ECON5153 MATHEMATICAL ECONOMICS

University of Oklahoma, Fall 2011

Tuesday and Thursday, 9:00-10:15am, Hester Hall 213A

Instructor:	Qihong Liu
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Office Hours:	Tuesday and Thursday, 1:30-2:30pm, and by appointment
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Course Description

This is the first course in the graduate Mathematical Economics/Econometrics sequence. The objective of this course is to acquaint the students with the fundamental mathematical techniques used in modern economics, including *Matrix Algebra*, *Optimization* and *Dynamics*. Upon completion of the course students will be able to set up and analytically solve constrained and unconstrained optimization problems. The students will be also able to solve linear difference equations and differential equations.

Textbooks

Required: Simon and Blume: *Mathematics for Economists*, W.W.Norton, 1994.

Other useful books available on reserve at Bizzell:

Chiang and Wainwright: *Fundamental Methods of Mathematical Economics*, McGraw-Hill, Fourth Edition, 2005.

Avinash Dixit: *Optimization in Economic Theory*, Oxford University Press, Second Edition, 1990.

Michael D. Intriligator: *Mathematical Optimization and Economic Theory*, Prentice-Hall, 1971.

Assessment

Grades are based on homework (15%), class participation (10%), two midterm exams (20% each) and final exam (35%). You are encouraged to form study groups to discuss homework and lecture materials. All exams will be in closed-book forms.

Problem Sets

Several problem sets will be assigned during the semester. You will have at least one week to complete each assignment. Late homework will not be accepted. You are allowed to work

with other students in this class on the problem sets, but each student must write his or her own answers. Each student is also required to write the names of the other students he or she worked with on each homework assignment.

Exam Dates

Midterm 1 – Tuesday, October 4

Midterm 2 – Thursday, November 10

Final – Wednesday, December 14, 8:00-10:00am

Tentative Outline

The following is a list of topics I wish to cover. We may not be able to cover all the topics. Approximate number of lectures to cover each chapter is listed in parenthesis.

Chapter 1: Introduction (0.5)

Chapter 2: One-variable calculus is mainly for self-reading (1.5)

Chapter 3: Matrix algebra (6)

> System of linear equations; Matrix operations; Elementary matrices; Rank, determinant, submatrix, minor, cofactor and adjoint of a matrix; Algebra of vectors; Planes in Euclidean spaces; Linear independence.

Chapter 4: Functions of several variables (3)

> Limits and sets; Level curves; Total differentials; Taylor expansion; Directional derivatives and gradients; Hessian.

Exam 1 approximately here.

Chapter 5: Optimization (11)

> Quadratic forms; Definiteness of matrices; Unconstrained optimization; Constrained optimization; Kuhn-Tucker conditions; Lagrangian multiplier; Second-order conditions; Envelope theorem; Homogeneous and homothetic functions; Concave/convex and quasiconcave/quasiconvex functions.

Exam 2 approximately here.

Chapter 6: Dynamics (7)

> Linear difference equations; Eigenvalues and eigenvectors; Ordinary differential equations; Dynamic optimization.

Handouts: Integration; Probability and Statistics (1)

Final exam.