MIT Department of Economics **Fall 2006**

14.102 Mathematics for Economists
TTh 2:30-4, E51-063
Recitations: F 2:30-4, E51-063

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The goal of this class is to introduce students to the principles of mathematical analysis which lie in the foundation of modern economic theory. The course will intend to enable students to conduct rigorous arguments and proofs, understand underline mathematical structure of economic problems and develop mathematical maturity. The course will focus on both rigorous mathematical proofs and economic applications of main concepts.

The main textbook for the course is

Rudin *Principles of Mathematic Analysis*

A significant part of the material will be based on that textbook and I strongly recommend students to acquire it. Other books which may be useful are

Mas-Colell, Whinston and Green "Microeconomic Theory"
Stokey, Lucas and Prescott "Recursive Methods in Economic Dynamics"
Luenberger "Optimization by Vector Space Method"

A good review book is

Simon and Blume *Mathematics for Economists*

There will be a midterm and a final exam, each counting 35% towards the final grade; there will also be problem sets, handed out approximately every two weeks, counting for the rest of the grade. The preliminary class schedule is given below, however it is subject to change depending on how the course progresses and the need of the students.

1. Basic Topology (Rudin, Ch. 2) 2 classes

2. Sequences and Series: sequences, subsequences, upper and lower limits, absolute convergence (Rudin, Ch. 3) 1 class

3. Continuity and Differentiation: mean value, Taylor series (Rudin, Ch. 4, 5) 2-3 classes

4. Sequences and Series of Function (Rudin, Ch. 7) 1 class

5. Functions of several variables (Rudin, Ch. 9) 1 class

6. Correspondences, Berge's Maximum Theorem, Weistrass Theorem (LSP, Ch. 3) 2-3 classes

7. Separating hyperplanes, finite dimention Kuhn-Tucker (SB, MWG) 1 class

8. Applications: competitive equilibrium - properties of excess demand, existence theorems 2 classes

9. Basic functional analysis. Applications to dynamic programming. (Luenberger, Ch. 2; SLP. Ch. 3 and 4) 3-4 classes

10. Measure theory and integration 2-3 classes

11. Advanced topics in optimization 4 classes