

# MATH 445/545 Applied Probability

Spring 2007

Time: 4:00-5:15 pm TR  
Classroom: 340 Math Sci Bldg.  
Call Numbers: 14163 / 26682

Instructor: Dr. Maria Rizzo  
Office: MSC 439  
Office hours: 12:30-1:20 MWF  
Phone: 419-372-0476

Prerequisite: MATH 441 or MATH 541

Required textbook: Introduction to Probability Models Ninth Edition (2007), by Sheldon Ross, Academic Press (new edition)

Material in Chapters 1 and 2 (except 2.8) are prerequisites, covered in MATH 441/551. Chapter 3 (Sections 1-5) are also prerequisites. The main topics of the course begin with Chapter 4.

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.

## Course Outline

Chapter 2	Section 2.8 Stochastic Processes
Chapter 3	(Review) Conditional Probability and Conditional Expectation
Chapter 3	Applications and Compound Distributions
Chapter 4	Markov Chains
Chapter 5	The Exponential Distribution and the Poisson Process
Chapter 6	Continuous-Time Markov Chains
Chapter 7	Renewal Theory and Its Applications (Selected Topics)
Chapter 8	Queueing Theory
Chapter 9	Reliability Theory
Chapter 10	Brownian Motion and Stationary Processes
Chapter 11	Simulation (Selected Topics)

Grading:	Exam 1	100 points
	Exam 2	100 points
	Final Exam	150 points
	Quizzes, Homework	150 points
	Total	500 points

The course grade is determined by the total number of points earned, on the scale: 450-500 A, 400-449 B, 350-399 C, 300-349 D, 0-299 F.