

IE 370: Stochastic Processes and Applications

1 Course description

This course is an introduction to stochastic processes with applications in decision-making under uncertainty. It covers newsvendor problem, discrete-time Markov chains, Poisson processes, continuous-time Markov chains, Markov decision processes, queueing models.

Prerequisites: IE 300, IE 310.

2 Learning outcomes

- Learn basic stochastic processes notions and models.
- Understand how to apply these in modeling and solving problems involving decision-making under uncertainty.

3 Basic information

Credit: 3 undergraduate hours

Instructor: Alexander Stolyar (stolyar@illinois.edu). Office: 156 CSL.

Office Hours: TENTATIVE: Tuesday and Thursday, 6:20pm - 6:50pm. 103 TB.

Lectures: Tuesday and Thursday, 5:00pm - 6:20pm. 103 Transportation Building.

TA: John Qin (johnqin2@illinois.edu); Office: 202 TB. Office Hours: TENTATIVE:

Monday 4pm - 5:30pm, Wednesday 4pm-6pm, Friday 11am - 12:30pm.

TA: Haonan Xu (haonan9@illinois.edu); Office: 139 CSL. Office Hours: TENTATIVE:

Monday 10am - 11:30am, Tuesday 12:30pm - 1:30pm, Thursday 12:30pm - 1:30pm, Friday 1:30pm - 3pm.

Required Textbook: No required textbook.

Optional Textbooks: Both can be downloaded for free from UIUC library:

1. R. Feldman & C. Valdez-Flores, *Applied Probability and Stochastic Processes*, 2010.
2. S. M. Ross, *Introduction to Probability Models, 11th Ed.*, 2014 (or pretty much any other edition).

4 Course Mechanics

Homeworks: About 7-8 homeworks. All homeworks must be submitted as a scanned pdf file in canvas. **Late submissions are not accepted.**

Project: There will be one project involving numerical computation using Python. It is done by teams of **2 or 3** people; students can form teams themselves. The project must be submitted in canvas. **Late submissions are not accepted.**

Midterm exam: 80 min, in the regular lecture time slot on **March 13 (Thursday), 5pm-6:20pm, Room TENTATIVE 103 Transportation Building (but will see if can get a bigger room)**. The exam is close notes and close textbook, but one two-sided sheet of paper with formulas will be allowed. **No make-ups.**

Final exam: 80 min, in the designated final exam time slot, which is **May 13 (Tuesday), 2pm-3:20pm, Room TBD** The exam is close notes and close textbook, but one two-sided paper with formulas will be allowed. **No make-ups.**

Grading Policy: The grading will be based on the homeworks (40%), the project (10%), midterm exam (25%), final exam (25%). One – worst – homework grade will be excluded. The grading scale is as follows. (It may be adjusted eventually, but only in the direction of grade improvement.)

Letter	Grade Percent
A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

5 Course outline (tentative)

1. Newsvendor problem and extensions
2. Discrete-time Markov chains
3. Markov decision processes
4. Poisson process
5. Continuous-time Markov chains (CTMC)
6. Queueing theory basics
7. CTMC queueing models
8. Possible other topics

6 Course Policies

6.1 Academic Integrity

The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: <http://studentcode.illinois.edu/>.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: <http://studentcode.illinois.edu/>. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

6.2 Students with Disabilities

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor as soon as possible. To insure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class should contact Disability Resources and Educational Services (DRES) and see the instructor as soon as possible. If you need accommodations for any sort of disability, please speak to me after class, or make an appointment to see me, or see me during my office hours. DRES provides students with academic accommodations, access, and support services. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail a message to disability@uiuc.edu. <http://www.disability.illinois.edu/>.

6.3 Emergency Response Recommendations

Emergency response recommendations can be found at the following website:

<http://police.illinois.edu/emergency/>. I encourage you to review this website and the campus building floor plans website within the first 10 days of class:

<http://police.illinois.edu/emergency/floorplans/>.

6.4 Family Educational Rights and Privacy Act (FERPA)

Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See <http://registrar.illinois.edu/ferpa> for more information on FERPA.