STA 257F: Probability and Statistics I (Fall 2023)

This course will present an introduction to mathematical probability theory, including: probability spaces, common probability distributions, discrete and continuous random variables, distribution and density functions, joint distributions, expected values, generating functions, probabilistic inequalities, convergence of random variables, laws of large numbers, the Central Limit Theorem, and the concept of statistical inference. See also the evolving lecture notes, to be updated the evening after lectures.

Course Web Page Quick link: probability.ca/sta257

Course Enquiries email address: sta257@utoronto.ca   (Or, for enrolment issues: ug.statistics@utoronto.ca.)

Instructor: Professor Jeffrey S. Rosenthal, Department of Statistics, University of Toronto. Email j.rosenthal@math.toronto.edu; web http://probability.ca/jsr

Lectures -- Mondays (1 hour) and Wednesdays (2 hours):

L0101: Mondays 11:10-12:00 in room 128 of the Lassonde Mining Building (MB: 170 St. George Street), and Wednesdays 11:10-1:00 in room 100 of Muzzo Family Alumni Hall (AH: 121 St. Joseph Street).

L0201: Mondays 3:10-4:00 in room 116 of the Wallberg Building (WB: 200 College Street), and Wednesdays 3:10-5:00 in room 100 of Muzzo Family Alumni Hall (AH: 121 St. Joseph Street).

First class Sept 11. Last class Dec 6. No class Oct 9 (Thanksgiving) nor Nov 6 nor 8 (Reading Week).

Lectures will be interactive; please put away your laptops and cell phones (aside from taking class notes) and stop talking and pay close attention to the material being presented, and raise your hand to ask and respond to questions.

Tutorials -- Mondays (1 hour):

L0101: Mondays 12:10-1:00 (in your assigned classroom).

L0201: Mondays 4:10-5:00 (in your assigned classroom).

First tutorial Sept 18. Last tutorial Dec 4. No tutorial Oct 9 (Thanksgiving) nor Nov 6 (Reading Week).

Tutorials will discuss solutions to each week's suggested homework problems.

TAs will also have some time for office hours, and to reply to email and Piazza questions.

See also the New College Stat Aid Centre (scroll down).

Textbook: We will roughly follow the book Probability and Statistics: The Science of Uncertainty (2nd ed) by M.J. Evans and J.S. Rosenthal, available as a free pdf file of the entire book, including:

• Chapter 1 (Probability Models, pp. 1-32),

• Chapter 2 (Random Variables and Distributions, pp. 33-128),

• Chapter 3 (Expectation, pp. 129-198),

• Chapter 4 (Sampling Distributions and Limits, pp. 199-252)

• See also the TOC and preface and background and index and answers and solutions and errata (scroll down).

Note: Please try to save these pdf files locally on your computer, rather than download them every time.

[Much of this material is also covered in Chapters 1-4 of this book, with solutions at ISBN 978-3-319-52401-6, "product archive file" item #4, from this link.]

[The follow-up course STA261 then covers much of the material in the later chapters, and STA347/STA447/book expand on probability and Chapter 11.]

Prerequisites: MAT137 or 157 (or their UTSc/UTM equivalents), plus co-requisite MAT237 / 257 and also MAT223 / 240. Strictly enforced by the university! (For lower math prerequisites see STA237 or 247.) Send enquiries about this to: ug.statistics@utoronto.ca

Instructor Office Hours: Wednesday lectures will end about 20 minutes early, after which the instructor will stay for questions. You can also email the instructor to ask questions or arrange to meet. Special additional office hours will be arranged before the midterms and exam and as needed, including Tues Oct 10 at 3:30-5:30 in SS1085, and Tues Nov 14 at 1:10-3:00 in MP102, and Fri Dec 8 at 12:10-1:30 in SS2125 (part of Exam Jam).

Covid Protocols: Since Covid is still active, I will try to wear a mask when near students indoors, and request that you do too (though it is not required). Please let me know of any concerns. Thank you.

Discussion Page: I created a STA257 "Piazza" discussion page where students can post and answer questions about the course. You should be able to access it from the course's quercus page; let me know of any difficulties. Also, feel free to create a recognized study group, or join a drop-in study space.

Homework: There will be suggested homework exercises assigned from the textbook each week, listed within the course notes. They will not be handed in or graded, but they will be discussed in tutorial. They are strongly recommended to learn the material well. See also the book's selected answers and solutions. (The book's solutions should only be used as a last resort if you are stuck, and may contain errors; send corrections to sta257@utoronto.ca.) We will mostly skip the textbook's Challenges and Discussion Topics, but you are encouraged to think and ask questions about them, too.

Statistical Computing: This course will not require students to perform statistical computations. However, the statistical package "R" will be demonstrated in lecture, and students are encouraged to try it on their own; see this basic R information or textbook Appendix B.

Evaluation:

• 28% Midterm #1: Wed Oct 11, at 11:10 for L0101 or 3:10 for L0201; 100 mins; in room 200 of the Exam Center (EX: 255 McCaul Street)

• 28% Midterm #2: Wed Nov 15, at 11:10 for L0101 or 3:10 for L0201; 100 mins; in room 200 of the Exam Center (EX: 255 McCaul Street)

• 44% Final Exam: Sat Dec 9, at 2:00-5:00 pm, three hours, in the MP (physics) building, rooms by last name: MP 102 A--HU; MP 103 HUA--NA; MP 202 NE--WA; MP 203 WE--Z.

All tests will be closed book (no aid sheet). Bring your TCard. Do NOT sit next to anyone that you know. You may bring one basic calculator for arithmetic only.

You must take the midterm of the section that you are enrolled in. Write with pen or sharp pencil in the space provided (or last page).

You are required to follow the university's Code of Behaviour at all times. Thank you for not cheating!

Any student who cannot attend a midterm due to illness should follow the FAS Absence Declaration procedure using the ACORN Absence Declaration Tool (or for multiple absences a Verification of Illness form), and send the information to sta257@utoronto.ca. If excused, the corresponding weight will be shifted to the Final Exam. If a student cannot attend the Final Exam, they should instead submit a petition for a deferred exam.

Regrades: Regrading requests should be made within one week of when the graded item was first available, but only for genuine grading errors, not for grading judgements, otherwise your mark may end up going down rather than up. For details, see the regrading policy and instructions. (For the final exam, a different Faculty-wide process should be followed instead.)

Stressed? If you encounter challenges during your studies, then please see these support options or here or visit Academic Success or the Health & Wellness Centre or Navi for assistance and support.

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This document is available at probability.ca/sta257, or permanently at probability.ca/jeff/teaching/2324/sta257/.