University of Hawaii at Manoa
Department of Economics

**Mathematics for Economics**
**ECON 627, Fall 2007**
*(Tentative syllabus; subject to change)*
TR 12:00-1:15 at Saunders 244

Instructor: Nori Tarui
Office: Saunders 509
Phone: 956-4703
Email: nori@hawaii.edu
Office Hours: TBA

**Course Content and Objectives**
- The goal of this course is to prepare you for, or remind you of, the mathematical underpinnings of economic theory courses–Econ 606, 607, 608 and 609. To that end, we will seek to translate undergraduate economic theory topics into the language of mathematics, taking considerable care to develop the necessary mathematical framework and adding a few bells and whistles in the process. In addition, several increasingly important topics in economic theory are inherently mathematical—notably dynamic optimization models that form the basis of macroeconomic growth theory, natural resources exploitation models and other “dynamic” topics. We will cover both the mathematics and economics of these subjects, though only briefly. I would emphasize that this is not a course in mathematical economics—the sub-discipline seeking to extend the frontiers of economic theory in mathematical form.
- Ideally, we would cover each topic in this course just in time for the theory courses to use that topic. Inevitably, we will miss the timing on at least some topics. If the theory courses arrive at some topic that requires mathematics we have not yet covered in this course, you will nonetheless be expected to read mathematical appendices or other textbooks for that course to obtain at least an intuitive feel for the mathematics. Of course, you are also welcome to request adjustments in our schedule, and I will try to accommodate.

**Course Requirements**

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<tr>
<th>Requirement</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>25%</td>
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<tr>
<td>Two Midterms</td>
<td>50% (25% each)</td>
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<tr>
<td>Final</td>
<td>25%</td>
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There will be periodic problem sets. The problem sets will be mostly analytical but may also include some numerical problems. The latter type may involve the use of *Excel* or *Matlab* on the computer. I encourage you to work together on problem sets but each of you will hand in your own assignment.
Texts
There are two books that we will reference fairly extensively in the course:

Other references
*Calculus and its application to economics:*

*Analysis:*

Schedule
Introduction: Using and writing mathematics in coursework
Chapter A1 Sets, Numbers and Proofs
Chapter 2, 3, 4 One-Variable Calculus: Foundations, Applications, Chain Rule
Chapter 12 Calculus of Several Variables: Limits and Open Sets
Chapter 13 Functions of Several Variables
Chapter 14 Calculus of Several Variables I
Chapter 15 Implicit Functions and Their Derivatives
Chapter 7 Linear Algebra: Systems of Linear Equations
Chapter 8 Matrix Algebra

Chapter 9 Determinants: An Overview
Chapter 10 Euclidean Spaces
Chapter 11 Linear Dependence
Chapter 16 Optimization: Quadratic Forms
Chapter 17 Unconstrained Optimization
Chapter 18 Constrained Optimization I: First Order Conditions

Chapter 19 Constrained Optimization II
Chapter 21 Concave and Quasiconcave Functions
Chapter 23 Eigenvalues and Eigenvectors
Chapter A4 Integral Calculus
Application: Utility maximization vs. expenditure minimization, Roy’s identity, Shephard’s lemma, Slutsky matrix*
Dynamic Optimization (selected chapters from Chiang’s Elements of Dynamic Optimization)
The Calculus of Varizations Ch 2, 3, 6
The Hamiltonian Function Ch. 7
More on Optimal Control Ch. 8
Infinite-Horizon Problems Ch. 5, Ch. 9

Disability Access
If you feel you need reasonable accommodations because of the impact of a disability, please: (1) contact the KOKUA Program (V/T) at 956-7511 or 956-7612 in room 013 of the QLCSS; (2) speak with me privately to discuss your specific needs. I will be happy to work with you and the KOKUA Program to meet access needs related to a documented disability.