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  
Office hours: 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  • 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
PERT and CPM for project networks with uncertain activity duration.
Case Studies: (a) Effective distribution; (b) Game plan for success.