Economics 890: Quantitative Techniques II

CONTACTS

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COURSE

Meetings
Tuesday/Thursday, 12:30pm–1:45pm
Gardner 307

Friday, 2:30pm–3:45pm
Gardner 307

Office hours
Tuesday/Thursday, 2:00pm–3:00pm
Gardner 305A

[TBD], [TBD]
[TBD]

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.

RESOURCES

There is no textbook for this course. If you are interested in further references, the following texts may prove useful:

⊞ *Real Mathematical Analysis*, Charles Pugh, 2002.

⊞ *Introductory Real Analysis*, Andreï Kolmogorov and Sergei Fomin, 1970.

⊞ *Principles of Mathematical Analysis*, Walter Rudin, 1976.

⊞ *Recursive Methods in Economic Dynamics*, Nancy Stokey and Robert Lucas, 1989.

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 developed a comprehensive set of notes for this course.

You are encouraged to use your classmates as resources. If you need further assistance, contact Adam or myself.

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 your labor and Adam's. **Submitted problem sets must be typeset and not handwritten.** Problem sets will be due **at the beginning** of Friday section, 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 $\{H, P, L, F\}$. 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