

STA 447/2006S: Stochastic Processes (Winter 2020)

STA 447/2006S is a course about random (stochastic) processes, designed for graduate and senior undergraduate students in statistics and related disciplines.

Tentative list of topics to be covered: Markov chains in discrete and continuous time, martingales, Poisson processes, renewal theory, and Brownian motion, with applications (as time permits) to Monte Carlo algorithms, random walks on graphs, branching processes, option pricing, queueing theory, and more.

Textbook: [A First Look at Stochastic Processes](#), by J.S. Rosenthal (World Scientific). [[Bookstore](#), [Publisher](#), [Amazon](#), [Indigo](#), [Kindle](#), [Kobo](#), [errata](#)]

Instructor: Professor [Jeffrey S. Rosenthal](#), Department of Statistical Sciences, University of Toronto. Sidney Smith Hall (SS), room 5022; phone (416) 978-4594; e-mail j.rosenthal@math.toronto.edu; web <http://probability.ca/jeff/>.

Lectures: Thursdays, 6:10 - 9:00 p.m., in room 128 of the Mining Building (170 College St.; building "MB" on [campus map](#)). First class Jan 9. Last class April 2. No class Feb 20 (Reading Week). During lectures, please **put away your laptops and cell phones** (unless you are using them specifically for a class-related purpose with prior permission), and **pay attention** to the material being presented. **Note:** The lectures will follow the textbook quite closely, so it is not necessary to take notes, you should just pay close attention to learn the material well and then use the textbook for later reference.

Course Web Page: Visit <http://probability.ca/sta447> for course information and announcements.

Prerequisite: [STA347](#). **NOTE:** This prerequisite will be **strictly enforced** for undergraduate students: undergraduate students without STA347 will **not** be permitted to remain in STA447 except in **very special circumstances**. (It does **not** suffice to simply have taken some other advanced statistics courses.) For graduate students, it suffices to have taken a course equivalent to STA347 at another university; if you are unsure about the equivalence then please ask me. (For basic probability background, see e.g. [Chapters 1-4 of this free book](#). And, for brief but important background for the course, read the textbook's **Appendix** carefully.)

Evaluation:

28% **Midterm #1** (135 minutes): **Thurs Feb 6** during class time: **surname A-G in Victoria College room 323** (VC, 91 Charles Street West), **surname H-Z in Northrop Fry room 003** (NF, 73 Queen's Park Crescent East); see [campus map](#).

28% **Midterm #2** (135 minutes): **Thurs Mar 19** during class time (location TBA)

44% **Final Exam** (three hours): some time during the April 6-25 period

Homework: There are no graded homework assignments. However, you are strongly encouraged to attempt the textbook's **practice problems** to learn the material well.

Notes: On all tests and exams, **BRING YOUR STUDENT CARD**, and **DO NOT SIT NEXT TO ANYONE THAT YOU KNOW**, and **NO AIDS ALLOWED** (not even calculators). The tests will cover all lecture material up to that time, and it is important

to **explain** your solutions clearly.

Instructor Office Hours: You are welcome to talk to the instructor after class, or any time you find him in his office (SS 5022), or you can e-mail him to arrange another time to meet. He will also hold special office hours in his office (SS 5022) on: Mon Jan 27 at 2:30-3:30, Thurs Jan 30 at 4:30-5:30, Mon Feb 3 at 2:30-3:30, Wed Feb 5 at 1:30-2:30.

TA Office Hours: Fri Jan 31 at 2:10-4:00, and Mon Feb 3 at 4:10-6:00, in HSB 390 (155 College St, 3rd floor). And, Tues Feb 4 at 12:10-2:00 in Medical Sciences (MS) room 2290. And, Wed Feb 5 at 10:10-12:00 in SS 2104. You can also email the TAs at brian.ning@mail.utoronto.ca and ali.al.aradi@utoronto.ca to ask questions or request a meeting.

Supplementary Readings: In addition, the following books (among others) may be useful for further reading:

- R. Durrett (1999), Essentials of stochastic processes. Springer, New York. [See [free online version of second edition](#), 2011.]
- G.R. Grimmett and D.R. Stirzaker (1992), Probability and random processes, second edition. Oxford University Press. [Or: third edition, 2001.]
- G.E. Lawler (1995, or 2nd ed. 2006), Introduction to stochastic processes. Chapman & Hall.
- O. Häggström (2002), Finite Markov chains and algorithmic applications. Cambridge University Press.
- S. Resnick (1992), Adventures in stochastic processes. Birkhauser, Boston.
- J.S. Rosenthal (2006), A first look at rigorous probability theory, 2nd ed. World Scientific Publishing Company, Singapore. [Especially chapters 7,8,14,15.]

Regrading policy: Regrading requests should only be made for **genuine grading errors**, and should be initiated by writing or typing a complete explanation of your concern (together with your full name, student number, e-mail address, and telephone number) on a **separate piece of paper**, and giving this together with your original **unaltered** test/exam/paper to the instructor **within one week** of when the graded work was first available (not counting Reading Week). **WARNING:** If the instructor does not find any genuine grading errors, then your **entire** paper might get re-graded **firmly**, with a **critical eye**, and your mark might well go **DOWN** rather than up. [More details are here](#). (Note: for the final exam, a different [Faculty-wide process](#) should be followed instead.)

Challenges? If you encounter challenges during your studies, then please visit [Academic Success](#) or the [Health and Wellness Centre](#) for assistance and support.

This document is available at probability.ca/sta447 or probability.ca/sta2006, or permanently at probability.ca/jeff/teaching/1920/sta447/.