Mathematics for Social Sciences

Academic Year: (2019 / 2020)   **Review date: 29-04-2019**

Department assigned to the subject:

Coordinating teacher: SANCHEZ-CUENCA RODRIGUEZ, IGNACIO

Type: Additional training ECTS Credits : 2.0

Year : 1 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

The course presents a revision of basic concepts and tools of Calculus and Linear Algebra that may be of application in the empirical research in Social Sciences. The course is of intermediate level. It is then advisable to have a solid background of Linear Algebra and Mathematical Analysis

OBJECTIVES

Knowledge of basic concepts of Calculus and Linear Algebra

DESCRIPTION OF CONTENTS: PROGRAMME

1	Introduction to Maths
1.1	Arithmetic
1.2	Algebra
1.3	Graphs and functions
1.4	Linear Equations
1.5	Quadratic Equations
1.6	Financial Maths
1.7	Introduction to calculus
2	Matrix Algebra
2.1	Elementary Geometry and Algebra using R
2.2	Vector Spaces
2.3	Matrix Basics
2.4	Norm, Rank, Trace, Determinant.
2.5	Matrix Inverse, Solution of Linear Systems
2.6	Eigenvalues and Eigenvectors
2.7	Matrices in Statistics and other applications
3	Simulation
3.1	Random numbers
3.2	Monte Carlo simulations
3.3	Monte Carlo integration
3.4	Simulating physical systems
4	Optimization
4.1	One-dimensional optimization
4.2	Linear programming
4.3	Quadratic programming

LEARNING ACTIVITIES AND METHODOLOGY

Competences will be acquired by students from:

[I] Theory classes: 5 sessions

[II] Practical classes: 5 sessions

Activities [I] and [II] will be devoted to exercises, problems, and practical cases. Teaching will make intensive use of resources available in Aula Global. Some short reading notes will be also distributed, for helping to understand specific parts of the course, and to facilitate the transmission of information during the lectures.

Continuous evaluation: 100%

Given the introductory character of the course, the final grade will be based on the submission of exercises and activities that will be proposed at the end of each session. Further details will be discussed in class.

% end-of-term-examination: 50

% of continuous assessment (assigments, laboratory, practicals…):   50

BASIC BIBLIOGRAPHY

- SYDSÆTER, K., HAMMOND, P., STRØM, A. and CARVAJAL, A. Essential mathematics for economic analysis, 5th Edn, Pearson United Kingdom, 2016

ADDITIONAL BIBLIOGRAPHY

- CHIANG, A. C. and WAINWRIGHT, K. Fundamental methods of mathematical economics, 4th Edn, McGraw Hill, 2013