Syllabus
Introduction to Quantitative Economics
Fall 2007

This course is designed to introduce new graduate students to the kinds of quantitative analysis in wide use in the economics literature. For those who have not taken a math course at this level, the insistence on formalism may appear strange, but it is both intentional and, I believe, essential to being able to understand and communicate new research in economics.

Website

My website is jasandford.com. All course materials, including lecture notes, assignments, a detailed schedule, and information on exams will be posted here as they become available.

Email

My email address is jeremy.sandford@uky.edu. Feel free to contact me with questions or concerns about the course.

Office Hours

My office hours are 4-5pm Monday and 8-9am Friday, in 335L Gatton. You are welcome to try to find me outside of these hours; you may pop in unannounced with a quick question, but if you'll need more than 5 minutes of my time, please send me an email to set up an appointment.

Homework

New homeworks will be posted to the website approximately weekly, and will be due in class about a week later. Due dates will be posted on each homework, and are not flexible. Homeworks will be graded largely for thoroughness but also for accuracy. In my view, it is highly desirable that you work in groups on your homeworks, and, as such, collaboration on homeworks is expected. Each student should turn in her own draft of each homework. Your lowest-scored homework will not be counted towards your course grade.

You will probably spend the bulk of your time for this course on homeworks. This is ok. They are the best preparation for exams, and the best way to learn how to apply the material in ways that will be useful to you in your life as an economist. Many problems will not be solvable without serious thought and reviewing class notes and texts. Some may be too difficult even then. All of this is expected. Consult with your classmates, and, if you are still stuck, me, and be prepared to have the occasional problem where the best you can do on the write-up is to describe why it is hard.

Though not required, I encourage you to try writing your homeworks in LATEX. Learning now will save you aggravation in the future when you begin writing papers.

Schedule

A broad outline of topics follows on the last page of this syllabus. This schedule will evolve over the semester; I will post each lecture's topics on the web site. I welcome student comments or suggestions on choice of topics.

Course Materials

My lectures will comprise the main content of the class. Additionally, there are several texts you can and should consult to read more on the topics covered in class.

The book on file with the bookstore is "Mathematics for Economists," by Carl Simon and Lawrence Blume. There exist several other good mathematical economics books, most notably "Fundamental Methods of Mathematical Economics," by Alpha Chiang and "A First Course in Optimization Theory," by Rangarajan Sundaram. Any of these books would be a useful addition to your bookshelf. Most graduate microeconomics books contain math appendices which can be usefully consulted.

My lectures will be based on my own notes, which will not generally be derived directly from Simon and Blume. If you are relying on this as your textbook, this is good because it will then give you a second point of view on each topic, and bad because you may have to jump around between sections and some topics I do in class may not be covered in the same depth in Simon and Blume.

The book I use when I really need to understand a topic in basic analysis is "Principles of Mathematical Analysis," by Walter Rudin. This is a well-written book on pure mathematics that is about at the level of an advanced undergraduate math student. Some lectures on topics in the first part of the course will align closely with Rudin's book. Also, "Undergraduate Analysis," by Serge Lang, is a fairly standard reference for economists, and is broader in scope than Rudin's book.

Grading Policies

Course grades will be determined by a combination of homework (10%), one midterm (40%), and a final exam (50%).

Exams

The midterm will be in class on Tuesday October 23, and the final exam will be Tuesday December 11 from 1-3pm in BE 208. You use any materials you wish in completing the exam, with the exception of cellphones, laptops, and anything else which is normally capable of communicating. You will complete exams individually.

I expect all of you to take both exams at their scheduled time. In the unlikely event of an excused absence from an exam, I will work with you to determine how to best complete the course. I alone will decide whether an absence is excused or not. In the past, I have only excused students who were very ill, had gravely ill family members, or who were observing a religious holiday.

<p align="center">***ex ante*** **outline of topics**</p>

Preliminaries

    Sets and functions

    Definitions

    Sequences

    Series

Topology

    Definitions

    Metrics

    Continuity

    Compactness

Differentiation

    Extending notions in $\mathbb{R}$

    Linear functions

    Linear algebra review

    Mean value theorem

    Taylor's theorem

Optimization

    Weierstrass theorem

    Unconstrained optimization

    Concavity and second-order conditions

    Lagrange's theorem

    Kuhn-Tucker theorem

Dynamic programming

    Cauchy sequences

    Bellman equations

    Guess and verify

    Contraction mapping theorem

Comparative statics tools

    Inverse function theorem

    Implicit function theorem

    Envelope theorem