

**Operations Research III: Stochastic Models**

This course presents an introduction to modeling and analysis of random processes. In the first part of the course, following a review of conditional probability and expectation, some decision making procedures under uncertainty are discussed. Then the optimization methods the probabilistic dynamic programming and the Markov decision processes (MDP) are reviewed. In order to understand the MDP, first Markov chains are introduced. In the second part of the course, first Poisson processes and Markov processes are presented. Next probabilistic queueing systems and reliability models are modeled based on Markov processes. Finally probabilistic inventory problems are presented.

Week	Topic	Resource
1	Conditional Probability and Expectation & Markov Chains	
2	Decision Making under Uncertainty	Taha Ch. 14
3	Probabilistic Dynamic Programming	Taha Ch. 15
4	Probabilistic Dynamic Programming	
5	Markov Chains	Ross Ch. 4
6	Markov Decision Processes – Policy Iteration	Taha Ch. 19
7	Markov Decision Processes – LP Formulation	
8	Poisson Process	Ross Ch. 5
9	Queueing Theory	Ross Ch. 8
10	Queueing Theory – Decision Models	Taha Ch. 17
11	Reliability Theory	Ross Ch. 9
12	Stochastic Inventory Theory – Newsboy Models	Nahmias Ch. 5
13	Stochastic Inventory Theory – Continuous Review Models	Taha Ch. 16

Monday 9:00-10:00, Tuesday 15:00-17:00, Thursday 15:00-17:00

All courses to be held in M2230

**Course Prerequisites:**

IE 255 or MATH 343 or equivalent

**References:**

1. S. M. Ross (2003), *Introduction to Probability Models*. 8<sup>th</sup> Edition. Academic Press
2. H.A. Taha (2003), *Operations Research*. 7<sup>th</sup> Edition. Pearson Education.
3. S. Nahmias (1997), *Production and Operations Analysis*. 3<sup>rd</sup> Edition Mc Graw Hill.

**Course Website:** <http://karagoz.ie.boun.edu.tr/moodle/> (Enrolment Key. Random-Call)

**Grading:**

Midterm: 35 %, Quiz: 25 %, Final: 40%

**Instructor:**

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