

Course outline

Course title: Applied Stochastic Process

Course code: 152062B

Instructor: CHEUNG Ying Lun

Office: 诚明楼 321室

Venue and class time: Fri 08:00-10:00 慎思楼 216室

Course Overview

This course introduces the theory and applications of several important stochastic processes. The course mainly includes Markov chains, Poisson process and Brownian motion. Students can also understand how to solve complicated problems using Monte Carlo simulation.

Course Schedule

1. Primer of statistics and probabilities

- a. Introduction to probability theory
- b. Random variables, expectations and conditioning
- c. Simulations

2. Markov chains

- a. Discrete-time Markov chains
- b. Poisson process
- c. Continuous-time Markov chains

3. Brownian motion

- a. Random walks
- b. Brownian motions
- c. Introduction to stochastic calculus (*tentative*)

Computation

It is necessary to develop computational skills to complete the assignments and projects. In this course, we will be using R in all computational examples. R is a free software environment for computational statistics and is available under <https://www.r-project.org>. You are recommended to use RStudio as the IDE. RStudio is freely available under <https://rstudio.com>.

Reference

1. Ross, Sheldon M. (2019). *Introduction to Probability Models*. Academic Press.
2. Durrett, Richard. (2016). *Essentials in Stochastic Processes*. Springer.
3. Hassler, Uwe. (2016). *Stochastic Processes and Calculus: An Elementary Introduction with Applications*. Springer.

Assessment Methods

- Class participations (10%)
- Assignments (25%)
- Group project (25%)
- Thesis (40%)