IN700 Mathematics for Economists   Instructor: Alexis Orellana
Fall 2015

Syllabus

Overview

This is an introductory class to the core subjects covered in the Master in Applied Economics program. The objective is to give students the necessary analytic and mathematical tools employed in economic theory. At the end of the course, students are expected to understand and apply the fundamental mathematical notions to the master's courses' core contents.

Course Material

The material covered in this class will be divided in the following chapters:

1. Sets and Functions (4 classes)

    (a) Convex Sets (Ref. 3, pp. 499-503)
    (b) Basic Topology (Ref. 3, pp. 505-515; Ref. 2, pp. 58-63)
    (c) Continuity (Ref. 3, pp. 515-520)
    (d) Functions in $\Re^n$: Concavity and quasi-concavity (Ref. 3, pp. 529-545; Ref. 2, 245-266)

2. Calculus and Optimization in $\Re^n$ (6 classes)

    (a) Differential Calculus in $\Re^n$ (Ref. 3, pp. 553-565; Ref. 2, pp. 156-179)
    (b) Introduction to optimization problems (Ref. 4, pp. 1-2, 14-16)
    (c) Optimality conditions (Ref. 4, pp. 14-27; Ref. 5, pp. 954-963; Ref. 2, pp. 274-300):
        • Unconstrained optimization problems
        • Constrained optimization problems
    (d) The Theorem of the Maximum (Ref. 2, pp. 301-304)
    (e) The Envelope Theorem (Ref. 2, pp. 312-316)

3. Comparative Statics (3 classes)

    (a) The Implicit-Function Theorem (Ref. 2, pp. 205-210)
    (b) Supermodularity (Ref. 4, pp. 33-47)
    (c) Topkis' Monotonicity Theorem (Ref. 4, pp. 33-47)

4. Other Topics (4 classes)

    (a) Fixed Point Theorems: Brouwer and Kakutani (Ref. 5, pp. 952-953; Ref. 2, pp. 221-224)
    (b) Metric Spaces and the Contraction Mapping Theorem (Ref. 2, pp. 79-90)
    (c) Dynamic Programming (Ref. 5, pp. 968-970; Ref. 2, pp. 549-555)

Evaluation

Course grades are based on weekly problem sets and a final exam. This final exam will cover all the material taught in class. Students are strongly encouraged to discuss and work together on each problem set, but each student needs to submit his/her answers individually. Your final grade will be a weighted average of your performance in the problem sets (40%) and your final exam (60%).

Bibliography

The following texts may help you to deepen the content of each section:

1. Real Mathematical Analysis, Charles Pugh. Springer.

2. Mathematical Methods and Models for Economists, Angel de la Fuente. Cambridge University Press.

3. Advanced Microeconomic Theory - Jehle and Reny. (Mathematical Appendix)

4. Useful Math for Microeconomics (by Jonathan Levin, available at
   `http://www.stanford.edu/~jdlevin/Econ%20202/UsefulMath.pdf`)

5. Microeconomic Theory - Mas Colell, Whinston and Green; pp. 926 - 970 (Mathematical Appendix)