Boston University  
Department of Economics  
EC 505 Elementary Mathematical Economics  
Spring 2011  
Syllabus

Course description
This is an introductory course in mathematics for economic analysis, aimed at MA students with background in both economics and mathematics. The course consists of four parts. In the first, we introduce some concepts from linear algebra. The second and third parts are devoted to multivariate calculus and constrained static optimization. The last section provides an introduction to differential equations and dynamic optimization techniques (time permitting).

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Meetings
MW 12.30 – 2.00 in CAS B36

Blackboard website
http://blackboard.bu.edu/bin/course.pl?course_id=11springcasec505_a1. You will be asked to login. Use your BU username and Kerberos password

Text
It is highly recommended that each student has access to at least one of the two following texts: Pemberton and Rau: Mathematics for Economists, Manchester University Press 2006. Simon and Blume: Mathematics for Economists, W. W. Norton 1994.  
Note on the textbooks: Simon and Blume (SB) is more rigorous and contains a more in-depth coverage of most topics than Pemberton and Rau (PR). However, unlike PR, SB does not cover dynamic optimization techniques.  
Copies of both textbooks have been ordered by the BU bookstore.

Prerequisites
Students are expected to be familiar the material covered in chapters 1-10 in PR/chapters 2-5 and A2 in SB (one-variable calculus/optimization, logarithmic and exponential functions and their derivatives, and basic trigonometry)
Examination
There will be a set of home assignments, one midterm exam, and one final exam. They will count to your final grades as follows:
Assignments: 20%
Midterm 40%
Final 40%

Exam dates
Midterm: March 9 in class
Final: TBA

Make-up exams
No make-up exams will be given unless acceptable reasons can be provided as defined by the university.

Academic conduct
It is a student’s responsibility to know and understand the provisions of the CAS Academic Conduct Code (copies are available in room CAS 105). Cases of suspected academic misconduct will be referred to the Dean’s Office.
Course outline
Below is a preliminary list of topics. Some deviations from the actual schedule may be necessary as the class progresses. Students are responsible for attending classes and learning of any changes in the schedule.

I. Linear algebra
Systems of equations
Vectors and matrices
Matrix algebra
Determinants
Linear independence
PR: Ch 11, 12, 13.1-3, SB: 7, 8.1-4, 9.1-2, 10.1-6, 11.1

II. Multivariate calculus
Functions from \( \mathbb{R}^n \) to \( \mathbb{R}^m \)
Inverse functions
Calculus (gradients, total derivatives, directional derivatives)
Implicit functions
Quadratic forms

III. Optimization
Unconstrained optimization
Constrained optimization
Value functions
Envelope theorems
Comparative statics
PR: 16, 17, 18, SB: 17.1-4, 18.1-6, 19.1-5

IV. Dynamic analysis
Integration
Ordinary differential equations
Systems of differential equations
Eigenvalues
Phase diagrams
Dynamic optimization in continuous time