Fall 2018 STSCI 5080
"Probability Models and Inference"
Syllabus

Instructor

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Office: 1194 Comstock Hall

Office hours: ~~Th 11am – 1pm~~ Tu 4:30pm – 6:30pm (updated)

Teaching Assistant

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Office hours: W 10am – 12pm at 1181 Comstock Hall

Grader

Huijie Feng

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Lecture and Discussion meeting times and places

Lecture (Instructer): Tu/Th 2:55pm – 4:10pm, Olin Hall 255

Discussion (TA): Fr 2:55pm – 4:10pm, Upson Hall 216

Course description

This course provides an introduction to probability and parametric inference. Topics include: random variables, joint and conditional distributions, standard distributions, the central limit theorem, sampling distributions and instances of likelihood-based estimation. The expected learning outcomes are listed below.

1. Students will be able to manipulate random variables and their distributions using differential and integral calculus.
2. Students will be able to derive properties of standard probability.
3. Students will be able to discuss the properties of maximum likelihood estimators of a number of classical probability models.

Prerequisites and textbook

- Prerequisite: BTRY 3010, Calculus II, or the equivalent. It is assumed that students have a good command of algebra and calculus, especially differentiation and integration; both these tools will be used extensively throughout the semester.
- Required textbook: Rice, J.A. (2013). *Mathematical Statistics and Data Analysis*, 3rd Edition. Brooks/Cole.

Tentative course outline

- Probability (Chapter 1)
- Discrete and Continuous Random Variables (Chapter 2)
- Joint Distributions (Chapter 3)
- Expected Values (Chapter 4)
- Limit Theorems (Chapter 5)
- Sampling Distributions (Chapter 6)
- Parametric Estimation (Chapter 8)
- Hypothesis Testing (Chapter 9)

Grading (tentative)

- 5 Homeworks (16%), best 4 kept
- Midterm 1 (20%) on Tuesday September 25, 1 hour, in-class, closed-books & closed notes, 1 cheatsheat allowed
- Midterm 2 (20%) on Tuesday October 30, 1 hour, in-class, closed-books & closed notes, 1 cheatsheat allowed
- Final (44%) on December 9 2pm–4:30pm, open-books & open-notes

Homeworks: We will have 5 homework assignments, which are to be submitted on paper by each individual student in-class. It can be difficult on the teaching staff to have to decide on a case-by-case basis what constitutes an acceptable/unacceptable reason for a homework to be late. Thus, we will simply not accept any late homework (and they are given 0). At the end of the semester, we will drop your lowest homework score.

Some tips

- Please provide not only final solutions but intermediate steps so that the grader can understand how you reached your final solutions.

- You may work on problem sets with classmates, but write up solutions individually.

Schedule (tentative)

Homework 1: Posted on 8/28 (Tu). Due 9/6 (Th).

Homework 2: Posted on 9/11 (Tu). Due 9/20 (Th).

Homework 3: Posted on 10/2 (Tu). Due 10/11 (Th).

Homework 4: Posted on 10/16 (Tu). Due 10/25 (Th).

Homework 5: Posted on 11/6 (Tu). Due 11/15 (Th).

Midterms: There will be two midterm exams. They are in-class, 1 hour long, closed-books and closed-notes exams. But you can bring 1 cheatsheet (letter size paper) and you can use two sizes of the sheet.

Final: The final exam is open-books and open-notes.

In both midterm and final exams, there will multiple-choice questions and open-ended questions. Any electronic device (laptop or tablet) is not allowed to use in the exams.

Each exam will be based on : (i) the material covered in class during the period before the exam; (ii) all homework problems due prior to the exam; (ii) the material covered in the discussion session. I will give you a practice exam (with solutions) before each exam.

The offcial policy of this course is that

<u>no makeup exams will be offered</u>

except for extraordinary circumstances, such as serious illness. The instructor reserves the right to decide if the circumstances justify a makeup exam. The instructor must be noticed at least a week prior to the exam that a student will not be able to take the exam.

Univeristy breaks: October 9 (Tu), November 22 (Th) and 23 (Fr).

Academic Integrity: As per university policy, all syllabi should contain some reference to the Cornell Academic Integrity Code. Violations are dealt with seriously, so please read
https://cuinfo.cornell.edu/aic.cfm

Accommodations for Students with Disabilities: In compliance with the Cornell University policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances, so arrangements can be made. Students are encouraged to register with Student Disability Services to verify their eligibility for appropriate accommodations.