

Course: IEEM510300 Stochastic Processes

Semester: Fall 2012

Number of credit hours: 3

Instructor: Professor Kuo-Hao Chang (chang@mx.nthu.edu.tw)
Room 713R. Phone (03) 5742337

Lecture Time: M 2:10-5:00 pm

Office Hours: M 5-6 pm or by appointment

TA office hours: TBA

Prerequisites: IEEM203000 (Engineering Statistics) or equivalent basic probability course.

Textbook: *Introduction to Probability Models, 10th Ed.* by Sheldon M. Ross, Academic Press, 2009 (or the newest version).

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 basic stochastic processes.

Course Topics

- Chapter 5. The Exponential Distribution and the Poisson process (three weeks)
- Chapter 6. Continuous-time Markov Chain (CTMC) (three weeks)_
- Chapter 7. Renewal theory and its applications (four weeks)
- Chapter 8. Queueing Theory (four weeks)
- Student presentation (two weeks)

Grading Elements, Weighting and Scale:

Grade Element	Weighting
Midterms (I and II)	40%
Final	30%
Project and Presentation	15%
Class Participation (Quizzes)	15%

General Policies:

Homework:

Homework will be assigned bi-weekly while I will not collect them. You will have a chance to ask homework questions in class. You are also encouraged to discuss homework with your classmates and learn from each other.

Exams:

Exams will cover material discussed in class. The two midterm and final examinations are close book and notes. The exact date of midterm exam will be announced later (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, finance, insurance, telecommunication, software reliability, etc.), study the related literature (paper, book etc.), and do some computational work. This will be a team project (four team members at most) for which you are required to prepare a project report (around 10 pages, not counting cover and reference list), written at a level that your classmates could read. Specifically, the report should include:

- (1) A background introduction of the application area
- (2) The description of your stochastic model. You should justify the appropriateness of stochastic modeling being used to model systems/processes in the chosen area.
- (3) Work out numerical examples to demonstrate the use of stochastic process models in solving realistic problems and provide the managerial insights through your examples.

A complete reference list is required. In the middle of this semester (11/19), you should turn in a proposal for your term project where you should at least finish (1) and (2). The final report will be collected at the last week in class (before the final exam starts), and plus, each team will make a 30-minute presentation in the last two weeks of this semester. More details about the order of presentation will be announced later.

Quizzes:

Quizzes are given on a bi-weekly basis. All the quiz problems are strongly related with the homework problem. You should fully understand every homework problem in order to get good grades for the quiz.