Syllabus

Introduction to Mathematical Economics - Economics 4808 - Fall 2007

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Office:	Economics 14C
Office hours:	MWF 11:00-12:30, TR 2:00-3:30
Class Schedule:	class meets MWF 10:00-10:50, GUGG 205

Course Description

Econ 4808 is a course that will improve your math skills and will introduce you to how mathematical tools are applied in economic analysis. The ability to apply mathematics is crucial for economic analysis. Thus, this course is essential for anyone who wants to pursue graduate work in economics or a career in economic analysis.

In principles of economics courses, ideas are both presented anecdotally and graphically. Graphs allow us to visualize more difficult economic concepts so graphs will be used in this course. But mathematical notation is more precise and compact. It allows us to understand more complicated concepts than is possible with just words and graphs. For example, graphs are useful when the phenomenon being studied involves just two variables. When there are more variables, mathematical notation and the ability to manipulate it becomes very powerful analytical tool.

The course covers the mathematics and economic applications of equilibrium, slopes and derivatives, differentials, optimization (maximizing and minimizing profit, cost and utility), constrained optimization (e.g., maximizing utility subject to the budget constraint) and integration. Applications include problems in consumer and producer theory, general equilibrium, welfare economics, growth and discounting, oligopoly behavior, game theory, statistics, and econometrics.

The course will follow the unpublished text written by Professor Edward Morey. The material is available at: http://www.colorado.edu/Economics/morey /4808/4808home.html.

Prerequisites

Principles of Economics (Econ 2010 and Econ 2020, or Econ 1000) are prerequisites, and so are Econ 1078 (Mathematical Tools for Economists 1) and Econ 1088 Mathematical Tools for Economists 2), or the equivalent. One or more semesters of Calculus would suffice for Econ 1078 and 1088. This course and Intermediate Micro Theory are compliments. It is **very** important that you fulfill the prerequisites **before** you take this course, and **still** understand the materials in the prerequisites. To be successful in mathematical economics, you need to first be comfortable with algebra and derivatives. If you have any uncertainty as whether you are under or over qualified to take the course, please talk to me ASAP.

Class format

The course includes lectures, problems and discussion. In-class problems will be solved both individually and in groups.

The readings for this course will be posted on the course web site although some of the material for which you are responsible will be presented in lectures only, and is not explicitly covered in the readings.

Review questions, will be posted on the course web site.

Readings

I will not assign specific readings from a text book. However, you need access to good algebra and calculus texts.

Essential Mathematics for Economic Analysis (Knut Sydsaeter and Peter Hammond) is the official math text for undergraduate econ majors here at C.U. You are expected to own a copy and understand much of the material in this book. The book is the required text for Econ 1078 and Econ 1088 and students in those courses are told to keep and use the book until they finish their undergraduate major in economics. If you don't have a copy you should be able to easily find one online. ISBN 027368180X.

You should also have an intermediate micro theory textbook that will provide you the theory that you need; e.g. the one you used in Econ 3070. *Intermediate Microeconomics* (Hal Varian) is a good example.

Evaluation

Your grade will be determined by five components. Quizzes are 15%. The better of the two midterm exams is 25%. The cumulative final exam is 35%. The problem sets (homework assignments) are 25%.

Review questions and homework problems sets will be posted for each section of the course. Late homework will not be accepted. Some of the assignments will be done in groups. I will tell you in advance if an assignment is a group endeavor. You choose your own group. The group will work together and turn in only one assignment.

Everyone in the group will get the same grade for that assignment. . Homework assignments will be graded randomly.

Use the review questions to prepare for exams. I strongly encourage you to write out answers to these questions and discuss them with your classmates.

MIDTERM 1:	Monday, October 1 st
MIDTERM 2:	Monday, November 12 th
FINAL EXAM:	Tuesday, December 18, 7:30 a.m 10:00 a.m.

Tentative Course Outline

Text chapters are in parentheses.

- I. Introduction; Models (Theories) and Tools. A brief review of necessary and sufficient, what's a theory (model), variables, functions, sets, and proofs (*S&H*: chap 1, chap 2, chap 3: sections 3.4-3.7)
- II. Equilibrium Analysis, that is, Economic Models and Static Analysis (there is no a lot to read in S&H for this section, but review Chapter 2 Chapter 12 *Tools for Comparative Statics* is relevant but too advanced for the moment we will return to it later).
- 1. Equilibrium definition, partial and general equilibrium models.
- 2. Simple partial equilibrium models: a simple linear model of supply and demand; a simple nonlinear model of supply and demand; a simple Keynesian macro model.
- 3. Moving toward general equilibrium models (G.E.).

III. Economic Applications of Differential Calculus

- 1. The nature of comparative static analysis and the concept of a derivative: slopes, continuity, limits and derivatives (*S&H*: Chapter 4).
- 2. Rules of differentiation: first-order derivatives, higher-order derivatives, partial derivatives (*S&H* 15.3-15.6), economic applications of derivatives (marginal revenue, marginal cost, marginal products, elasticities, Shepard's Lemma and the conditional input demand function, macro models and market models, etc.).

IV. Total Differentials (S&H 5.4)

1. Differentials - definition and the basics.

- 2. Economic applications of total differentials: isoquants, isocost lines, indifference curves and budget lines.
- V. Economic Applications of Constrained Optimization
- VI. Integration: An Introduction and Some Simple Economic Applications
- VII. Game Theory and Oligopolistic Behavior

University Policies

Please be aware of the university policies regarding classroom behavior, honor code, disabilities, religious practices and sexual harassment.

University policies regarding classroom behavior are available at http://www.colorado.edu/policies/classbehavior.html and at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

Information regarding the University Honor Code is available at http://www.colorado.edu/policies/honor.html and at http://www.colorado.edu/academics/honorcode. The Honor Code Council can be contacted by email at honor@colorado.edu or by telephone at 303-725-2273.

University policies regarding disabilities are available at http://www.colorado.edu/disabilityservices. Disability Services can be contacted by telephone at 303-492-8671, or in person at Willard 322.

University polices regarding religious practice are available at http://www.colorado.edu/policies/fac_relig.html.

University policies regarding Sexual Harassment and Amorous Relationships are available at http://www.colorado.edu/odh/. The Office of Discrimination and Harassment can be reached by telephone at 303-492-2127. The Office of Judicial Affairs can be reached at 303-492-5550.

All campus policies should be accessible at http://www.colorado.edu/policies/.