Master in Economics: Empirical Applications and Policies
2016-2017

ALGEBRA &CALCULUS

CONTENT: *The objective of this course is to review the mathematics needed for the Economic Analysis. The course covers an overview of the basic requirements of linear algebra and differential and integral calculus with one and several variables.*

SYLLABUS:

1. Preliminaries: Sets and numbers

Basic set-theoretic notation and terminology. Numbers and operations: from natural numbers **N** to the real line **R**. Operations with real numbers. The plane.

2. Real valued functions of a single variable

Functions of a single real variable. Graph, domain and range of a function. Linear functions, quadratic functions, polynomials functions. Exponential and logarithmic functions. Limits and continuity.

3. Differential calculus with one variable

Derivative: the problem of calculation of a rate of change. Calculation of derivatives. Chain rule. Increasing and decreasing functions. Second and higher-order derivatives. Convex and concave functions. Maximum and minimum. Conditions for an extreme.

4. Linear algebra

The vector space R^n. Operations with vectors. Norm and distance. Linear combinations. Linearly dependent/independent vectors. Basis. Matrices. Linear systems. Gauss elimination. Rank of a matrix. Determinants. Cofactors. The inverse of a matrix. Cramer's rule.

5. Integral calculus with one variable

The problem of calculation from a rate of change. Indefinite integral: calculation of primitives. Integration by parts. Integration by substitution. Definite integral: Riemann integral. Calculation: Barrow's rule. Introduction to differential equations.

6. Real-valued functions of several variables.

Limits and continuity. Partial derivatives. Total differential. Chain rule.
Implicit functions. Homogeneous functions and Euler’s theorem. Multiple integrals. Taylor's formula.

BIBLIOGRAPHY

Sydsaeter and Hammond: Essential Mathematics for Economic Analysis, Prentice Hall, 1995.

Chiang: “Fundamental Methods of Mathematical Economics”, Mc-Graw Hill International Editions, 3th edition, 1984.

De la Fuente: “Mathematical Methods and Models for Economists”, Cambridge University Press, 2000.

Mas-Colell and Whinston: M.R. and J.R. Green, “Microeconomic Theory”, Oxford University Press, 1995.

Takayama: “Analytical Methods in Economics”, Harvester Wheatsheaf, 1994.