Econ 701, Fall 2022

Analytical Methods for Mathematical Economics

Instructor: Jaden Yang Chen

Class Time: T&R, 11:00 am - 12:15 pm, 0001 Gardner Hall.

Office Hours: Thursday, 2 pm – 3 pm or by appointment at yangch@unc.edu, Gardner 301.

Teaching Assistant: Jiaxi Li, lijiaxi@email.unc.edu. **TA office hours:** TBA

Class Description

The goal of this course is to introduce students to mathematical tools which will be useful in economic research. In this course, students will study linear and non-linear optimizations, dynamic programming, and stochastic processes. The course will discuss economic applications of these tools.

Tentative Course Outline

1. Linear Programming and Convex Analysis
2. Non-linear Optimization
3. Correspondences and Fixed-point Theorem
4. Dynamic Programming
5. Stochastic Processes

Readings

[1] Sundaram, Rangarajan K. *A first course in optimization theory*. Cambridge university press, 1996.

[2] Vanderbei, Robert J. *Linear programming*. Springer International Publishing, 2020.

[3] Gale, David. *The theory of linear economic models*. University of Chicago press, 1989.

[4] Vohra, Rakesh V. *Advanced mathematical economics*. Routledge, 2004.

[5] Williams, David. *Probability with martingales*. Cambridge university press, 1991.

[6] Durrett, Rick. *Probability: theory and examples*. Vol. 49. Cambridge university press, 2019.

Course Requirements

- *Problem set.* Problem sets will be posted on Canvas if you get stuck, you can discuss with the instructor or the TA during our office hours. Late submission will not be accepted. Please be aware that it is your responsibility to point out any grading or clerical errors within one week of receiving the assignment back.
- *Exams.* There will be 2 in-class midterms on September 22 and November 1, and a final (date TBA). If a student misses a midterm, the weight of that midterm in the course grade will be added to the weight on the student's final. An exception will be made for University approved absences (see http://catalog.unc.edu/policies-procedures/attendance-gradingexamination/); students with this type of absence may request a make-up examination at a time convenient to both student and instructor.

Grades

- Problem Sets: 20%
- First Midterm (Sep 22): 20%
- Second Midterm (Nov 1): 20%
- Final (TBA): 40%

Honor Code

All students are expected to follow the guidelines of the UNC Honor Code. If you are unsure about which actions violate the Honor Code, please consult studentconduct.unc.edu.

Syllabus Changes

I reserve the right to make changes to the syllabus including project due dates and test dates. These changes will be announced as early as possible.