Course Description: This course introduces mathematical concepts and techniques commonly used in the graduate economics theory courses. This course covers the mathematics that is most frequently used by economists. Topics to be covered include linear algebra, vector calculus, unconstrained and constrained static optimization theory, differential and difference equations, and dynamic optimization theory.

Text:

Simon and Blume (1994) and Chiang (1992) are primary textbooks. Since the course will proceed rapidly, and much will hopefully be material you have covered before, you are encouraged to review what you can. These two books are required and available at the bookstore. Introductory textbooks such as Hoy et. al. (2011) and Chiang and Wainwright (2005) are good for quick review. These two books are optional.


Grading: 1 mid-term exam 30%
1 final exam 50%
7 or 8 homework 20%

There will be one midterm exam and one final exam. The mid-term exam will count for 30% and the final exam will count for 50% of the final grade. Seven (or eight) homework assignments will count for 20% of the final grade. Those homework assignments are designed to help you prepare more effectively for the exams. Those homework assignments are due at the beginning of the class.

Exam Policy: Unless otherwise notified, there will be no makeup exam for the exams. You will receive grade 0.0 if you miss the final exam. If you cannot take the exam on the
scheduled time, you should contact me at least a week in advance to schedule a makeup exam. The mid-term exam will be at our regular class time. Final exam is cumulative.

**Help**: Office Hours: TR 9:15-10:15 or by appointment  
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Schedule:

Outline for the Course

Calculus Review
Ch. 1-Ch. 5

Linear Algebra
Gaussian Elimination & Rank condition Ch. 7
Matrices Ch. 8
Inverse, Determinants, and Cramer's Rule Ch. 9
Vector Spaces Ch. 10, 11

Multivariate Calculus
Limits and Sets Ch. 12
Function and Calculus of Several Variables Ch. 13, 14
Implicit Function Theorem Ch. 15
Quadratic Forms Ch. 16
Unconstrained Optimization Ch. 17
Constrained Optimization Ch. 18, 19
Homogeneous and Homothetic Functions Ch. 20
Concave and Quasiconcave Ch. 21

Dynamic Methods
Integral calculus A4
Systems of Differential Equations Ch. 24, 25
Difference Equations

Dynamic Programming
Introduction Ch. 25, Chiang Ch. 1
The Calculus of Variations Chiang Ch. 2, Ch. 3, Ch. 6
The Hamiltonian Function Chiang Ch. 7
More on Optimal Control Chiang Ch. 8
Infinite-Horizon Problems Chiang Ch. 5, Ch. 9