

ECON 413
Advanced Economic Analysis

Spring 2011
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Office Hours

Walk in: TR 10:00am – 12:00pm; 2:30pm – 3:30pm; Email: TR 8pm – 9pm; and by appointment.

Course Web Page: <http://facstaff.uww.edu/ahmady/courses/econ413/>

This is the web page for the course. Here you can find the course schedule, lecture notes, problem sets and more.

Prerequisites

ECON 202 – Principles of Macroeconomics AND
MATH 243 or MATH 250 or MATH 253

In this course, we will be using mathematics extensively. In particular, you should be able to algebraically manipulate equations, solve equations, and calculate slopes of functions. As such, you will find it beneficial to review calculus concepts such as partial and total derivatives.

Required Resources

1. Required Text: *Fundamental Methods of Mathematical Economics*, by Alpha Chiang and Kevin Wainwright, 4th Edition, 2005, McGraw Hill. ISBN: 0-07-010910-9.
2. The Course Homepage: <http://facstaff.uww.edu/ahmady/courses/econ413/>

Other useful texts or sources you may wish to look at:

- *Methods for Economics*, by Michael Klein, 2nd Edition, 2002, Addison Wesley/Prentice Hall. ISBN: 0201726262
- *Mathematics for Economists*, by Simon and Blume, 1994 – Anyone interested in pursuing graduate studies in economics should consider purchasing this book. It is an excellent reference book.
- *A First Course in Optimization Theory*, by Rangarajan K. Sundaram, 1999 – A more theory orientated book that covers the ideas behind optimization theory.
- *Principles of Mathematical Analysis*, by Rudin, 1976 – A book which gives a good grounding in Real Analysis.
- *Elementary Linear Algebra*, by Anton, 1991.

Course Description Objectives and Assessment

This course is an advanced course in mathematical economics that is intended to provide a preview of the technical rigors involved in graduate studies. As such, this course will expose the student to the use of applied mathematics in solving economic problems. We will explore advanced techniques used to study both microeconomic and macroeconomic problems, whilst consolidating the mathematical techniques needed for graduate work. Thus, students intending to go on to graduate school (in economics), or any student who is

interested in brushing up on their math skills or interested in exploring the rigors of technical analysis will find this course extremely beneficial.

Course Requirements and Grading

This course has the following requirements which will be used to assign you a grade at the end of the semester. There will be four quizzes, a midterm exam and a final exam. Each quiz is worth 10 percent, the midterm is worth 30 percent and the final exam is worth 30 percent.

Quizzes	4 x 10% (each)	= 40 %
Midterm Exam		30 %
Final Exam		<u>30 %</u>
		<u>100 %</u>

A Note on Letter Grades:

As a general guideline, grades will be assigned based on the raw scores from the grading scheme above as follows:

A:	>=86	C+:	66-69
A-:	82-85	C:	62-65
B+:	78-81	C-:	56-61
B:	74-77	D:	50-55
B-:	70-73	F:	<50

Please note that the scale above is only an approximation. I will curve the raw scores obtained from the grading scheme above at the very end of the semester.

Attendance Policy

Enrollment in this course is taken as a commitment from you that you have made room in your life to fulfill the obligations of this course - coming to class, being there for exams when they are scheduled, etc. I will not record attendance, but you will find yourself at a significant disadvantage if you miss class. **It is the student's responsibility to obtain any materials or information missed due to absence.**

Advice

The key piece of advice that I would say to you is to make sure you spend sufficient time trying to grasp the ideas that are being presented in class and in the papers you will read. These ideas are often complex and it takes time to fully grasp the issue at hand. You may find it useful as well to attend my office hours with any questions that you have. However, if you choose to use office hours, please come prepared with a list of questions, as that will probably allow us to use the time more effectively.

There is a lot of math in this course. If you get stuck or feel like you're falling behind, talk to your peers and do come use my office hours! Come and see me if you have any questions whatsoever, be it about the material, or some concept you haven't fully grasped yet. It will be easier for me to put you on the right track rather than have you struggle through something that you do not understand.

