

Syllabus
CAS EC 505 Mathematical Economics
Fall 2011

Instructor

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Teaching fellow

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Time and location

MW 12:30 - 2:00 PM in GCB 205

Office hours

M 5:00 - 6.30 p.m., TW 10:00 - 11:30 a.m.

Website

The web site for this class is:

Use your BU login name and Kerberos password to login

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.

Recommended readings

Pemberton and Rau: *Mathematics for Economists*, Manchester University Press 2008.

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

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)

Grading and exam policy

There will be assignments, one midterm exam and a final exam. Assignments and their due dates will be posted on the course web site. No late assignments will be accepted. There will be no make-up exams. Unless a student fails to take an exam because of documented health problems or family emergencies, the score of a missed exam will be zero.

Grading weights

Assignments 20%

Midterm Exam 40%

Final Exam 40%

Exam dates

The midterm exam will take place **October 19** in class.

Final exam time and place **12.30 - 2.30 p.m., December 21**, room TBA

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

PR: 13.4, 14.1-2, 14.4, 15, SB: 13, 14, 15.1-3, 16.1-2

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

PR: 19.1-3, 20, 21.1-3, 22.1, 23.1, 24, 26.2, 27, 28, SB: A4, 24.1-5, 25.1-5