Course: IEEM510300 **Stochastic Processes**

Semester: Fall 2017

Number of credit hours: 3

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

Lecture Time: Thursday 3:30-6:30 pm

Office Hours: Monday 4-6 pm or by appointment

TA office hours: TBA 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 (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 3. Conditional Probability and Conditional Expectation
Chapter 4. Markov Chains
Chapter 5. The Exponential Distribution and the Poisson process
Chapter 6. Continuous-time Markov Chain (CTMC)
Chapter 7. Renewal theory and its applications
Chapter 8. Queueing Theory
Student presentation (1 week)

Grading Elements, Weighting and Scale:

Grade Element	**Weighting**
Midterms (I and II)	40%
Final	30%
Quiz	15%
Project	15%
Class Participation	5%

Note: You have additional 5 % in total in the best case.

General Policies:

Homework:

Homework will be assigned roughly bi-weekly while I will not collect them. You are also encouraged to

discuss homework with your classmates and learn from each other

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

Exams:
Exams will cover material discussed in class. The two midterm and final examinations are close book and notes. No make up exams! Final exam is cumulative. The exact date of midterm exams is given as below (additional information).

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 should choose an 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. The final report (and the presentation slides) will be collected in class before your presentation starts, and plus, each team will make a 15-minute presentation in the last two weeks of this semester. More details about the order of presentation will be announced later.