

OR / STAT 645: Stochastic Processes

Course Overview, Fall 2015

Many real-world processes are fundamentally *stochastic* – that is, they have some degree of randomness or uncertainty. This course provides an in-depth survey of models that can be used to analyze a wide variety of stochastic processes. The focus includes quantitative and theoretical analysis of such models as well as practical issues using such models to represent real problems. This course assumes some prior knowledge of probability and basic stochastic models (like Markov chains). The pre-requisite is OR 542 (Stochastic Models), or STAT 544 (Applied Probability), or permission of the instructor.

Class Hours: Tuesday, 4:30 – 7:10 pm, Nguyen Engineering Building, room 1109
Pre-requisite: OR 542, or STAT 544, or permission of instructor

Instructor: John Shortle
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703-993-3571
Nguyen Engineering Building, room 2210
Office hours: Tue. Noon – 1pm, Wed. 2:45 – 3:45

Textbook: S. Ross, *Introduction to Probability Models*, 11th edition (earlier editions may be fine too).

Student Evaluation Criteria

Homework	15%
Midterm	40%
Final exam	45%

Course Schedule
Last updated: 8/17/15

Class	Lecture Topic	Reading	Homework
Sep. 1	Review of probability The exponential distribution	Sections 2.4-5 Sections 3.1-5 Section 3.4 Section 5.2	
Sep. 8	Poisson process	Section 5.3	Hmwk #1 due
Sep. 15	Poisson process: Generalizations	Section 5.4	
Sep. 22	Markov chains: Discrete time, continuous time, Chapman- Kolmogorov equations	Sections 4.1-2 Section 6.2 Section 6.4	Hmwk #2 due
Sep. 29	Markov chains: Limiting probabilities, long-run proportions	Sections 4.3-4 Section 6.5	
Oct. 6	Markov chains: Branching processes	Section 4.7	Hmwk #3 due
Oct. 13	Columbus Day (on Monday)		
Oct. 20	Midterm		
Oct. 27	Markov chains: Birth-death processes, reversible chains	Section 6.3 Section 6.6	
Nov. 3	Renewal theory	Sections 7.1, 7.3	
Nov. 10	Renewal theory: Renewal-reward	Section 7.4	Hmwk #4 due
Nov. 17	Renewal theory: Alternating renewal process, inspection paradox	Sections 7.5-6	
Nov. 24	Brownian motion	Sections 10.1-2	Hmwk #5 due
Dec. 1	Brownian motion: Variations	Section 10.3	
Dec. 8	Brownian motion: Stock options	Section 10.4	Hmwk #6 due
Dec. 15	Final Exam , 4:30 pm – 7:15 pm		