

ISYE 4232 ADVANCE STOCHASTIC SYSTEMS

Concentration depth elective for Operations Research and Analytics and Data Sci.

Credit: 3-0-3

Prepared Prof. Hayriye Ayhan, Fall 2013

Prerequisite(s): ISYE 3232

Catalog Description:

The course will cover Jackson Networks and Markov Decision Processes with applications to production/inventory systems, customer contact centers, revenue management, and health care.

Texts:

No required texts. The class will be based on lecture notes, reference papers and text.

Course Description

The objective of this course is to develop models for sequential decision making in production and service systems where the outcomes are uncertain.

Topical Outline

1. Open and Closed Jackson Networks
2. Markov Decision Processes
 - Finite Horizon Models, Infinite Horizon Models, Long-Run Average Reward Models
3. Sequential Decision Making Under Uncertainty: Some Applications
 - Multi-Period Inventory Systems, Production Systems, Telecommunication Systems, Call Centers and Other Service Systems

Outcomes

At the end of this course, students will be able to:

1. Model a system when randomness is significant
2. Apply Continuous Time Markov Chains
3. Use open and closed Jackson networks
4. Use Markov Decision Processes
5. Develop models for sequential decision making under uncertainty

The Mapping from the Course Outcomes to ABET Student Learning Outcomes

The table below shows the relationship between course outcomes and ABET student learning outcomes. The table has 8 columns. The first column lists the course learning outcomes listed above. The next 7 columns list the abbreviated ABET Student Learning Outcomes. The entry of H in a row with specific course learning outcome and column with specific ABET Student Learning Outcomes indicate the importance of attaining this outcome is high and will be assessed.

Course outcome \ Program Outcomes	1. identify, formulate solve engg prob by engg, sci & Math	2. produce solutions consider public health, safety, welfare, global, cultural, social, environ & economic	3 communicate with a range of audience	4 recognize ethical & professional responsibilities, make informed judgement consider resolutions in global, economic, environ and societal context.	5. effective on a team provide leadership, collaborative and inclusive envirn, plan tasks & meet objectives	6. develop and conduct experiment, analyze and interpret data & use engineering judgement to draw conclusions.	7. acquire and apply new knowledge using appropriate learning strategies
1. Model a system when randomness is significant	M						
2. Apply Continuous Time Markov Chains	M						
3. Use open and closed Jackson networks	M						
4. Use Markov Decision Processes	M						
5. Develop models for sequential decision making under uncertainty	M						

Evaluation of the important course outcomes