

1	Course title	Probability Theory
2	Course number	0301932
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	None
5	Program title	Ph.D.
6	Program code	
7	Awarding institution	The University of Jordan
8	School	Science
9	Department	Mathematics
10	Level of course	Obligatory
11	Year of study and semester (s)	Third year
12	Final Qualification	Ph.D. degree
13	Other department (s) involved in teaching the course	None
14	Language of Instruction	English
15	Date of production/revision	

16. Course Coordinator:

Dr. Mohammad Z. Al-Raqab
Department of Mathematics
Email: mraqab@ju.edu.jo

17. Other instructors:

Dr. Ahmad Al-Zghoul
Department of Mathematics
Email: a.zghoul@ju.edu.jo

18. Course Description:

This course introduces rigorous theory of probability various concepts in probability theory, including conditioning properties, conditional probability measures, interchangeable random variables, independence, central limit theorem, martingales and related inequalities, infinite divisible laws, Markov chains, birth and death processes, renewal theorem, Brownian motion.

19. Course aims and outcomes:**A- Aims:**

The main aim of this course is to expose students to a variety of probability theorems and rules that can be used to deal with some stochastic processes problems.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to

1. Give a count of the foundations of probability theory from a measure-theoretic perspective;
2. Describe theory for conditional probability and expectation from a measure-theoretic perspective;
3. Enable to characterize probability distributions using the characteristic functions;
4. Define and relate different types of central limit theorems in obtaining the asymptotic normal distribution for large sample size under different conditions;
5. Appreciate the use of high level procedures in stochastic processes in the fields of engineering, biology and medical studies.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Conditioning Arguments Conditional properties, conditional expectations, conditional independence, conditional probability measures, interchangeable random variables	1-3		1+2		
Martingales Basic properties of martingale, inequalities, applications, convex functions of inequalities for martingales, stochastic inequalities.	4-5		1+2		
Distribution and characteristic functions Uniqueness and inversion, convergence theorems, representation theorems	6-7		3		
Central Limit Theorem Independence components, miscellaneous central limit theorems, Liapounov and Lindeberg-Feller theorems.	8-9		3+4		
Infinitely Divisible Laws Infinitely divisible characterizing function, infinitely divisible laws, stable laws.	10-11		3+5		

Stochastic Processes Renewal theorem, applications of the renewal theorem, Brownian motion, Brownian paths.	12-15		1+2+5		
---	-------	--	-------	--	--

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.

- Lectures and discussion through the class time
- Encourage the team work by discussion of some real life data
- Various sets of homework will be assigned on different period of times.
- The solutions of the homework sets and the exams will be solved in the class to allow students to learn and figure out their mistakes.

22. Evaluation Methods and Course Requirements:

ILO/s	Learning Methods	Evaluation Methods	Related ILO/s to the program
	Lectures	Exams	
	Home works	Assignments	
	Discussions		

23. Course Policies:

1. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
3. Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.
4. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
5. Solutions for the exams questions and marks will be announced to the students.
6. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on home-works

24. Required equipment: (Facilities, Tools, Labs, Training....)

