ECE 604 Stochastic Processes

Fall 2023

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Office Hour: Wednesdays, 2:00-3:00pm @ EIT 4156

Prerequisite: ECE206 or equivalent (subject to the approval of instructor)

Text: Sheldon M. Ross, Introduction to Probability Models, 12nd ed., Academic Press, 2019 (Hardback ISBN: 9780128143469; eBook ISBN: 9780128143476)

This course studies fundamentals in probability theory and random processes. It is strongly recommended that students in communications, networks, signal processing, control, and other related areas should take this course.

Course Outline:

- Review: probability and conditional probability, random variables, probability density function, probability mass function, cumulative distribution function, mean and variance, moment generating functions.
- Convergence concepts: convergence in mean square, convergence almost everywhere, convergence in probability, convergence in distribution.
- Markov chains: Chapman-Kolmogorov equations, time reversibility, Markovian decision process.
- Poisson processes: exponential distribution, Poisson process, generalization of the Poisson process.
- Continuous-time Markov chains: birth and death process, transition probability function, time reversibility, uniformization.
- Renewal processes: limit theorems, renewal reward process, regenerative process.
- Stationary processes: Brownian motion, white noise, Gaussian process, stationary process.

Grading: Midterm Examination = 30%, Final Examination=70%.

References for Chapters 1-3 (reserved in DC library):

- Ian F. Blake, An introduction to applied probability, 1979 (call number: QA273.B586 1987)
- Sheldon M. Ross, A first course in probability, 9th ed., 2012 (ISBN10: 1-292-02492-5)
- Athanasios Papoulis, Probability, Random Variables, and Stochastic Processes, 2002 (QA273 .P2 2002)

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