

**Course: IEEM510300 Stochastic Processes**

**Semester:** Fall 2010

**Number of credit hours:** 3

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

Lecture Time: M 11:10 an-12 pm, Th 16:20-18:10 pm

Office Hours: Th 15-16 pm or by appointment

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

**Textbook:** *Introduction to Probability Models, 10th Ed.* by Sheldon M. Ross, Academic Press, 2009.

**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**

- Probability basics (two weeks)
- Conditional probability and conditional expectation (one week)
- Discrete-time Markov Chain (DTMC) (three weeks)
- Poisson process (three weeks)
- Continuous-time Markov Chain (CTMC) (three weeks)\_
- Renewal theory and its applications (three weeks)
- Student presentation (one week)

**Grading Elements, Weighting and Scale:**

Grade Element	Weighting
Midterm	25%
Final	30%
Project and Presentation	25%
Class Participation	10%
Quizzes	10%

**General Policies:**

**Homework:**

Homework will be assigned approximately once a week 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 examinations are close book and notes. The midterm exam is temporarily scheduled for the 8<sup>th</sup> 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, finance, insurance, telecommunication, software reliability, etc.). This will be a team project (two team members at most), for which you are required to prepare a project report, written at a level that your classmates could read. Specifically, the report 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 numerical examples to demonstrate the use of stochastic process models in solving realistic problems

A complete reference list is required. The total pages of the report should be between 7-10 . I will discuss more details when time comes. The report will be collected at the last week in class, and plus, each team will make a 15-minute presentation.

**Quizzes:**

There will be unannounced quizzes in class. All the quiz problems are strongly related with the homework problem. You are expected to fully understand every homework problem.