Economics 7004: Mathematics for Economists
Fall 2016

Instructor
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Note: Please put EC7004 in the subject line

Lecture: Tuesday and Thursday 1:35 pm – 2:55 pm in D.M. Smith 104
Webpage: http://tsquare.gatech.edu

Course Description
This course intended for first year PhD students in economics. The aim of this class is to provide the fundamental mathematical tools necessary to take PhD level economics courses.

Textbooks
Mathematics for Economists, by Carl P. Simon and Lawrence Blume, 1994

Software
Before the Final Exam, three will be a review session using Mathematica. Please download Mathematica from OIT website (https://software.oit.gatech.edu/).

Grading Policy
Grades will be based on five problem sets (15%), one in-class midterms (30%), participation (10%), and a final exam (45%). Exams are cumulative and closed book. Late problem sets will not be accepted. Attendance at both midterm and final exam is mandatory, and no make-up exams will be offered.

Academic Accommodation
Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Disability Services. Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current semester in which the request is being made. Students should contact the Office of Disability Services as soon as possible since timely notice is needed to coordinate accommodations. Website: http://disabilityservices.gatech.edu/

Course Outline

I. Introduction
   a. Single variable calculus

II. Linear Algebra
   a. Row operations and reduced row echelon form (Ch. 7)
   b. Determinant (Ch. 9 & 26)
   c. Inverse matrix and Crammer's rule (Ch. 9 & 26)
   d. Vector space and linear independence (Ch. 11 & 28)
   e. Rank (Ch. 7)
   f. Eigenvalue and eigenvector (Ch. 23)
   g. Quadratic forms and definite matrices (Ch. 16)
   h. Geometry in OLS
   i. Markov Chain (if time allows)

Midterm

III. Unconstrained Optimization
   a. Calculus of several variables (Ch. 14)
   b. Implicit functions (Ch. 15)
   c. Unconstrained Optimization (Ch. 17)

IV. Constrained optimization
   a. Equality constraints (Ch. 18)
   b. Inequality constraints (Ch. 18)
   c. Mixed constraints (Ch. 18)
   d. Second Order Condition (Ch. 19)
   e. Comparative statistics

V. Dynamic optimization in continuous time
   a. Ordinary Differential Equation
   b. Hamiltonian (control theory)

VI. Monotone Comparative Statistics (if time allows)
   a. Supermodularity
   b. Topkis's Theorem

Final Exam (2:50 pm – 5:40 pm, Dec. 15th)