Mathematics

Academic Year: (2018 / 2019) **Review date: 19-12-2017**

Department assigned to the subject: Department of Economics

Coordinating teacher: NUÑEZ SANZ, CARMELO

Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 1

STUDENTS ARE EXPECTED TO HAVE COMPLETED

This is a first graduate course on Mathematics for Economists. It assumes knowledge of the elementary techniques of Mathematics that are used in Economics, although they will be revisited and deepened throughout the course.

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

The objective is to provide a mathematical background for advanced courses on Economic theory. The student should learn and manage the main mathematical tools which are widely applied in the different areas of Economics.
Regarding the general competences and skills, the student will develop the ability to:
- Use the main tools that are needed in the analysis of economic problems.
- Address economic problems with precision and rigour by means of mathematical models.
- Analyze and solve the above mentioned models.
- Interpret the solutions and apply them to a real context appropiately.

On the other hand, regarding the specific competences, the student will be able to:
- Perform operations with vectors and matrices and solve systems of linear equations.
- Understand the fundamental concepts involved in the calculus of real-valued functions (with emphasis in differentiability).
- Describe the qualitative properties of real-valued functions (with emphasis in convexity).
- Articulate the different notions in a topology defined in a metric space.
- Pose and solve static and dynamic optimization problems.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Matrix and Vector Algebra. Operations with matrices, determinants and Inverse Matrices. Systems of Linear Equations. Eigenvalues and Diagonalization. Quadratic forms.
2. Topology. Interior, Closure and Boundary. Compact sets. Convergent sequences and Limits.
3. Functions of One Variable. Properties. Monotonicity , continuity and differentiation.
4. Multivariable Calculus. Continuity and Differentiation. Implicit Function Theorem.
5. Convexity. Linear functionals and hyperplanes. Separating theorems.
6. Multivariable Optimization. The Lagrange Multiplier method. The Kuhn-Tucker Theorem.
7. Dynamical Systems. Difference Equations.

LEARNING ACTIVITIES AND METHODOLOGY

Students are expected to try to solve the problems and be ready to discuss them in class. Homeworks will be assigned on a regular basis, and will be solved in the classroom. Quizzes based on the classroom material will be held in class. There will be three office hours every week (voluntary).

ASSESSMENT SYSTEM

Problem sets solved at the classroom and partial evaluations will count 40% towards the final grade.
A final exam will constitute the remaining 60% of the final grade.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- Alpha C. Chiang; Kevin Wainwright Fundamental Methods of Mathematical Economics, McGraw-Hill, 2005

- Angel de la Fuente Mathematical Methods and Models for Economists, Cambridge University Press, 2000

- Carl P. Simon; Lawrence E. Blume Mathematics for Economists, W.W. Norton & Company, Inc., 1994

- Knut Sydsæter; Peter Hammond Mathematics for Economics Analysis, Pearson.

- Knut Sydsæter; Peter Hammond Essential Mathematics for Economics Analysis, Prentice Hall, 2008

- Knut Sydsæter; Peter Hammond; Atle Seierstad; Arne Strøm Further Mathematics for Economics Analysis, Prentice Hall, 2005