

MATH 4450 – Applied Probability

Course Description: Probability models for applications, finite Markov chains, queueing systems, Poisson process, applications to genetics, diffusion, computer systems.

Prerequisites: Grade of C or higher in Math 3320 and Math 4410.

Schedule: Spring of odd-numbered years. 3 credit hours.

Textbook: *Introduction to Probability Models*, Ninth Edition, by Sheldon Ross. Academic Press, 2006.

General description:

The main goal of the course is for you to learn how to model real-world situations which require stochastic models (meaning random or probabilistic). We will spend a relatively small amount of time developing the theory of stochastic processes, and a relatively large amount of time trying to model real-world problems with tractable stochastic models. We will develop theory as it becomes useful for working out the predictions of the models.

The main theoretical topics to be covered are: independence and conditional probability, Markov chains, branching processes, and Markov processes. If time allows, we will also discuss Brownian motion or other topics. We will discuss applications to gambling, stock prices, inventory policies, queueing, and many other things.

Chapters Covered:

1. Introduction to Probability Theory
2. Random Variables
3. Conditional Probability and Conditional Expectation
4. Markov Chains
5. The Exponential Distribution and the Poisson Process
6. Continuous-Time Markov Chains
7. Renewal Theory and Its Applications (as time permits)
8. Queueing Theory (as time permits)
9. Reliability Theory
10. Brownian Motion and Stationary Processes
11. Simulation (as time permits)