

**ISE 331: Introduction to Operations Research:
Stochastic Models
3 Units
Spring 2018 T/TH 12:30-1:50pm**

Location: KAP 140
Instructor: Sze-chuan Suen
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Course Description

This undergraduate level course introduces students to the foundations of probabilistic models. We will review basic probability, and cover conditional probabilities, the exponential distribution and Poisson processes, discrete and continuous time Markov chains, and basic queuing theory.

Learning Objectives

The objective of this course is to familiarize students with some of the probabilistic models available for the analysis and solution of common ISE problems in which uncertainty and randomness are particularly important. Upon completion of ISE 331, the student should:

- 1) Be able to develop an appropriate probabilistic model from a verbal description of a problem
- 2) Have an understanding of the restrictions associated with various modeling assumptions
- 3) Be able to extract relevant information from various types of models

Outcomes

Students will develop an understanding of modeling with exponential and Poisson random variables, methods for formulating and analyzing Markov Chains (both discrete-time and continuous-time), and analytical models used to study the queueing behavior of systems.

Prerequisites

- ISE 220 Probability Concepts in Engineering (or equivalent)
- By topic: calculus based probability (i.e., axioms of probability, discrete and continuous distributions, expectation)

Recommended Preparation

ISE 330 Introduction to Operations Research: Deterministic Models.

Textbooks and Supplementary Materials

- *Introduction to Probability Models*, 10th Edition. (S.M. Ross, Academic Press, 2010).

Grading

- Homework: 20%
- First Exam: 25%
- Second Exam: 25%
- Final Exam: 30%

Each component will be normalized to a total of 100 points prior to applying the percentages listed above. Course grades will be determined by the final score. To the extent possible, “natural gaps” in the grade distribution will be used to assign grades.

Homework problems will be assigned most weeks, but will not be graded. Instead, the homework score will be based on assessments of the homework material using in-class quizzes. These quizzes will be “closed book.” In calculating the homework score, the lowest grade for each student will be discarded.

Mid-term Exams will last for the full class period. Both exams will be in-class and “closed book”. However, each student is allowed to bring one 8½ x 11 sheet of hand written notes for use during the exam. This sheet must be turned in with the exam. Two such sheets of notes will be allowed during the final exam. Each exam will draw upon the material presented up to, and including, the class period in which the exam date is announced.

Final Exam: The final exam will be held on the date determined by the registrar during exam week. The final exam will be comprehensive, and will include at least one question on material covered after the second mid-term exam.

Course Schedule

The actual timing of the exams, both in terms of dates and topics, will depend heavily on the time required to cover the various topics. This schedule represents my best guess prior to the start of the semester.

Topic	Source Material	Approximate Duration
Review of Basic Probability	Ross, Ch 1,2	2 classes
Conditional Probability & Conditional Expectation	Ross, Ch 3	5 classes
Discrete Time Markov Chains	Ross, Ch 4	6 classes
Mid-Term Exam		
Exponential Distribution & Poisson Processes	Ross, Ch 5	5 classes
Mid-Term Exam		
Continuous Time Markov Chains; Basic Queueing Theory	Ross, Ch 6, 8	6 classes
Additional Topics, as time permits	TBD	TBD

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” <https://policy.usc.edu/scampus-part-b/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. <https://engemannshc.usc.edu/counseling/>

National Suicide Prevention Lifeline - 1-800-273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. <https://engemannshc.usc.edu/rsvp/>

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. <https://equity.usc.edu/>

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. <http://dsp.usc.edu>

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. <https://studentaffairs.usc.edu/ssa/>

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. <https://diversity.usc.edu/>

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, <http://emergency.usc.edu>

USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime.

Provides overall safety to USC community. <http://dps.usc.edu>