1	**Course title**	Stochastic Processes
2	**Course number**	0301935
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 aims to introduce Ph.D. students to Markov chains and their applications in both discrete and continuous time, including classification of states, recurrence, limiting probabilities. Queuing theory, Poisson process and renewal theory, Semi-Markov processes.

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. Explain the fundamental concepts of stochastic processes in continuous time and their role in modern applied statistical contexts;
2. Demonstrate mathematical reasoning through explaining concepts from stochastic analysis;
3. Provide logical and coherent proofs of important theoretic results;
4. Apply problem-solving techniques using stochastic analysis methods in various situations;
5. Learn how real phenomena are modelled with stochastic processes.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Markov Chains Transition probability matrices of a Markov chains, recurrence, basic limits theorem of Markov chains and applications, queueing examples.	1-4		1+2		
Renewal Processes Definition and related concepts, renewal theorem, applications, characterization.	5-7		1+2		
Brownian Motion Joint probabilities, continuous of paths, variations and extensions.	8-10		3+4		
Branching Processes Discrete time branching processes, extinction probabilities, examples, two-way branching processes.	11-13		4+5		
Stationary Processes Definitions, prediction of covariance stationary processes, ergodic theory and stationary processes.	14-15		4+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….)

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25. References:

1- Ross Sheldon (1996). *Stochastic Processes*, 2nd Edition, Wiley, New York.
2- A First Course in Stochastic Processes, 1975, 2nd Ed. by S. Karlin and H. M. Taylor, Academic Press, New York.

26. Additional information:

Name of Course Coordinator: Dr. M. Al-Raqab   Signature: ----------------- Date: -----------

Head of curiculum committee/Department: Dr. M. Al-Raqab Signature: -------------------------------

Head of Department: M. Al-Raqab   Signature: -------------------------------

Head of curiculum committee/Faculty: Dr. A. Al-Zghoul   Signature: -------------------------------

Dean: ---   Signature: -------------------------------