

Course: IENG 756 - Applied Stochastic Processes

Semester: Spring 2014

Number of credit hours: 3

Instructor: Feng Yang (feng.yang@mail.wvu.edu)
Room 353D MRB. Phone (304) 293-9477
Office Hours: M W F: 12–1pm

Prerequisites: IENG 213 (Engineering Statistics) or equivalent basic probability course.

Textbook: *Introduction to Probability Models, 8th Ed.* by Sheldon M. Ross, Academic Press, 2002.

Additional Reference:

Modeling and Analysis of Stochastic System. by Vidyadhar G. Kulkarni, Chapman & Hall/CRC, 1996.

Student Learning Objectives:

- To develop an ability to model dynamical processes as stochastic processes;
- To develop an understanding of important qualitative characteristics of stochastic processes;
- To develop an ability to analyze some basic stochastic processes.

Course Topics

- Review of probability theory
- Discrete-time Markov chain (DTMC)
- Poisson Process
- Continuous-time Markov chain (CTMC)
- Renewal theory and its applications
- Queueing theory
- Reliability analysis

Grading Elements, Weighting and Scale:

Grade Element	Weighting
Exams	65%
Project	15%
Homework	20%

General Policies:

Homework:

Homework will be assigned approximately once a week. You should start working on it early, that way you will have time to ask questions before the homework is due. You are encouraged to discuss homework and learn from each other, but all assignments must be written up individually. I will accept two late assignments without deducting marks, as long as the assignment is handed in before solutions are posted. No assignments will be accepted after solutions have been posted.

Exams:

Exams will cover material discussed in class. The two examinations are open book and notes. The midterm exam is temporarily scheduled for the 8th week of the semester and the exact date will be announced 3 weeks before the exam.

Project:

The goal of the project is to learn about an application area where stochastic process models have been successfully used to model realistic situations. You can choose any area you are interested in (such as manufacturing, inventory management, transportation, health care, safety engineering/ergonomics, finance, insurance, telecommunication, software reliability, etc.). This will be an *individual* project, for which you are required to prepare a brief tutorial, write at a level that your classmates could read. Specifically, the tutorial should include:

- A background introduction of the application area
- Explanations as to why stochastic modeling is an appropriate approach to model systems/processes in the chosen area
- Worked out examples to demonstrate the use of stochastic process models in solving realistic problems.

The tutorial should be no more than 7 pages, and should be based on references beyond the textbook (Ross 2002) and the reference book (Kulkarni 1996). The tutorial will be due at the end of the semester.

Regrades:

Regrades of homework or exams are obtained by submitting a written explanation via the instructor's mailbox within 48 hours of when the work was returned in class. Regrades will only be discussed *after* submitting the work in this manner.