Variables 3.4 Moments of Random Variables and the Variance	1/11/2021 Synchronous 3/11/2021 Asynchronous
Week 5		3.5 Conditional Expectations 3.6 The Markov Inequality 3.7 The Chebyshev Inequality	8/11/2021 Synchronous 10/11/2021 Asynchronous
Week 6	Special Probability Distribution	4.2 The Bernoulli Trial and Bernoulli Distribution 4.3 Binomial Distribution 4.4 Geometric Distribution 4.7 Poisson Distribution	15/11/2021 Synchronous 17/11/2021 Asynchronous
Week 7		4.8 Exponential Distribution 4.10 Uniform Distribution 4.11 Normal Distribution	22/11/2021 Synchronous 24/11/2021 Asynchronous
Week 8	Multiple Random Variables	5.2 Joint CDFs of Bivariate Random Variables	29/11/2021 Synchronous 1/12/2021 Asynchronous
Week 9		5.3 Discrete Bivariate Random Variables 5.4 Continuous Bivariate Random Variables	6/12/2021 Synchronous 8/12/2021 Asynchronous
Week10		5.5 Determining Probabilities from a Joint CDF 5.6 Conditional Distributions	13/12/2021 Synchronous 15/12/2021 Asynchronous
Week11	Functions of Random Variables	6.2 Functions of One Random Variable 6.3 Expectation of a Function of One Random Variable	20/12/2021 Synchronous 22/12/2021 Asynchronous
Week 12		6.4 Sums of Independent Random Variables	27/12/2022 Synchronous 29/12/2022 Asynchronous
Week 13	Transform Methods	7.2 Moment-Generating Function 7.3 The s-Transform	3/1/2022 Synchronous 5/1/2022 Asynchronous
Week 14		7.4 The z- Transform	10/1/2022 Synchronous 12/1/2022 Asynchronous