Policy Statement

The University of Wisconsin-Whitewater is dedicated to a safe, supportive and non-discriminatory learning environment. It is the responsibility of all undergraduate and graduate students to familiarize themselves with University policies regarding Special Accommodations, Misconduct, Religious Beliefs Accommodation, Discrimination and Absence for University Sponsored Events. (For details please refer to the Undergraduate and Graduate Timetables; the “Rights and Responsibilities” section of the Undergraduate Bulletin; the Academic Requirements and Policies and the Facilities and Services sections of the Graduate Bulletin; and the “Student Academic Disciplinary Procedures” [UWS Chapter 14]; and the “Student Nonacademic Disciplinary Procedures” [UWS Chapter 17].

UWW Student Honor Code

As members of the University of Wisconsin – Whitewater College of Business & Economics community, we commit ourselves to act honestly, responsibly, and above all, with honor and integrity in all areas of campus life. We are accountable for all that we say and write. We are responsible for the academic integrity of our work. We pledge that we will not misrepresent our work nor give or receive unauthorized aid. We commit ourselves to behave in a manner that demonstrates concern for the personal dignity, rights and freedoms of all members of the community. We are respectful of college property and the property of others. We will not tolerate a lack of respect for these values.

This code originated at Wheaton College.

Course Outline and Reading List

This course outline is tentative and I reserve the right to amend the schedule as I see fit. These changes will be announced in class and posted on the course webpage. We will cover as many topics as time permits, which in turn will depend on the pace of the class.

1: Introduction

Introduction: Notation and basic set theory; functions.

2: Linear Algebra

Topics in Linear Algebra include:

Systems of equations and matrices; Gauss-Jordan Elimination; Matrix Algebra; Formal definition of a matrix. Symmetric Matrices. Row space, column space and null space. Rank and nullity. Fundamental Theorem of Linear Algebra. Determinants. Cramer’s Rule; Definiteness of a matrix.

3. Euclidean Spaces

Topics in Euclidean Spaces include:

Vectors. Inner Product. Distance between vectors; Vector Spaces (Euclidean Spaces) and Subspaces; Hyperplanes. Budget Sets and Simplexes; Linear Combinations and Spanning Sets; Linearly Independent Sets. Basis and Dimension. Eigenvalues and Eigenvectors.

4. Multivariate Calculus

Topics in Multivariate Calculus include:

Differentiation at a point. Partial Differentiation. Gradients and directional derivatives. Derivative matrix (Jacobian). Differentiation and continuity. The Chain Rule. Higher order derivatives. Young's Theorem. Hessian Matrix. Implicit Differentiation and the Implicit Function Theorem.

5. Optimization

Topics in optimization include:

Quadratic Forms; Definiteness of Quadratic Forms; Local vs. absolute maximum; Unconstrained Maximum; Constrained local maximum. Kuhn-Tucker optimization. Convexity and concavity. Concavity and optimization. Quasiconcavity and quasiconvexity. The Envelope Theorem. The Envelope Theorem with constrained optimization.

6. Difference and Differential Equations

Topics include:

Introduction to differential equations and boundary value problems. Higher-order differential equations. Lag and difference operators. Linear first-order difference equations. Boundary conditions. ARMA representations.

7. Dynamic Optimization

Topics include:

Calculus of Variations; Euler equations; Boundary Conditions; Transversality condition. Introduction to Optimal Control Theory; The Maximum Principle; State variables, Controls, and Laws of Motion; Hamiltonian Functions.

8: Real Analysis (Time Permitting)

Topics in Real Analysis include: Ordered Sets. Upper and Lower Bounds. Supremeum and infimum. Metrics and distance functions. Neighborhoods, interior and limit points. Open and Closed Sets. Bounded Sets. Interior and Closure of a set. Compact and Connected Sets. Sequences, subsequences. Cauchy Sequences. Series, geometric series.