Course: IEEM510300 **Stochastic Processes**

Semester: Fall 2018

Number of credit hours: 3

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

Lecture Time: Thursday 2:20-5:20 pm

Office Hours: Thursday 2-3:30 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	20%
Quiz	10%
Class Exercise	15%
Final Project	15%

General Policies:
This course will adopt the "flip-classroom" mode, that is, lecture videos will be provided on a weekly basis before the class time. Students are required to watch the videos and bring their questions to the classroom. The instructor will answer the questions until everything is CLEAR. Quiz will be conducted to ensure that students have a full understanding about the teaching materials. Finally, class exercises will be provided with students to practice in class in groups. Discussion about the exercises are expected.

Homework:
Homework will be assigned roughly 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 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).

Final 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.