

IE 334 Operations Research III – Stochastic Problems (3 2 4) Spring 2018



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Course Description:

Introduction; review of basic concepts of probability and properties of random variables; basics of decision making under uncertainty; discrete-time Markov chains; exponential distribution and Poisson process; queuing theory; probabilistic inventory models, probabilistic dynamic programming.

Course Objectives:

The main aim of this course is:

- To extend the understanding of the methodology of Operations Research
- To create awareness of stochastic nature of real-life problems
- To develop further skills in building probability models for real life decision making problems
- To provide methods and techniques in solving stochastic problems

Learning Outcomes:

On successful completion of this course, all students will have:

1. Knowledge and understanding of uncertainties and their effects on decision making, and stochastic process
2. Ability in constructing basic stochastic models
3. Skills in analyzing and solving stochastic models
4. Skills in estimating and interpreting future values of stochastic components.

On successful completion of this course, all students will be

5. Aware of ethical issues

Prerequisites: IE 227, IE 232

Class meeting hours:

	LECTURES	RECITATION
Sec.01	Wed. 09:20-11:10 (LA14), Thu. 13:20-14:10 (LA14)	Fri. 09:20-11:10 (LA14)
Sec.02	Wed. 13:20-15:10 (LA14), Thu. 14:20-15:10 (LA14)	Fri. 11:20-13:10 (LA14)

Office hours: to be announced later

Textbook: Winston Wayne L., *Operations Research Applications and Algorithms*, Thomson Learning, 4th ed., 2004,

Supplementary course material:

Hillier, F.S. and G.J. Lieberman, *Introduction to Operations Research*, McGraw-Hill, 5th ed., 1990,

Taha, H.A., *Operations Research*, Prentice Hall, 7th ed., 2003.

Sheldon M. Ross, *Introduction to Probability Models*, Elsevier, 10th ed., 2010

Handouts and internet material uploaded to the course website.

Tentative Course Schedule:

Week	Dates	Topic(s)
1	(Feb 12-16)	Review of Probability, Random Variables, Sample Space, Conditional Probability, Distributions and Expectation
2	(Feb 19-23)	Basic Principles of Decision Making Under Uncertainty, Decision Criteria
3	(Feb 26-Mar 2)	Utility Theory, Decision Trees
4	(Mar 5-9)	Markov Chains: <i>n-Step Transition Probabilities, Classification of States</i>
5	(Mar 12-16)	Markov Chains: <i>Mean First Passage Times, Steady State Probabilities</i>
6	(Mar 19-23)	Markov Chains: <i>Absorbing Chains, Applications of Markov Chains</i>
7	(Mar 26-30)	Properties of Exponential Distribution, Counting Process, Poisson Process
8	(Apr 2-6)	Queuing Models: <i>Terminology, Arrival and Service Processes, Birth-and Death Processes</i>
9	(Apr 9-13)	Queuing Models: <i>M/M/1, M/M/s queues</i>
10	(Apr 16-20)	Queuing Models: <i>M/G/∞, GI/G/∞, M/G/1 queues, Finite Source Models</i>
11	(Apr 23-27)	Probabilistic Inventory Models: <i>The Newsvendor Problem</i>
12	(Apr 30-May 4)	Probabilistic Inventory Models: <i>The EOQ with uncertain Demand ((r,q) and (s, S) models)</i>
13	(May 8-11)	Probabilistic Inventory Models: <i>Service Level Measures</i>
14	(May 14-17)	Review

Make-Ups:

Make-up exam will be given based on Çankaya University Regulations for unanticipated absences and with valid excuse ONLY (e.g., illness with a doctor's report). If a student misses midterm exam and/or final exam with a valid excuse, then she/he will get one make-up exam for each.

Attendance requirements:

An attendance sheet will be distributed every hour (class and recitation hours included). Signing the attendance sheet every hour is your responsibility. It is best if you fully attend every hour. If you miss even a single hour, you may find it hard to understand the course material since the topics are interrelated.

Grading:

Homework (3)	30%
Midterm	30%
Final Exam	40%

Grading Policy:

Grading will be based on homework, midterm and final exams. There will be three homework (each 10%, total 30%), a midterm exam (30%), and a final exam (40%). All exams will be closed book and closed notes. Letter grades will be mainly based on the catalogue grading system described in Çankaya University regulations. When grading, I will also pay attention to whether you: took midterm exam (and surely the final exam if you are eligible to take

it based on regulations of the university), attended classes regularly and were actively involved in the class discussions.

Conditions leading to the letter grade NA:

Any of the following will lead to letter grade NA.

_ If you fail to take the midterm exam (or its makeup), you will NOT be able to take the final exam and you will receive the letter grade NA.

_ If you are eligible to take the final exam but fail to take it (or its makeup), you will receive the letter grade NA.

Web page:

Every student is responsible to check the web site of the course, at webonline.cankaya.edu.tr, regularly (at least twice a week). All the related announcements, lecture notes, grades, attendance and other information will be uploaded. You are responsible for all announcements made in class and on class web page, as well as for printing the materials from the class web page.

Academic Integrity:

The students, who are expected to be a graduate of Çankaya University Department of Industrial Engineering, are expected to act honestly and follow an ethical conduct. Therefore, any form of dishonesty will not be tolerated. This means throughout this course, you only get credit for your (in exams, homework) individual work.

Honor Code:

Every Industrial Engineering Department student should declare her/his understanding and belief in the Honor Code stated by the department for the examinations and assignments:

Exam:

Please read the following Honor Code carefully. Then write I agree. [Kabul ediyorum.] and sign underneath to show your understanding and belief in the Honor Code.

I hereby declare that I have neither given nor received any aid during the exam. [Sınav sırasında hiç kimseden hiçbir şekilde yardım almadığımı ve hiçbir kimseye hiçbir şekilde yardım etmediğimi beyan ederim.]

Assignment:

For individual assignments, each student (for team work assignments, only one member of the study team) should write the following Honor Code with her/his own handwriting on the cover page of your assignment report, and each student should sign underneath.

I(We) hereby declare that, except where I (we) have indicated, the work I (we) am (are) submitting in this assignment (project, report, ...)is my (our) own work. [Sunmakta olduğum (olduğumuz) bu ödevin (projenin, raporun,...), belirttiğim (belirttiğimiz) kısımların haricinde, tamamen kendi eserim (eserimiz) olduğunu beyan ederim (ederiz).]

NOTE THAT EVERYTHING ON THIS SYLLABUS IS SUBJECT TO CHANGE. STUDENTS WILL BE NOTED ABOUT ANY CHANGE.