

Math 590S - Introduction to Random Matrices
Spring 2021, WH G002, MWF 1:10 - 2:10

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Office: Whitney 130
Office Hours: by appointment

Course website: <http://people.math.binghamton.edu/renfrew/MATH590S/2021.html>

Text: Topics in random matrix theory by Terence Tao
available at <https://terrytao.files.wordpress.com/2011/02/matrix-book.pdf>

Additional References:

- An Introduction to Random Matrices by Greg W. Anderson, Alice Guionnet, Ofer Zeitouni available at <http://www.wisdom.weizmann.ac.il/~zeitouni/cupbook.pdf>
- Spectral Analysis of Large Dimensional Random Matrices by Zhidong Bai and Jack Silverstein
- Free Probability and Random Matrices by James Mingo and Roland Speicher available at https://mast.queensu.ca/~mingo/mingo_speicher_2017.pdf
- A large number of lectures notes can also be found by searching the internet.

Course Description: This course is an introduction to random matrix theory. Our main focus will be to understand the spectrum of large random matrices. The course will begin with a review of probability and linear algebra and then move on to:

- Wigner's semicircle law
- Free probability
- Exact computation of joint eigenvalue densities for GUE
- Bounds on the largest and smallest singular values
- The circular law

Prerequisite

Knowledge of linear algebra, analysis, and probability.

Grading:

Attendance - 10%
Homework - 30%
Presentation - 30%
Final Exam - 30%

Grading scale: A: 90%+, B: 80%+, C: 70%+, D: 60%+, F: 0%+

Homework:

1. Homework will be assigned roughly every other week and posted on the course website.
2. I will drop the lowest homework score.

Presentation:

1. You will present (orally or written) one paper/ problem.
2. You can choose one or can give you one.
3. More information will be given halfway through the class.

Exams:

1. There will be one take home final.

Disability-related Equal Access Accommodations

Students who wish to request academic accommodations to insure their equitable access and participation in this course should notify the Instructor by the second week of the class. Authorizations from Services for Students with Disabilities (SSD) are generally required. We encourage you to contact SSD at (607) 777-2686 and to schedule an appointment with the Director or Learning Disabilities Specialist. Their website (<http://www.binghamton.edu/ssd>) includes information regarding their Disability Documentation Guidelines. The office is located in UU-119.

Academic Dishonesty

Cheating is considered a very serious offense. According to the University Catalog, cheating consists of: Giving or receiving unauthorized help before, during or after an examination. The full strength of Binghamton Academic Honesty Policy will be applied to anyone caught cheating. This may include failing the course, and further disciplinary action.

Students found cheating will be reported to Harpur College.