

Economics 504: Mathematical Economics
Fall 2008
Tues,Thurs 11:00 - 12:15

1 Contact Information

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2 Textbooks

There are three required texts for the course: [Velleman \[2006\]](#), [Hoy et al. \[2001\]](#), and [Silberberg and Suen \[2001\]](#). [Velleman \[2006\]](#) provides a strong, readable introduction to how to do a proof. [Silberberg and Suen \[2001\]](#) provides a thorough introduction to using mathematics in economics. Compared to other texts, it has a stronger emphasis on applying mathematical methods to economics. In addition to providing a slightly easier introduction to the material covered in [Silberberg and Suen \[2001\]](#), [Hoy et al. \[2001\]](#) will also be the primary source for linear algebra and dynamics.

3 Course Description

This course teaches the logical and mathematical skills required for success in a PhD Economics program. An emphasis will be placed on introducing mathematical concepts in the context of economic examples. The primary topics covered in this course are: Logic and Proof, Matrix Algebra, Multivariate Calculus and Optimization, and Dynamic Optimization. In addition, this course will introduce you to a number of open-source computing tools, such as LaTeX, SciPy, and GnuPlot, that will increase your analytic efficiency. Introducing these tools will help you bridge the gap between economic theory and empirical application. We will occasionally meet in the computer pods for labs on these tools. [Table 1](#) shows a tentative list of chapters to be covered.

Our TA, Justin Smith, will lead weekly recitations. These recitations will go over selected homework problems. You are expected to attend.

4 Teaching Philosophy

My role as instructor is not to teach you all the material. Rather, my role is to help guide you as you teach yourself. Both while in graduate school and after graduate school, you will have to teach yourself new skills and economic methods. This class will attempt to

Table 1: Tentative Readings

Ch 1 (V)	Sentential Logic
Ch 2 (V)	Quantificational Logic
Ch 3 (S&S)	Functions of several variables
Ch 4 (S&S)	Profit maximization
Ch 5 (S&S)	Matrices and determinants (read on own - review)
Ch 10 (H)	Advanced topics in linear algebra
Ch 6 (S&S)	Comparative Statics: the traditional methodology
Ch 7 (S&S)	The envelope theorem and duality
Ch 8 (S&S)	Derivation of cost functions
Ch 9 (S&S)	Cost and production functions (special topics)
Ch 10 (S&S)	Derivation of consumer demand functions
Ch 14 (S&S)	Maximization with inequality and non-negativity constraints
Ch 17-25 (H)	Difference equations, differential equations, optimal control (as time)

ease the transition between undergraduate and graduate learning. With this in mind, I will provide structure through assignments and quizzes so that you clearly understand what you need to learn. When I teach, I will attempt to be concrete and clear. However, much of what I will expect you to learn you must teach yourself. I will assign reading and assignments on certain topics that I will not talk about in class but which you will be responsible for learning.

This mindset should also affect how you approach your homework assignments. The point of the assignments is not to get the "right" answer; it is to learn how to approach and think through the problems. Remember: when you are working on a real economic problem, there will be no answer key available that you can look at to see if you got the right answer. You need to become the most critical judge of whether the work you have done is logical, thorough, and correct. Working with other students on the assignments, discussing how you approached the problem, and explaining your work will be helpful. It is only when you can explain and defend what you did that you really understand it. However, just meeting with other students and trading answers will not help your understanding or grade.

In-class activities and problem-solving will also be an important component of the class.

5 Grading

There will typically be weekly assignments and quizzes every two to three weeks. (See Table 2 for the dates.) In addition, there will be a midterm exam and a comprehensive final. Table 3 shows how your grade will be calculated.

Absolutely NO late assignments will be accepted. Your lowest scoring assignment and quiz will be dropped. If for any reason you are unable to turn in one assignment or

Table 2: Important dates

Quiz 1	9/9
Quiz 2	10/2
Midterm	10/14
Quiz 3	11/4
Quiz 4	11/20
Final	12/16 from 12:30-2:30 pm

Table 3: Grade weights

Assignments/Labs	25%
Quizzes	25%
Midterm	25%
Final	25%

take one quiz, this will count for your dropped work.

I take academic honesty very seriously. Cheating or plagiarism is potentially punishable by a failing grade for the course and referral to the university.

References

- M. Hoy, J. Livernois, C. McKenna, R. Rees, and T. Stengos. *Mathematics for Economics*. Mit Pr, 2 edition, 2001. ISBN: 978-0262082945.
- E. Silberberg and W. Suen. *The Structure of Economics: A Mathematical Analysis*. McGraw-Hill Higher Education, New York US, third edition, 2001. ISBN: 978-0072343526.
- Daniel J. Velleman. *How to Prove It: A Structured Approach*. Cambridge University Press, Cambridge, second edition, 2006. ISBN: 978-0521675994.