

ISEN 421: OPERATIONS RESEARCH II
FALL 2009

104A Zachry, MWF 11:30am-12:20pm

Instructor	Dr. N. Gautam, 235A Zachry, 845-5458, gautam@tamu.edu
Office Hours	Wednesdays and Fridays 10:15-11:15am (or by appointment)
TA	Yi Zhang, 302C Zachry, 845-3549, dolphinazy@tamu.edu <i>Office hours:</i> Tue, Thu, Fri 3:30-4:30pm
Prerequisite	MATH 304 and STAT 212
Objective	The field of operations research focuses on the formulation, analysis and implementation of quantitative methods to support effective decision making. As a sequel to ISEN 420 (Operations Research I) that dealt with decision-making under deterministic environments, this course will focus on decision-making under uncertainty. In particular, the students will learn to use several important classes of models and techniques including Markov chains, queueing theory, stochastic networks and decision analysis. Such models and techniques will be used in case studies involving design and planning for service systems, and thus facilitate their effective analysis.
Integrity	Aggie Honor Code: “An Aggie does not lie, cheat or steal, or tolerate those who do.” For Further information, refer to the Honor Council Rules and Procedures on the web http://www.tamu.edu/aggiehonor
Text	None. Handouts and other relevant materials will be provided.
References	Introduction to Operations Research by Hillier & Lieberman Introduction to Probability Model by Winston Applied Probability and Stochastic Processes by Feldman & Valdez-Flores Modeling, Analysis, Design and Control of Stochastic Systems by Kulkarni Introduction to Probability Models by Ross (will try to put some on reserve in Evans library).
Homework	Assigned but not collected; solutions will be provided.
Quizzes	Short in-class problem solving exercises to keep up with course materials.
Project	Group project; project and groups will be assigned in the middle of the semester; project will be based on techniques taught in class; due on last week of class.
Case Study	Real-life cases; assigned throughout the semester and discussed as a group; some include assignments to be completed at home; cases will be based on techniques taught in class.
Grading	25% Quizzes (One every 3-5 class periods; drop lowest; no make up) 25% Case studies (10 in total, about half will be assignments) 30% Mid-term (Monday November 2, 2009: 6:00-8:00pm, 340 Zachry) 20% Project (Due Monday December 7, 2009: 11:30am)
Note	<ul style="list-style-type: none">• Check your email often (at least once on the day of class or the night before class). Make sure you have forwarded your TAMU mails to a “reasonable” place.• In lieu of the night exam, two classes will be cancelled.• Attendance is mandatory and class participation is expected.

Topic Outline

- 8/31 - 9/25 *Markov Chains*
Discrete-time Markov Chains: modeling, analysis and cost/rewards.
Continuous-time Markov Chains: modeling, analysis and cost/rewards.
Case Studies: (a) *Google page rank*; (b) *Data-center energy*.
- 9/28 - 10/23 *Applications of Queueing Theory*
Nomenclature, performance analysis of single station queues,
Jackson networks, and multi-class queues. Decision-making and models.
Case Studies: (a) *Emergency room in hospitals*; (b) *Call center management*; (c) *Reducing work in progress*.
- 10/26 - 11/13 *Managing Uncertainty*
Revenue management in hospitality industry (airline, hotels, car rentals).
Decision analysis: decision trees and utility theory.
Non-linear programming for portfolio optimization.
Case Studies: (a) *Boat charter management*; (b) *Engineering marketing and sales*; (c) *Savvy stock selection*.
- 11/16 - 12/7 *Stochastic Networks*
Stochastic shortest path problem. Stochastic maximum flow problem.
PERT and CPM for project networks with uncertain activity duration.
Case Studies: (a) *Effective distribution*; (b) *Game plan for success*.