

ISyE 3232 – Stochastic Manufacturing and Service Systems – Fall 2002

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Class Times: TTh 1:30–3:00pm. It is very important that you attend all classes. I do not always keep extra copies of supplementary handouts after the class in which they are distributed.

Office Hours: TTh 3:00–5:00pm. Due to the large class sizes, you are asked to *strictly honor* the above office hours. Furthermore, it is required that you come *prepared*. When my office door is closed, I am either away from my desk or too busy to answer questions.

Brief Description: Manufacturing & service systems typically have random components to their behavior such as the demand for products and services. We will learn quantitative methods which are useful in analyzing, designing, and operating stochastic systems particularly manufacturing and service systems. Much of our attention will be focused on inventory and queueing processes.

Course Objectives:

- To develop an intuitive understanding of a variety of models for systems with uncertainties.
- To understand the assumptions, limitations and suitable applications of these models.
- To develop skill in applying the techniques to solve problems.

Required Text:

KULKARNI, V. G., *Modeling, Analysis, Design, and Control of Stochastic Systems*, Springer-Verlag, New York, 1999. The most important chapters for our purposes will be Chapters 5, 6, 7, 8, & 9. You should already know the material in the first four chapters from ISyE2027 or an equivalent course. In addition to knowing basic probability, you should also be familiar with matrix algebra. Software routines to implement many of the computations in the book have been written in Matlab and can be downloaded from <<ftp://ftp.mathworks.com/pub/books/kulkarni/>>.

You should also obtain and read a copy of *The Goal: A Process of Ongoing Improvement (Second Revised Edition)* by E. M. Goldratt and J. Cox, North River Press, 1992. The ideas in this book should be useful when you and the other members of your team are managing a factory for Littlefield Technologies. Also there will be a homework assignment and quiz questions related to this book.

Basic Probability: It will be assumed that you are comfortable with basic probability at the level of Chapters 1–4 of the text. Homework 1 is aimed at helping you to review the material necessary for the course. I also expect familiarity with matrix notation and algebra.

Grading:

10%	Littlefield Technologies games and other assignments	
30%	Quizzes	During lecture times
30%	Midterm	Thursday, October 10, 1:30–3:00pm
30%	Final	Thursday, December 10, 11:30–2:20pm

Homework: Homework will be assigned roughly every 7–10 days. The homeworks will not be graded, but will serve as basis for a 15–30 minute quiz to be given during the lecture time. To solve the numerical problems, you can use either the software package MAXIM (a collection of MATLAB programs along with a front-end) or the Excel spreadsheets on the web page <<http://www.isye.gatech.edu/~anton>>.

Some of the assignments will involve how well your team manages a simulated factory as described in “Littlefield Technologies: Overview”. Each student should purchase an access code for the Littlefield Technologies game from the Georgia Tech bookstore. For more information about the Littlefield Technologies game, point your browsers at <<http://littlefield.responsive.net:8000/littlefield/littlefieldHome.html>>.

Quizzes: Quizzes will cover material discussed in class, and especially problems such as those assigned in homework. It is therefore in your best interest to make sure you understand the solution of the homework problems well.

Exams: The exams will be closed books and closed notes.

Old Exams: Sets of problems containing questions from old exams will be available.

Make-Up Exams: Anyone taking a make-up exam will be required to get an approval by the ISyE Office of Undergraduate Studies.

Regrading: If we have made a mistake in grading something, we will be happy to fix things. Any queries on quiz or exam grades must be submitted in writing to the instructor, together with the quiz or exam in question. If a quiz or exam is submitted for a regrade, we have the right to regrade the entire quiz or exam—so it is possible to *lose* additional points. Therefore, it is *strongly recommended* that you do not ask for regrading unless you have substantial reason to believe that we made a mistake when originally grading the quiz or exam.

Class Policy: You are not permitted to walk out of class during lectures. If you have an important obligation, you can ask for permission prior to class. You have time to schedule appointments around classes.

Course Outline:

Chapters 1-4	Probability Review (you are responsible for reviewing this material, covered in ISyE3027)
Chapter 5	Discrete-time Markov chains
Supplemental notes	The exponential distribution and Poisson processes
Chapter 6	Continuous-time Markov chains
Chapter 8	Queueing models
Chapter 7	Generalized Markov models
Chapter 9	Optimal design