

STA 447/2006S: Stochastic Processes (Winter 2019)

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.

[See also the evolving [lecture notes](#), to be updated after each lecture.]

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 10. Last class April 4. No class Feb 21 (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.

Course Web Page: Visit 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.

Evaluation:

28% [Midterm #1](#) (135 minutes): Thurs Feb 7 during class time -- surname A-K in MS 2170, surname L-Z in MS 3154. (See [solutions](#).)

28% [Midterm #2](#) (135 minutes): Thurs Mar 21 during class time -- surname A-L in Bahen (BA), 40 St. George St, room 1160; surname M-Z in Haultain (HA), 170 College St (rear), room 403. (See [solutions](#).)

44% Final Exam (three hours): [scheduled](#) for Friday April 12 at 7:00 pm [in BN3](#) (320 Huron St, third floor)

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. Although there are no graded homework assignments, you are strongly encouraged to attempt the **practice problems** in the lecture notes and supplementary readings, to learn the material well. See also the various [student services](#) and [academic resources](#) and [wellness centre](#) which are available to you.

TA Office Hours: The TAs will hold office hours during semester each Wednesday 3:10 to 5:00 (except Feb 20), and Friday 3:10 to 5:00 (except Feb 8 and 22 and Mar 22) in Sidney Smith Hall (SS) room 2119, at which you can ask them any questions about the course material and practice problems.

Additional TA office hours will be arranged before the tests and exam, including: Tues Feb 5 from 3:10 to 7:00 in Innis College (IN) room 313; Tues March 19 from 3:10 to 5:00 in SS 2119; Wed April 10 and Thurs April 11 from 6:00 to 8:00 PM in SS 1080; and Wed April 10 and Fri April 12 from 3:10 to 5:00 PM in SS 1080. You can also contact the TA at brian.ning@mail.utoronto.ca to ask questions or arrange other meeting times.

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) before the midterms and exam, including: Tues Feb 5 from 12:30 to 2:30; Wed Feb 6 from 11:30 to 1:30; Tues Mar 19 from 12:30 to 2:30; Wed Mar 20 from 5:00 to 6:00; Tues Apr 9 from 4:00 to 6:00; Fri Apr 12 from 12:00 to 2:00.

Supplementary Readings: There is no required textbook. The instructor will post his rough [lecture notes](#) on this course web page after each lecture. 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/homework paper to the instructor **within one week** of when the graded work was first available. **Warning: your mark may end up going down rather than up.** (Note: for the final exam, a different [Faculty-wide process](#) should be followed instead.)

This document is available at probability.ca/sta447 or probability.ca/sta2006, or permanently at probability.ca/jeff/teaching/1819/sta447/