

STOCHASTIC PROCESSES 26:960:580**ODYSSEAS KANAVETAS**Fall 2018
1 Washington Park, Room 202, Newark
Tuesdays 3:00 – 5:50 pm1 Washington Park, Room 1015A
Email: ok125@business.rutgers.edu
Office Hours: After class or by appointment**COURSE DESCRIPTION**

The course will focus on Chapters 3,4,5,6 and 7 from Ross's text: Poisson processes, renewal processes, discrete and continuous time Markov chains. Additionally, a portion of chapter 9, the Wiener Process and finance applications will be included. Further, some extra topics such as simulation and applications to optimizations of Markov Chains will be outlined. The course will begin with a review of basic probability.

COURSE MATERIALS

- Textbook: Required. Applied Probability Models with Optimization Applications, Reprint, Sheldon M. Ross, and ISBN 978-0486673141
- Check Blackboard (blackboard.rutgers.edu) and your official Rutgers email account regularly.
- Other recommended books: Introduction to Probability and Models, 7-th Edition, Sheldon M. Ross

PREQUISITES

Graduate students who have finished a basic course in Probability are allowed to take the course.

ACADEMIC INTEGRITY

I do NOT tolerate cheating. Students are responsible for understanding the RU Academic Integrity Policy (https://slwordpress.rutgers.edu/academicintegrity/wp-content/uploads/sites/41/2014/11/AI_Policy_2013.pdf). I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, "On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment." Don't let cheating destroy your hard-earned opportunity to learn. See business.rutgers.edu/ai for more details.

ATTENDANCE AND PREPARATION POLICY

Grade performance is a demonstrated function of attendance, preparation and participation. You can get behind very easily by skipping classes, resulting in a poor understanding of the material, which will show up as a poor grade for the class. Any class sessions missed by the student are the student's responsibility to make up, not the instructor's. Late arrival that causes disruption, early departure that causes disruption, excessive conversation among students (a disruption in its own right), inappropriate use of electronic devices that cause disruptions, and other actions that disrupt the classroom are unacceptable.

If I am to be absent, my department chair or I will send you notice via email and Blackboard as far in advance as possible. If you are to be absent, report your absence in advance at <https://sims.rutgers.edu/ssra/>. If your absence is due to religious observance, a Rutgers-approved activity, illness, or family emergency/death and you seek makeup work, also send me an email with full details and supporting documentation within 3 days of your first absence.

GRADING POLICY

Course grades are determined as follows:

Mid-term: 40% Homework: 10% Final Exam: 50%.

COURSE SCHEDULE

Topic 1: Review of basics in the theory of probability

Topic 2: Definition of a stochastic process; Classification of stochastic processes.

Topic 3: Discrete time Markov Chains; Transition probabilities; Classification of states; Limit theorems; Applications; Markov decision processes; Applications.

Topic 4: Poisson processes; Derivations of the process from postulates; Properties of the exponential distribution; Planar and special random point distributions; Applications.

Topic 5: Continuous time Markov chains; Kolmogorov equations; Birth and death processes; Stationary distributions; Applications.

Topic 6: Renewal theory; Elementary renewal theorem; Renewal equation; Renewal-reward processes.

Topic 8: Brownian motion process; Reflection principle and distribution of a maximum; Valuation of financial derivatives.

Topic 9: Queueing systems; Basic notions; The M/M/s system with finite and infinite capacities; Elements of queueing networks.

Topic 10: Applications to Mathematical Finance: Binomial Model; Capital Asset Pricing Model, Options.

SUPPORT SERVICES

If you need accommodation for a *disability*, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. <https://ods.rutgers.edu>

If you are a military *veteran* or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. <http://veterans.rutgers.edu/>

If you are in need of *mental health* services, please use our readily available services.

If you are in need of *physical health* services, please use our readily available services.

If you are in need of *legal* services, please use our readily available services: <http://rusls.rutgers.edu/>

If you are in need of additional *academic assistance*, please use our readily available services.