IEDA 3250: Stochastic Models
Fall, 2023

Instructor: Professor Rachel Zhang, Rm 5539, rzhang@ust.hk, 2358-7113
Class Schedule: 4:30 – 5:50am, Wednesday and Friday, LT-K
TAs: Shize Li slidq@connect.ust.hk (Rm 5568)
Zhihao Li zlifx@connect.ust.hk (Rm 5569)
Jiahao Li jliga@connect.ust.hk (Rm 5569)
Tutorial hours: Tuesday 6:30 - 6:50pm (T1: G009B, CYT Building), 10:00-10:50am (T2: Rm 6591)

Course Objectives: A Markov process is a particular type of stochastic process where, given the current state, the future is independent of the past (this is the Markov property). If something is "stochastic", then it involves chance or uncertainty. As the second half of Operations Re-search/Management Science, *Stochastic Models*, we will learn the mathematical language used to study real-world processes that involve uncertainty and have the Markov property. Because this is an introductory course we will focus predominantly on tools rather than applications. Applica-tions will be given whenever possible but, just as scales must be learnt when studying piano, there will be situations where no applications are obvious at our level of knowledge.

Topics to be discussed include four parts: probability review, Markov chains, Poisson processes and continuous time Markov chains, and queuing theory. We devote equal amount of time to each of the four parts.

Prerequisites: Students are expected to have the necessary prerequisite in probability theory and have taken (I) IEDA 2520 (Probability for Engineers) and IEDA 2540 (Statistics for Engineers), or (II) MATH 2411 and MATH2421.

This course is also a prerequisite for IEDA3270 (Quality Engineering), IEDA4310 (Integrated Production Systems), and IEDA4130 (System Simulation)

Text: *Introduction to Probability Models*, by Sheldon Ross, Academic Press.

Learning Outcomes: To provide students a working knowledge of basic Markov processes and their applications (reliability, inventory management, and queueing).

1. To reinforce knowledge of basic probability and mathematics.
2. To further students' abilities in analytical thinking.

Grading: 4 quizzes (100%) on Sept 22(F), Oct 18(W), Nov 8(W), and Nov 29(W) in classroom

There will be 4 quizzes throughout the semester. The quizzes are close book, but you are allowed to bring in a cheat sheet (both sides) and calculator, when done in a classroom. You are responsible for following the course materials and completing homework assignments, not to be turned in, on time whose solutions will be provided. Homework and solutions will be available on Canvas.

Tutorial schedule:

Probabilities: Sept: 8 (T2), Sept 15 (T2), Sept 19 (T1)

DTMC: Oct 6 (T2), Oct 10 (T1), Oct 13 (T2), Oct 17 (T1)

CTMC: Oct 27 (T2), Oct 31 (T1), Nov 3 (T2), Nov 7 (T1)

Queueing: Nov 17 (T2), Nov 21 (T1), Nov 24 (T2), Nov 28 (T1)