ISYE 4232 ADVANCE STOCHASTIC SYSTEMS

Credit: 3-0-3

Prepared Fall 2010

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.

Objective
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, Telecommucation Systems, Call Centers

Outcomes
At the end of this course, students will be able to:
- Model a system when randomness is significant
- Apply Continuous Time Markov Chains
- Use open and closed Jackson networks
- Use Markov Decision Processes
- Develop models for sequential decision making under uncertainty

Course outcome \ Program Outcomes	a. apply math	b. data	c. IE method	d. team	e. problem solving	f. prof/ and ethical responsibilities	g. communication	h. global, eco, envi and soc context	i. continue to improve	j. current issues	k. participate in an organization
Model a system when randomness is significant	H		M		M				L		
Apply Continuous Time Markov Chains	H				L						
Use open and closed Jackson networks	H		H								
Use Markov Decision Processes	H		M		H				L		
Develop models for sequential decision making under uncertainty	H		H		H						

Evaluation of the important outcomes

The students should be able to demonstrate the following on two midterm exams, a final exam, and a project:

1. The students should be able to apply Continuous Time Markov Chains to various kinds of problems.
2. The students should be able to use open and closed Jackson networks
3. The students should be able to use Markov Decision Processes
4. The students should be able to develop models for decision making in systems with uncertainty