Economics 741: Advanced Mathematical Economics
Syllabus UNCG Fall 2006

INSTRUCTOR
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COURSE LOCATION AND TIMES
MWF 8:45-9:50 Aug. 14-Oct. 4 in Room 456, Bryan Building
Final Exam: 8:00-11:00 Fri. Oct. 6.

COURSE DESCRIPTION
A PhD in economics requires an extensive familiarity with mathematical modeling. In this course, you will learn the mathematical tools necessary for economic modeling. In addition, we will cover the basic theory of probability and statistics.

TEXTBOOK
There are two required texts for this course: Mathematics for Economists by Carl Simon and Lawrence Blume (SB) and Introduction to Statistics and Econometrics by Takeshi Amemiya (A). In addition, we will use the text Microeconomic Theory by Mas-Collel, Whinston, and Green (MWG).

GRADING
Grading will be determined by homework assignments (10%), a modeling project (20%), one take-home midterm exam (30%), and an in-class final exam (40%).

SPECIFIC COURSE LEARNING OBJECTIVES
Students will learn about the following:

1. simple proofs.
2. the basic properties of sets and functions of several variables.
3. constrained optimization problems.
4. homogeneity, homotheticity, and (quasi-)concavity.
5. random variables and probability distributions.
6. the implicit function theorem.
7. matrix properties.
8. correspondences and fixed points.
9. linear and dynamic programming.
COURSE OUTLINE
The assigned readings from the text are given below. Read the assigned chapters before class.

A. Week 1: Sets, numbers and proofs. (SB App. A1)
B. Week 1: Set theory: limits, and open and closed sets. (SB #12, MWG M.F.)
C. Week 1: Functions of several variables: level curves, continuity. (SB #13, MWG M.F)
D. Week 2: Calculus of several variables: matrix notation and derivatives. (SB #14, MWG M.A.)
E. Week 2: Unconstrained optimization (SB #17, MWG M.J.)
F. Week 3: Constrained optimization (SB #18-19, MWG M.K.)
G. Week 3: Homogeneous and homothetic functions (SB #20, MWG M.B.)
H. Week 4: Concavity and quasi-concavity (SB #21, MWG M.C.)

Midterm
I. Week 4: Probability (A #1-2)
J. Week 5: Random variables and probability distributions (A #3)
K. Week 5: Moments (A #4)
L. Week 6: Binomial and normal random variable (A #5)
M. Week 6: Large sample theory (A#6)
N. Week 6: Implicit function theorem (SB #15, MWG M.E.)
O. Week 7: Matrices: negative (semi)definite, etc. (SB #16, MWG M.D.)
P. Week 7: Correspondences (MWG M.H.)
Q. Week 8: Fixed points (MWG M.I.)
R. Week 8: Linear programming (MWG M.M.)
S. Week 8: Dynamic programming (MWG M.N.)