

Economics 701: Analytical Methods for Mathematical Economics

CONTACTS	Kyle Woodward kyle.woodward@unc.edu Gardner Hall 305A	Haoran Zhang hz124@live.unc.edu
COURSE	Meetings Tuesday/Thursday, 11:30am–12:45am The Pope Box (501)/virtual	Friday, TBD TBD/virtual
	Office hours TBD Gardner 305A/virtual	TBD TBD/virtual
GOALS	The purpose of this course is twofold: first, it is to help you become conversant in the necessary tools underlying formal economic analysis. Second, it is to help you learn to employ robust logical arguments as a matter of habit. These goals are mutual side effects, and will be treated as equally important.	
PREREQUISITES	There are no prerequisites for this course.	
RESOURCES	There is no textbook for this course. If you are interested in further references, the following texts may prove useful: <ul style="list-style-type: none">▣ C. Pugh. <i>Real Mathematical Analysis</i>, Springer International Publishing, 2015.▣ A. Kolmogorov and S. Fomin. <i>Introductory Real Analysis</i>. Courier Corporation, 1975.▣ W. Rudin. <i>Principles of Mathematical Analysis</i>. McGraw-Hill, 1976.▣ N. Stokey and R. Lucas. <i>Recursive Methods in Economic Dynamics</i>. Harvard University Press, 1989. <p>As with other things in life, many problems that you run into — or definitions that you forget — may be addressed through Google. Peter Norman has also developed a comprehensive set of notes for this course.</p> <p>You are encouraged to use your classmates as resources. If you need further assistance, contact Haoran or myself.</p>	

GRADING

Problem sets

There will be five problem sets, roughly evenly distributed across the semester. You are expected to be able to complete the problem sets yourself, but may submit your final work in groups of up to three students; this reduces both Haoran's labor and your own. **Submitted problem sets must be typeset and not handwritten.** Problem sets will be due **at the beginning** of Monday lecture, and will be graded on a $\checkmark + |\checkmark| \checkmark -$ basis.

Exams

There will be one midterm and a final exam. The final exam will be cumulative, but will over-emphasize the material that did not appear on the midterm.

Grades

Your final grade will be one of $\{H, P, L, F\}$. Five problem sets will comprise 25% of this grade, the midterm will count for a further 30%, and the final exam will make up the remaining 45%.

AGENDA

There is some room for variance in each of the topics we will discuss. Depending on time and interest, we may go more or less in depth into a particular area.

1. **Set theory**
Sets, functions, countability
2. **Metric spaces**
Metrics, sequences, convergence, basic topology
3. **Function spaces**
Convergence, basic measure theory
4. **Fixed points**
Brouwer, Kakutani, contraction mappings, Blackwell
5. **Linear algebra**
Convexity, separating hyperplanes
6. **Optimization**
Concavity and quasiconcavity, maximum theorem, envelope theorem

Community Standards in Our Course and Mask Use

This fall semester, while we are in the midst of a global pandemic, all enrolled students are required to wear a mask covering your mouth and nose at all times in our classroom. This requirement is to protect our educational community — your classmates and me — as we learn together. If you choose not to wear a mask, or wear it improperly, I will ask you to leave immediately, and I will submit a report to the Office of Student Conduct. At that point you will be disenrolled from this course for the protection of our educational community. An exemption to the mask wearing community standard will not typically be considered to be a reasonable accommodation. Individuals with a disability or health condition that prevents them from safely wearing a face mask must seek alternative accommodations through the Accessibility Resources and Service.

Title IX Resources

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Please contact the Director of Title IX Compliance, Report and Response Coordinators in the Equal Opportunity and Compliance Office, Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (confidential) to discuss your specific needs. Additional resources are available at Safe at UNC.