STAT 7302: Advanced Statistical Theory II

Spring 2020

Instructor: **Xinyi Xu**
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Office Hours: Monday 3-4pm, or by appointment

Grader: **Prateek Sasan**
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Lecture Hours: MWF 9:10-10:05am, Journalism Bldg 295

Prerequisites: Statistics 7201 and 7301

Course Description:
   STAT 7302 is the second course of a two-semester sequence on Advanced Statistical Theory.   The sequence is intended primarily for PhD students in Statistics or Biostatistics.   The first half of the course will follow Chapters 3 and 4 of the textbook "Testing Statistical Hypotheses", and the second half will consist of introductions to various recent developments of hypothesis testing.   Core topics covered in this course include: the Neyman-Pearson lemma, uniformly most powerful tests, monotone likelihood ratio models, confidence bounds, unbiased tests, asymptotic theory of the tests, an introduction to the bootstrap and Bayesian hypothesis testing.

Text: *Testing Statistical Hypotheses*, 3rd Edition, by E.L. Lehmann and J.P. Romano

Additional References:
   1) *Mathematical Statistics*, Second Edition, Peter J. Bickel and Kjell A. Doksum
   2) *An Introduction to the Bootstraps*, by B. Efron and R. Tibshirani
   3) *Elements of Large-Sample Theory*, by E.L. Lehmann

Website: https://carmen.osu.edu
   Important announcement and homework assignments will be posted here.

Grading:

Homework	40%
Midterm	30%
Final project and presentation	30%

Homework: Homework will be collected approximately bi-weekly in the first half of the semester. Students are encouraged to work together on the problems, but each student must hand in his or her own work.

Midterm: There will be an in class, closed-book, closed-notes midterm exam, which focuses on the materials from Chapters 3 and 4 in "*Testing Statistical Hypotheses*" and asymptotic hypothesis tests. The tentative date of the midterm is April 6, Monday.

Final project and presentation: In the second half of the semester, each student is expected to choose a topic related with hypothesis testing, to read research papers and to even perform some simple analysis. At the end of the course, each student is expected to submit a written project report and make an oral presentation. Further details on the project will be given in class.

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/ .

Special Accommodations: Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614-292-3307, slds@osu.edu; slds.osu.edu.

Tentative weekly schedule*

Week	Topic
1	The structures of non-randomized tests and randomized tests
2	Neyman-Pearson lemma and most powerful tests
3	Monotone likelihood ratio distributions and UMP tests
4	p-values
5	Confidence bounds
6	Least favorable distributions and two-sided hypothesis tests
7	Unbiased tests, similarity and completeness
8	UMP unbiased tests
9	Asymptotic hypothesis tests
10	Asymptotic hypothesis tests, bootstrap
11	Bootstrap
12	Bayesian hypothesis tests
13	Final project presentations
14	Final project presentations

*: This is just a tentative schedule; the actual materials covered in each lecture might not be exactly the same

No class: January 20 (MLK) and March 9-13 (spring break)