ECONOMICS 630—Mathematics for Economists (Ph.D. Section)
Course: ECON 630 (Th, 7:20-10:00)
Term: Fall 2012
Instructor: Garett Jones
Office Hours: Th, 2:30-5:00, Carow Hall 8A; 6-6:45, GMU Fairfax Starbucks or TBA location
Phone: (314) 973-7243
Email: gjonesb@gmu.edu [include “630” in subject line]
Website: I will use Blackboard this semester for all course-related materials.

Course Description
The primary goal of this course is to provide an introduction to a modern language widely used in economics: The language of mathematics. Economists use only a narrow set of idioms and expressions in this rich language, and we’ll focus on the most important ones: mostly linear algebra, multivariate calculus, probability, and difference equations. By gaining comfort with this language, you will be able to read academic articles yourself without having to depend on third- or fourth-hand translations written by other economists or journalists, and with some expertise in this language you will be in a better position to contribute to the academic literature.

Required Texts
Carl Simon and Lawrence Blume, Mathematics for Economists. A standard text. About 20% more theoretical than I’d like, it has the merit of covering all of the big topics while including a surprising number of useful (and still widely-used) economic applications. I also recommend the answer key for the text.

Avinish K. Dixit, Optimization in Economic Theory. This will be our main text during the middle of the semester. A short classic that covers many of this semester’s topics in 183 fast-moving, elegantly written pages.

Recommended
Edward T. Dowling, Schaum’s Outlines: Introduction to Mathematical Economics, third edition. You can never have too many solved problems. An inexpensive way to practice the skills you’ll be building, especially if the material is new to you.

Potentially useful
Pemberton and Rau, Mathematics for Economists. A textbook written at a more basic level than Simon and Blume, I considered using this as our main text. It has many good applications and I’ll surely refer to it for lecture and exam ideas.

There are many good texts covering optimization methods in economics and a few that do well with the linear algebra used by economics. I’d recommend finding one you like to use as a supplement to the assigned texts.

Recommended approach to the course: Solve many problems, perform a few proofs.

Tentative Schedule
Week 1: The Algebra of the Expectations Theory of the Term Structure

Week 2: Matrix Algebra and Vectors as points in space
S/B Chapters 6, 8-9.
Week 3: The Geometry of Ordinary Least Squares
S/B, Chapters 10-11, and portions of Davidson/Mackinnon, chapter 1 (on Blackboard).

Test 1: 7:20-8:30 pm on Week 4: 20% of grade.

Week 4: Multivariate Calculus:
S/B 13, 14, 15 (with possible informal discussion of 12).

Weeks 5-6: Multivariate Optimization:
16-19, plus highlights of 20-22.

Weeks 7-8: Dixit, Chapters 1-8: A more economics-driven version of weeks 5-6.

Week 9: Test 2. 35% of grade

Week 10: Uncertainty and Time: Dixit, Chapter 10; S/B, Appendix A5.

Week 11: Discrete-time Dynamics: No optimization
S/B 23; Hamilton, Time Series Analysis, chapter 1 (Blackboard).

Week 12: Discrete Infinite-Horizon Optimization: The Bellman Equation.
Handouts: Kreps, A Course in Microeconomic Theory, Appendix 2 (Blackboard), Dixit #12, and likely one more treatment of the Bellman equation.

Week 13: Wrapping up & Review.

Final: 40% of grade.

I reserve the right to make moderate modifications to the syllabus, including the addition of short application-oriented readings.

Grading Procedures
Five percent of your grade will be based on informed class participation (a proxy for attendance and civil, intelligent comments).

Tests 55%
Class Participation 5%
Final Exam 40%

Academic Ethics
Please note that you are at an Honor Code university. You are expected to conduct yourself in a manner that is consistent with the learning mission of the University. All forms of academic dishonesty are strictly forbidden. This includes but is not limited to the following: communicating with other students during exams; unapproved references to books, notes or “cheat sheets” during exams; and plagiarism—representing another person’s work as your own. You should be aware that plagiarism is often easy to recognize. The minimum penalty for an incident of academic dishonesty will be a score of zero on the assignment where the dishonesty occurred. For further information on academic ethics, please consult the student handbook.
Class Attendance/Missed Exams
I highly recommend class attendance, since I believe there is strong correlation between class attendance and academic performance. If you happen to miss a class, you should ask a classmate to borrow their notes. I will not, as a general rule, offer make-up exams or early finals. Exceptions will be made for students with documented illnesses.

For Further Reading:
David Kreps, A Course in Microeconomic Theory. The first few chapters of this text give a slow, masterful, coverage of the basics of the microeconomic theory of choice.

Dennis Lindley, Making Decisions. Low-tech coverage of choice under uncertainty. He recently wrote a similar book entitled Understanding Uncertainty.


Hal Varian, Microeconomic Analysis. If you’re looking to speak the language of microeconomics, this is a great place to start.

Schaum’s Outline of Probability and Statistics. Recommended if you’ve never seen probability or statistics before.