Jordan University of Science and Technology

Faculty of Computer & Information Technology

Network Engineering And Security Department

NES301 Probability And Queuing Theory
First Semester 2020-2021

Course Catalog
3 Credit Hours. Probability principles and sets theory, random variables, operations on random variables, various distribution functions, introduction to random processes, weak stationary, correlation functions, linear processing, and estimation, Poisson processes and Markov chains, queuing analysis.

Text Book	
Title	Probability, Random Variables, and Random Signal Principles
Author(s)	Peyton Z. Peebles
Edition	4th Edition
Short Name	Ref#1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#2	Introduction to Probability	Dimitri P. Bertsekas and John N. Tsitsiklis	2nd Edition	

Instructor	
Name	**Mrs. Rana Alkarem**
Office Location	CH1-L0
Office Hours	Sun : 11:30 - 13:00 Mon : 10:00 - 11:30 Tue : 11:30 - 13:00 Wed : 10:00 - 11:30
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Instructor	
Name	**Dr. Omar Banimelhem**
Office Location	C5L2
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Instructor	
Name	**Dr. Ahmad Al-Hammouri**
Office Location	N2 L0
Office Hours	Sun : 11:30 - 13:00 Mon : 10:00 - 12:00 Tue : 11:30 - 13:00 Wed : 10:00 - 11:00
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Class Schedule & Room

Section 2:
Lecture Time: Sun, Tue : 10:00 - 11:30
Room: منصة الكترونية

Section 4:
Lecture Time: Sun, Tue : 13:00 - 14:30
Room: منصة الكترونية

Section 5:
Lecture Time: Mon, Wed : 08:30 - 10:00
Room: منصة الكترونية

Prerequisites

Line Number	Course Name	Prerequisite Type
902411	MATH241 Discrete Mathematics	Prerequisite / Study

Tentative List of Topics Covered

Weeks	Topic	References
Weeks 1, 2	Review of set definitions and set operations	**chapters 1.1,1.2** From **Ref#1**
Weeks 2, 3	Probability introduced through set theory and relative frequency	**chapter 1.3** From **Ref#1**

Weeks 3, 4	Joint and conditional probability, independent events, combined experiments, and Bernoulli trials	**chapters 1.4-1.7** From **Ref#1**
Week 5	The random variable concept, the density function, and the distribution function	**chapters 2.1-2.3** From **Ref#1**
Weeks 6, 7	The Gaussian, the Binomial, the Poisson, the Uniform, and the Exponential random variables	**chapters 2.4,2.5** From **Ref#1**
Week 7	Conditional density and distribution functions	**chapter 2.6** From **Ref#1**
Weeks 8, 9	Expectation and moments of one random variable	**chapters 3.1,3.2** From **Ref#1**
Week 9	Transformation of a random variable of one random variable	**chapters 3.4,3.5** From **Ref#1**
Weeks 10, 11	Joint distribution and its properties, and joint density and its properties	**chapters 4.1-4.3** From **Ref#1**
Week 12	Statistical independence and distribution and density of a sum of random variables	**chapters 4.5-4.6** From **Ref#1**
Week 12	Expected value of a function of multiple random variables, and joint moments, correlation and covariance of random variables	**chapter 5.1** From **Ref#1**
Week 13	Continuous ?time Markov chains, Birth-death process and steady-state behavior	
Week 14	Queuing systems, single-server queuing systems, steady-state analysis, Little?s formula, and performance metric calculations	

Mapping of Course Outcomes to Program Student Outcomes	**Course Outcome Weight (Out of 100%)**	**Assessment method**
Compute the probability of a given event based on set theory, density function, or distribution function [1SO1]	32%	Midterm Exam, Quizzes, Final Exam
Compute the conditional probability of a given event [1SO1]	25%	Midterm Exam, Quizzes, Final Exam
Compute the expectation of a random variable, and the expectation of a function of a random variable(s) [1SO1]	9%	Quizzes, Final Exam
Compute the probability density function, and the distribution function of random variable(s) [1SO1]	11%	Quizzes, Final Exam
Compute various performance measures, e.g., server utilization, average number of customers in the system, and average waiting time for queueing models, mainly the M/M/1 model [1SO1]	11%	Final Exam

Compute various metrics, e.g., average dwelling time, probability of transition, average transition rate, and steady-state probability of being in a given state, for a continuous-time Markov chain (CTMC) [1SO1]	12%	Final Exam

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
100						

Evaluation	
Assessment Tool	**Weight**
Midterm Exam	30%
Quizzes	20%
Final Exam	50%

Policy	
Exams	1. May include: Multiple-Choice, Analysis and Descriptive formats. 2. Use only your own tools: calculator, pens and ruler 3. Instructions on the first page of the exam are quite important. 4. Not abiding by the rules is a reason for dismissal from the exam.
Makeups	Makeup exam should not be given unless there is a valid excuse.
Drop Date	Last day to drop the course is before the 12thweek of the current semester.
Cheating	Standard JUST policy will be applied.
Attendance	1. Excellent attendance is expected. 2. According to the JUST policy, a student will receive the grade of ZERO (35%) "failed for absence" if he misses more than 20% of the classes. 3. Attendance will be taken by calling the names or passing a sign-up sheet. 4. If you miss a class, it is your responsibility to find out about any announcements or assignments you may have missed.
Workload	Average workload student should expect to spend is 6 hours/week.
Graded Exams	Graded exam papers will be returned within a week.
Participation	1. Participation in the class will positively affect your performance. 2. Disruption and side talks will possibly result in dismissal from class. 3. No eating or chewing gums are allowed in class.

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