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Jones Graduate School of Business

BUSI 573: Stochastic Models in Operations Management

Spring 2026 Syllabus

Course Information

Instructor: Süleyman Kerimov, kerimov@rice.edu. McNair Hall 244
Office Hours: By appointment
Meeting Times: 4:30pm-7:30pm
Location: TBD
Course Website: Canvas

Course Description

This course introduces students to stochastic models of manufacturing and service enterprises, for which uncertainty is a key aspect of performance. It focuses on the workflow optimization for operational competitiveness, capacity and revenue management, as well as the operations of online platforms, which play an increasingly important role in delivering services to customers.

Course Materials

There is no required textbook. I will pass out hard copies of book chapters and research papers when necessary. Some books that I will use throughout the semester are:

- Jyotiprasad Medhi. Stochastic Models in Queueing Theory. 2nd ed. Academic Press, 2003.
- Sean Meyn and Richard Tweedie. Markov Chains and Stochastic Stability. 2nd ed. Cambridge University Press, 2009.
- Robert G. Gallager. Stochastic Processes: Theory for Applications. Cambridge University Press, 2014.
- Sheldon M. Ross and Erol A. Peköz. A Second Course in Probability. Cambridge University Press, 2023.

Grading

- **Homework assignments (60%):** There will be 6 homework assignments posted on the course website. I will not accept late submissions. Aside from the course material, you may not use external sources such as the internet (see the Rice University Honor Code below). You may discuss homework problems with your peers, but all work and submissions must be completed individually.
- **Final (30%):** The final exam will be a 24 hour take-home exam.
- **Presentation (10%):** You will give a presentation on your own research or on one of the assigned papers during the semester.

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Course Policies

- Students are expected to attend all classes and actively participate in class discussion. In case of absence, students are required to report the instructor in advance. Students are also expected to read the assigned papers throughout the semester.
- Any regrading request must be made within three days after grades are posted. Your request must include a detailed note about the objection. You should be aware that the entire assessment will be regraded.
- All submitted work must include the signed Honor Code pledge (see Rice University Honor Code below).
- Please be courteous and be in class promptly. Use of electronic devices (call, text, etc.) is not allowed in class. If you are using an electronic device (e.g., a tablet) to take notes, please let me know.

Academic Accommodations for Disability

If you have a documented disability or other condition that may affect academic performance, you should:

- Make sure this documentation is on file with the Disability Resource Center (Allen Center, Room 111, adarice@rice.edu, x5841) to determine the accommodations you need.
- Notify the instructor at the beginning of the term so we can discuss your accommodation needs.

Mental Health Statement

The wellbeing and mental health of students is important; if you are having trouble completing your coursework, please reach out to the Wellbeing and Counseling Center. Rice University provides cost-free mental health services through the Wellbeing and Counseling Center (`https://wellbeing.rice.edu`) to help you manage personal challenges that threaten your personal or academic well-being. If you believe you are experiencing unusual amounts of stress, sadness, or anxiety, the Student Wellbeing Office or the Rice Counseling Center may be able to assist you. The Wellbeing and Counseling Center is located in the Gibbs Wellness Center and can be reached at 713-348-3311 (available 24/7).

Honor Code

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. **All submitted work must include the signed Honor Code pledge**: "On my honor, I have neither given nor received any unauthorized aid on this (assignment, exam, etc.)."

Course Topics

The following (tentative) list includes the course topics that we will cover.

- Lecture 1 (Jan 13): Limit theorems
  Probability spaces, convergence theorems, law of large numbers
- Lecture 2 (Jan 20): Stein's method (HW1 out)
  Couplings, Poisson approximation, Stein's method for distributions
- Lecture 3 (Jan 27): Concentration inequalities
  Bounds on expectations and tail probabilities
- Lecture 4 (Feb 3): Queueing theory I (HW1 due, HW2 out)
  Poisson process, exponential models, birth-death processes
- Lecture 5 (Feb 10): Queueing theory II
  Markovian queueing systems, queueing networks
- Lecture 6 (Feb 17): Queueing theory III (HW2 due, HW3 out)
  Non-Markovian queueing systems
- Lecture 7 (Feb 24): Foster-Lyapunov techniques
  Lyapunov functions, bounding stationary expectations
- Lecture 8 (Mar 3): Dynamic matching models I (HW3 due, HW4 out)
  Matching queues
- Lecture 9 (Mar 10): Dynamic matching models II
  Dynamic control of two-way and multi-way networks
- Lecture 10 (Mar 24): Mean field theory I (HW4 due, HW5 out)
  Density dependent Markov chains, Kurtz's theorem, the supermarket model
- Lecture 11 (Mar 31): Mean field theory II
  Applications of power of d choices paradigm
- Lecture 12 (Apr 7): Online resource allocation (HW5 due, HW6 out)
  Secretary problems, prophet inequalities, stochastic knapsack problems
- Lecture 13 (Apr 14): Revenue management
  Capacity control, customer choice models
- Lecture 14 (Apr 21): Presentations (HW6 due)