V2.0 - 25/11/2021

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 and 20233		
Credit Hours	3		
Course Type	Lecture		
Course Delivery Method	Blended		
Required or Elective	Mandatory for the computer science program.		
Semester	Second semester 2022/2023		
Instructor Name	Dr. Maisa Khader		
Instructor's email	m.khader@psut.edu.jo		
Instructor's Office Number	Basic Sciences Department.		
Course Schedule	12:30 - 2:00 (Wed) Synchronous, (Mon) Asynchronous		
Office Hours	Sun., Tue., Thu.: 11:00 – 12:00 Mon., Wed.: 10:00 – 11:00		
Assessment Tools & Grading Policy	Assessment Tool	Weight	Additional Information
	First Exam	25%	
	Second Exam	25%	
	Midterm Exam	N/A	
	Final Exam	40%	
	Homesrk	N/A	
	Quiz(es)	10%	Minimum of 3
	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: http://psut.jo/elearning/course		
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 Events		Week 2
	Random variables: Definition of Random Variable, Events Defined by Random Variables, Distribution Functions, Discrete Random Variables, Continous Random Variables		Week 3
	Moments of Random Variable: Expection, Expectatio 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.

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Blended Course - Weekly Topics Distribution Plan

Weeks	Topics	Days	Delivary 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	20/2/2023 Asynchronous 22/2/2023 Synchronous
Week 2		1.6 Conditional Probability 1.7 Independent Events	27/2/2023 Asynchronous 1/3/2023 Synchronous
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 Continous Random Variables	6/3/2023 Asynchronous 8/3/2023 Synchronous
Week 4	Moments of Random Variables	3.2 Expection 3.3 Expectations of Nonnegative Random Variables 3.4 Moments of Random Variables and the Variance	13/3/2023 Asynchronous 15/3/2023 Synchronous
Week 5		3.5 Conditional Expectations 3.6 The Markov Inequality 3.7 The Chebyshev Inequality	20/3/2023 Asynchronous 22/3/2023 Synchronous
Week 6	First Exams Period Special Probability Distribution	4.2 The Bernoulli Trial and Bernoulli Distribution 4.3 Binomial Distribution 4.4 Geometric Distribution 4.7 Poisson Distribution	27/3/2023 Asynchronous 29/3/2023 Synchronous
Week 7		4.8 Exponential Distribution 4.10 Uniform Distribution 4.11 Normal Distribution	3/4/2023 Asynchronous 5/4/2023 Synchronous
Week 8	Multiple Random Variables	5.2 Joint CDFs of Bivariate Random Variables	10/4/2023 Asynchronous 12/4/2023 Synchronous
Week 9		5.3 Discrete Bivariate Random Variables 5.4 Continuous Bivariate Random Variables	17/4/2023 Asynchronous 19/4/2023 Synchronous
Week10		5.5 Determining Probabilities from a Joint CDF 5.6 Conditional Distributions	24/4/2023 Asynchronous 26/4/2023 Synchronous
Week11	Functions of Random Variables	6.2 Functions of One Random Variable 6.3 Expectation of a Function of One Random Variable	1/5/2023 Asynchronous 3/5/2023 Synchronous
Week 12	Second Exams Period	6.4 Sums of Independent Random Variables	8/5/2023 Asynchronous 10/5/2023 Synchronous
Week 13	Transform Methods	7.2 Moment-Generating Function 7.3 The s-Transform	15/5/2023 Asynchronous 17/5/2023 Synchronous
Week 14		7.4 The z- Transform	22/5/2023 Asynchronous 24/5/2023 Synchronous
			29/5/2023 Asynchronous 31/5/2023 Synchronous
			5/6/2023 Asynchronous 7/6/2023 Synchronous