

Introduction: Econ 630: Mathematical Economics (I) will introduce students to the mathematical tools necessary for understanding economic work of others and supporting your own, including single and multivariable calculus, exponents and logarithms, linear algebra, and optimization.

Prerequisites: You must be enrolled as a graduate student in the Economics Ph.D. program at G.M.U. or have the dispensation of the instructor. You must be comfortable with calculus through multivariable integration and differentiation and have been introduced to linear (matrix) algebra.

Logistics: This is Economics 630: Section 1(01272). Lectures on Thursdays, 7:20 -10:00 pm in Enterprise Hall Rm 175, Fairfax Campus, George Mason University.

E-mail is the best way to reach me outside of class. I usually answer within 24 hours. My Office hours are on Thursday, 3 pm to 5 pm in Enterprise 328, at the Fairfax campus. My office phone is 703-993-1156 (office) and the department fax number is 703-993-1133 (fax)

#### Course Requirements

Problem Sets: 20% of final grade.

12 problem sets, of which I will drop the lowest two, worth 20 points each.

Problem sets are due in or before class on the dates indicated. I will not accept late problem sets. If you are not able to attend class you must e-mail or fax the problem set to me by 5 pm on the due date. I can accept problem sets written in MS Word or WordPerfect.

One in Class Midterm: 30% of Final Grade. (300 points)

Held in class. NO MAKE-UPS. The midterm is voluntary (see below).

Final Examination: 50% of final grade.(500 points on exam)

Final Exam is Thursday, December 11. 7:30-10:15 pm. Usual class room.

The final is a RESURRECTION FINAL. If you do better on the Final than on your midterm, the Final will REPLACE the midterm. The final does NOT replace your problem set grades. (Therefore if you skip the midterm, your final will automatically replace the midterm.)

If you cannot take the final and your excuse is accepted by the dean, you will get a temporary grad of "AB," and I will give you a make-up exam within ten days of the final. If you miss the final for any other reason you will receive a grade of "Incomplete" (i.e. an "IN") for the course.

Honesty: All students are expected to be familiar with University policies on cheating, plagiarism, and proper citation of sources. I will fail any student who hands in work that is not his or her own. I will fail any student who fails to properly credit and cite sources used for the problem sets. If I am convinced that you have cheated on any of the exams, I reserve the right to give you EITHER or BOTH 1) a score of zero on that exam and 2) a quality grade of "F" for the course. Of course, no one in this course would cheat, so this paragraph is unnecessary.

Collaboration on problem sets:

Everyone should find study partners to solve the problem sets and prepare for the exams in this course. In order to eliminate even the hint of impropriety you MUST list the names of all people with whom you worked or from whom you received any assistance whatsoever on the problem set. It is understood that you will UNDERSTAND and be able to REPLICATE all work that you hand in.

I will occasionally mess with your minds by handing out two (or more) almost identical problem sets, so straight copying may be embarrassingly obvious. I will also do the same on the exams.

Collaboration on Exams:

FORBIDDEN. All exams will be closed book, with, obviously, no assistance from others. In general there will be no written aids EXCEPT those distributed with the exam.

Acknowledgements:

No introductory theory course is ever created from whole cloth, and this one is no exception. I am indebted to many people for help in preparing these materials, especially Andrew Sellgren.

## Reading

Required textbook:

Simon, Carl P. and Lawrence Blume. 1994. *Mathematics for Economists*. Norton.

Polya, G. 1957. *How to Solve It: A New Aspect of Mathematical Method*. 2<sup>nd</sup> ed. Princeton University Press.

McCloskey, Deirdre. 2000. *The Vices of Economists - The Virtues of the Bourgeoisie*. Amsterdam University Press.

Suggested textbooks:

Math References (when the textbook doesn't make sense, try another one.)

Ostaszewski, Adam. 1993. *Mathematics in Economics: Models and Methods*. Blackwell.

I know everyone recommends Chiang *Fundamental Methods of Mathematical Economics*, and many of you will already have a copy, but it is very poorly written. I find it most useful when I am having trouble sleeping. The two books above are written better.

Microeconomic Theory (to which the math is being applied)

For an intuitive approach:

Nicholson, Walter. *Microeconomic Theory: Basic Principles and Extensions*.

Frank, Robert. *Microeconomics and Behavior*. McGraw Hill.

Pindyck, Robert and Daniel Rubinfeld. *Microeconomics*. Prentice-Hall

For a more rigorous, mathematical approach to micro theory:

Varian, Hal. *Microeconomic Analysis*. 3<sup>rd</sup> edition 1992. Norton. ISBN: 0-39-395735-7

Mas-Colell, Andreu, Michael D. Whinston, and Jerry R. Green. *Microeconomic Theory*. 1995. New York: Oxford University Press

Matching texts and students is more of an art than a science, and I am always trying to improve the state of the art. Suggestions for other texts and feed-back on the assigned and suggested texts will be gratefully accepted.

Schedule of Class Topics and Reading Assignments

The following schedule contains the topics, reading assignments, due dates, and dates of exams. The topics and assigned reading will likely change as the semester progresses, but the due dates and the exam dates are set in stone.

All reading assignments are DUE on the day they are listed.

Week 1: 8/28	Introduction. One Variable Calculus. Chap 1 and 2. Polya: Introduction and Part I: In the Classroom
Week 2: 9/4	One Variable Calculus. Chap 3, 4 and 5. McCloskey: Vices of Economists
Week 3: 9/11	Linear Algebra. Chap (5) & 6 and 7.
Week 4: 9/18	Matrix algebra and determinants. Chap (7), 8, 9 and 26
Week 5: 9/25	continued
Week 6: 10/2	continued
Week 7: 10/9	continued
Week 8: 10/16	Midterm
Week 9: 10/23	Euclidean Geometry and Linear Independence. Chap 9, 10 and 11
Week 10: 10/30	continued
Week 11: 11/6	Multivariable Calculus: Limits and Open Sets, Functions of Several Variables, and Implicit Functions. Chapter 13, 14, 15.
Week 12: 11/13	continued. Math Camp this Friday and Sunday.
Week 13: 11/20	Optimization: Chapters 16 - 19. Math Camp this Friday and Saturday
Thanksgiving Recess: 11/27	
Week 14: 12/4	Special Functions and Economic Applications: Chap 20, 21, 22
Final Exam: 12/11	Final Exam Thursday, Dec. 11, 2003. 7:30-10:15 pm

## Support

I have found Math is best learned through repetition. No one understands a point in math the first time through. For this reason, one three-hour class per week is NOT the best way to learn this material. (One of the most convenient, perhaps, but pedagogically difficult.)

In order to learn more effectively I will make available a range of teaching aids. Participation is voluntary, but highly recommended.

1. READ AHEAD.

2. Polya

3. Weekly Sections: led by our Teaching Assistant. Time and Day to be arranged.

4. Math Camp

I will be hosting a 3-day Mathematical Retreat, probably over Columbus Day Week-end (after the first Mid-Term.) Participation is entirely voluntary. In Math Camp we will basically review the entire course.

(All math camp materials will be available in electronic format as well.)