IEN/MAS 442: Stochastic Models in Operations Research

Spring 2010

Instructor: Dr. Murat Erkoç (Erkoch)
Office: McArthur Bldg., Rm 282
Phone: 284-4477
email: merkoc@miami.edu

Office Hours: T & R 3:00 – 4:30 PM and by appointment
Class hours: T & R 12:30 PM -1:45 PM, Room MM 213
Prerequisite: IEN441 or equivalent

Overview

The course concentrates on stochastic models in Operations Research as the name implies and it complements IEN441 in which the main discussion involves Deterministic OR models (i.e. Linear Programming, Transportation models, Flows in Networks, etc). Since many real-life systems contain stochastic elements, the aim of the course is to present and study OR methods that can be applied to analyze and solve such problems. Examples of stochastic systems include all sorts of Queuing and Communication networks in which random arriving jobs request random processing times from a limited number of 'servers'; Inventory systems where demand is random; Reliability models where life times of the components of systems are stochastic, and alike.

This class is an introduction to the fundamental methods used in stochastic operations research. Topics covered will include decision making under uncertainty, dynamic programming, Markov Chains, Queuing Theory, and Game Theory. We will discuss both modeling and theory with some (occasional) proofs. We will work with Excel Solver and other software tools to have experience in computer applications.

Course Objectives

- Develop an appreciation for the importance and broad applicability of operations research
- Become comfortable modeling stochastic OR problems
- Learn the basic mathematical theory of probabilistic decision making
- Gain ability to create and work with optimization models
- Learn to interpret solutions to optimization problems
- Computer modeling of stochastic OR problems

Course Materials

Primary and Required Text:
Assignments

Homeworks: Homework will be assigned about every other week. Each homework assignment will be due at the beginning of class one week after it is assigned.

Tests: There will be two mid-term exams and a final exam. Both mid-term exams will be given online through the course web site. Students can take each exam as many times as they choose within a time window to be specified later (usually 1 week). Each attempt will generate similar but not identical questions and problems. The weighted averages of all the attempts will be recorded as the exam grade. The Final Exam will be in the classroom and closed book.

Project: There will be a project assignment composed of open end questions based on the material covered in the class. The projects assignments can be carried out individually or by groups of 2 students.

Grading
Homework 20% - Project 10% - Midterms 40% (20% each) - Final 30%

Course Outline (Tentative)

- Review of Calculus and Probability
- Decision Making under Uncertainty
- Dynamic Programming
- Markov Chains
- Queuing Theory
- Markov Decision Processes
- Game Theory

General Behavior

Students will conduct themselves with respect and professionalism toward faculty, students, and others present in class and will follow the rules prescribed by the instructor for classroom behavior. Students who fail to do so may be asked to leave the classroom with a grade penalty. Arriving late, leaving early, and missing class will affect your participation grade. All cell phones/beepers must be turned off during the class.

Laptops, Smartphones, PDAs and other electronic devices (such as recording equipment) may not be used during class except at the express discretion of the instructor. Use of a laptop or Tablet PC is permitted only if (1) it is used for class
function such as taking notes or following lecture notes, (2) the use does not distract the student from paying attention to class content, and (3) the use does not distract other students in class. Activities such as checking messages and browsing the internet are especially prohibited.

**Honor Code**

The University of Miami is governed by an Undergraduate Student Honor Code, with which all students must be familiar. The Honor Code applies to all course assignments and examinations, and violations will not be tolerated.

Although we encourage studying together, we do not tolerate any cheating on the tests. In general, we expect and encourage students to discuss readings, computer exercises, and other course content with their classmates. Such discussions constitute a valuable aspect of the student’s own learning experience. However, all work submitted for a grade must be produced solely by the individual student submitting it unless otherwise specified. A student who commits cheating (or plagiarism) automatically receives an "F" for their final grade regardless of the point contribution to her/his total grade.