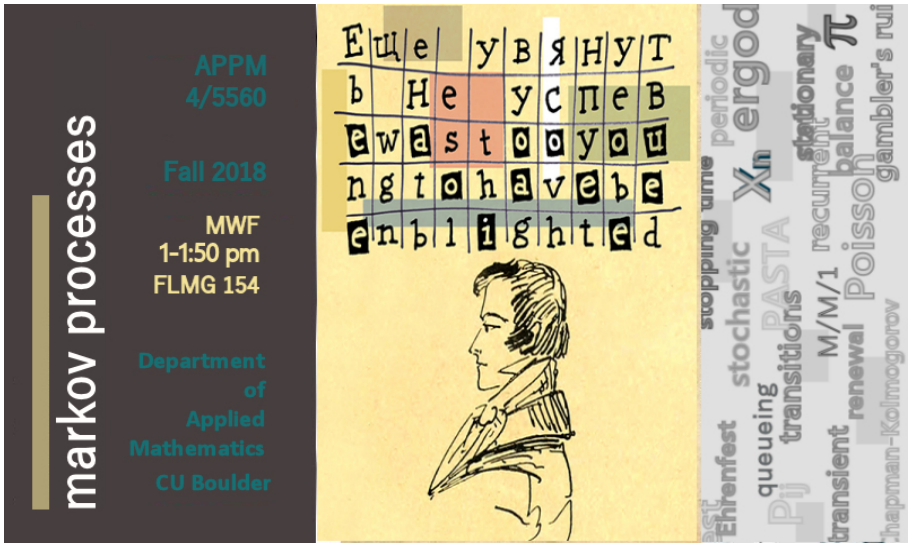

Why Markov Processes?

Let go of the past because all that matters is **now**. A **Markov chain** (process) is a sequence of random variables such that, if you've observed one, the distribution of the next is completely known and independent of previous values. At first read this might sound overly simplistic, but it is an important building block for more complicated models in areas as diverse as queueing theory, mathematical biology, chemical kinetics, web page ranking, motion tracking, and simulation. In this course, we'll learn about Markov chains in both discrete and continuous time. They will mostly live on discrete spaces though we will touch on continuous spaces as well.

Instructor

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Phone: 303-492-0685

Office Hours:
Mon, Fri :2-2:50 PM
Wed: 11-11:50 AM

We'll linger a bit on Poisson processes in particular until you become thoroughly paranoid about how pervasive they are in your life. We'll study birth-and-death processes, queueing models, and renewal processes. When you leave this course, youll be an old pro at navigating grocery store checkout lines, rush hour traffic, and even spider webs. For more specifics in terms of content, I'll refer you to the table of contents in the textbook where we will cover roughly Chapters 1-4.

Throughout this course, we will be reinforcing some ideas with simulation. There will be no big stand-alone simulation projects, but there will be occasional quick simulation exercises embedded into some homework assignments. You are welcome to use any programming language you choose. For those with little to no programming experience, I recommend **R** since it is simple to use, found in most university computer labs, and available for free for your personal computer at www.r-project.org.

Important Dates

With a few exceptions surrounding exam weeks, homework will be assigned every **Wednesday and will be due the following Wednesday**. Please see the course website for specific dates.

There are two **evening midterm exams** which take place from **6-8:30 PM** on the following days.

- Thursday, February 21st
- Thursday, April 4th

Please let your instructor know as soon as possible if you can not make one or both of these times and dates.

Due to the extra evening time you will be putting in, class will be cancelled on the Friday immediately following each exam.

Ask lots of questions and get help when you need it– especially if you feel that you are falling behind!

Please visit the course website often for important announcements and useful topic tutorials.

Please see the course website for university policies on honor, discrimination, disability, and religious holidays.

Make sure to always show your work. Correct answers with no supporting work may not receive any credit!

Homework Policy: Homework is due on the listed dates at (or before) the beginning of class and will be accepted up until 5pm on these dates. Homework will no longer be accepted after 5pm on its due date. (Exceptions will be made for documented medical emergencies.) Your lowest two homework scores will be dropped.

Textbook: Essentials of Stochastic Processes by Richard Durrett, 2nd ed.

Overall Grade: Your overall grade will be determined as 25% homework, 25% for each midterm, and 25% for the final. The final will be cumulative but strongly emphasizing material covered since the second midterm. There will not be a take-home part for the final.

Grad Students: Students registered for the graduate section of this course will have extra problems on homework assignments and an additional take-home section for each of the two midterms. Grad students may also be held to higher standards in grading than the undergraduates.

Image attribution: www.americanscientist.org/article/first-links-in-the-markov-chain