

**UNIVERSITY OF ALICANTE**  
**Master in Quantitative Economics**  
**MATHEMATICS**  
**September 2011**

## **A. OBJECTIVES**

First the basic concepts about Linear Algebra and Mathematical Analysis that are included in most undergraduate courses are reviewed. Then the course covers some topics in Optimization Theory that are frequently used in economic theory and applications. Emphasis is placed on problem solving, but also on theoretical fundamentals

## **B. CONTENTS**

### **1. Preliminaries: Sets, Functions, Numbers**

- References: [1]: Chap. A.1; [2]: Chap. 1; [4]: Chap. 1.1.

### **2. Linear Spaces and Euclidian Spaces**

- References: [1]: Chap. 10, 11; [2]: Chap. 12.1, 12.2, 12.3, 12.4; [4]: Chap. 1.2, A.3.

### **3. Matrices**

- References: [1]: Chap. 8, 9, 16, 23, 26, 27; [2]: Chap. 12.6, 12.7, 12.8, 12.9, 13, 14; [4]: Chap. A.1, A.2, A.5, A.6, A.7, 1.4

### **4. Topology in $\mathbb{R}^n$**

- References: [1]: Chap. 12, 29; [2]: Chap. 6.1, 6.2; [4]: Chap. 1.3.

### **5. Differentiability**

- References: [1]: Chap. ; [2]: Chap. 4, 5, 7, 15, 16, 30; [4]: Chap. 1.5.1, 1.5.2, 1.5.3.

### **6. Convexity and Concavity**

- References: [1]: Chap. 20, 21 ; [2]: Chap. 17.5, 17.6, 17.7, 17.8, 17.9, 17.10; [4]: Chap. 1.5.4, 1.5.5; [5]: Chap. M.G.

## 7. Correspondences and Fixed Point Theorems

- References: [3]: Chap. 14; [5]: Chap. M.H, M.I.

## 8. Unconstrained Optimization

- References: [1]: Chap. 17; [2]: Chap. 9, 17; [3]: Chap. 3; [5]: Chap. M.J.

## 9. Constrained Optimization

- References: [1]: Chap. 18, 19; [2]: Chap. 18; [3]: Chap. 3; [5]: Chap. M.K; M.L.

# C. BIBLIOGRAPHY

## C.1. Basic Bibliography

- 1 . SIMON, C. and BLUME, L. (1994), Mathematics for Economists, Norton.
- 2 . SYDSAETER, K. and HAMMOND, P.J. (1995), Mathematics for Economic Analysis, Prentice Hall, New Jersey
- 3 . SYDSAETER, K., HAMMOND, P.J., SEIERSTAD, A. and STROM, A. (2006), Further Mathematics for Economic Analysis, Pearson Education
- 4 . TAKAYAMA, A. (1995), Analytical Methods in Economics, Harvester Wheatsheaf.

## C.2. Complementary Bibliography

- 5 . MAS-COLELL, A., WHINSTON M.D. and GREEN, J.R. (1995), Microeconomic Theory, Oxford University Press.
- 6 . TAKAYAMA, A. (1985), Mathematical Economics, Cambridge University Press.

# D. GRADING SYSTEM

Final exam at the end of the course. The exam will include brief questions about the theoretical issues discussed in the course, and problems similar to those included in the problem sets.