STAT-810 Applied Stochastic Models (3 Credit Hours)

1. Objectives

This course aims to introduce students to the discrete and continuous stochastic process, and related stochastic models.

2. Course Contents

Probability generating functions, compound distributions, simple random walk, branching processes, Markov process, discrete and continuous-time Markov chains, birth-death process, immigration and emigration process, immigration-death processes, renewal processes, Markov renewal process, Ergodic theorem, Gaussian processes, and Brownian motion. Stochastic Calculus. Related applications/computations with R.

3. Recommended Books

i. Cox, D.R. and Miller, H.D., Theory of Stochastic Process, Chapman and Hall. (2017).
ii. Feller, W. an Introduction to Probability Theory and its Applications, Vol-1, 3rd ed., John Wiley and Sons. (2008).
iii. Richard FB., Stochastic Processes, Wiley International Ltd. (2011).
iv. Stirzaker, D.R., Probability and Random Processes, Oxford Uni. Press, London. (2001).
v. Tijms, H.C. A., First Course in Stochastic Models. John Wiley and Sons. (2003).

4. Outcomes

On successful completion of this course, students will be able to differentiate and model the random/stochastic process, to fit the discrete, continuous, Poisson, Gaussian, birth, death and immigration process. Moreover, students will be able to study the properties of Brownian motion and stochastic calculus.