CAS EC 505 Mathematics for Economics
Syllabus
Spring 2017

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 three parts. In the first, we introduce some concepts from linear algebra. The second part is devoted to multivariate calculus and constrained static optimization. The last section provides an introduction to differential equations and dynamic systems.

Instructor

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Teaching fellow/grader

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Meetings

MW 2.30 – 3.45 pm in CAS 233

Blackboard website

Use your Kerberos password to access the course site on Blackboard Learn.

Recommended texts

Simon and Blume: *Mathematics for Economists*, W. W. Norton 1994.
Pemberton and Rau: *Mathematics for Economists*, Manchester University Press 2012. Copies of the textbooks have been ordered by the BU bookstore.

Prerequisites

Students are expected to be familiar the material covered in chapters 2-5 and A2 in SB (one-variable calculus/optimization, logarithmic and exponential functions and their derivatives, and basic trigonometry).

Exercises

A set of assignments will be distributed throughout the semester. These need not be handed in and will not count towards the grade. Solutions will be posted on the course website.

Examination

There will be one midterm test and a final exam. The exam dates are:
Midterm: March 1 in class
Final:

Make-up exams

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

Classroom conduct and participation
Students are expected to attend all lectures. Each lecture will build on the knowledge acquired in the previous one and, if you miss a class, you are responsible for getting the lecture notes from your classmates. **Please do not use electronic devices such as phones, ipads, computers, etc. during the lectures.**

Academic conduct
It is a student's responsibility to know and understand the provisions of the CAS Academic Conduct Code. 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. The readings refer to the text by Simon and Blume.

I. Linear algebra
Linear systems
Matrix algebra
Linear independence and basis
Vector spaces
Linear transformations
The determinant function
Parametric expressions
Inner product and norm
Convexity
Readings: 7.1-4 8.1-4, 9, 10.1-6, 11

II. Multivariate calculus and optimization
Open sets, closed sets, compact sets
Calculus (gradients, total derivatives, directional derivatives)
Implicit function theorem
Quadratic forms
Unconstrained optimization
Constrained optimization
Value functions
Envelope theorems
Comparative statics
Readings: 12, 13, 14, 15.1-3, 16.1-2, 17.1-4, 18.1-6, 19.1-5

III. Dynamic analysis
Integration
First-order ordinary differential equations
Second-order ordinary differential equations
Eigenvalues and eigenvectors
Systems of differential equations
Stability
Phase diagrams and phase portraits
Linearization of nonlinear ordinary differential equations
Readings: A4, 23.1, 24.1-5, 25.2-5, 26.1-3, 27.1-5, 28.1-2