
Mathematics

1. Objectives

The objective of the Mathematics course is to refresh differential and integral calculus and introduce optimization methods, which are going to appear in the courses of Econometrics, Multivariate Statistics and Microeconomics. The selection of the topics is driven by their later occurrence there. It also contains a brief introduction to numerical methods.

2. Methodology

2.1. Contents

1. Derivatives
2. Differential calculus
3. Numerical solution of equations
4. Convex functions
5. Indefinite integrals
6. Definite integrals
7. Partial derivatives
8. Local maxima and minima
9. The Lagrange method
10. More on optimization
11. The least squares method

2.2. Description of the methodology

The course is based on lectures, given in a traditional, professor-to-student way. The topics covered in the lectures are explained in a set of lecture notes.

2.3. Number and title of the sessions

The course has 14 sessions, listed in the table at the end of this outline.

2.4. Description of the topics

The topics covered in each session are described in the table.

2.5. Required readings

[MATH-09] Derivatives

[MATH-10] Differential calculus

[MATH-11] Numerical solution of equations

[MATH-12] Convex functions

[MATH-13] Indefinite integrals

[MATH-14] Definite integrals

[MATH-15] Partial derivatives

[MATH-16] Local maxima and minima

[MATH-17] The Lagrange method

[MATH-18] More on optimization

[MATH-19] The least squares method

2.6. Optional readings

T Apostol (1969), Calculus, Wiley.

DW Hands (2004), Introduction to Mathematical Economics, Oxford University Press.

3. Grading

The grades are based on the exercises delivered at the end of each session (60%) and the final exam (40%).

4. Competences

4.1 General Competences

- To understand optimization methods.
- To bridge the gap between textbook formulas and their implementation in the computer

4.2 Specific Competences

- To understand the concepts of derivative and integral.
- To manage differential and integral calculus
- To manage optimization, from both the theoretical and the practical perspectives.
- To manage linear regression equations.

5. Course Outline and Bibliography

SESSION	DESCRIPTION	DOCUMENTS
03/OCT	Derivatives	Outline of the Mathematics course [MATH-09] Derivatives
03/OCT	Differential calculus	[MATH-10] Differential calculus
06/OCT	Numerical solution of equations	[MATH-11] Numerical solution of equations
06/OCT	Convex functions	[MATH-12] Convex functions
07/OCT	Indefinite integrals	[MATH-13] Indefinite integrals
07/OCT	Definite integrals	[MATH-14] Definite integrals
10/OCT	Partial derivatives	[MATH-15] Partial derivatives
10/OCT	Discussion of assignments	
13/OCT	Local maxima and minima	[MATH-16] Local maxima and minima
13/OCT	The Lagrange method	[MATH-17] The Lagrange method
14/OCT	More on optimization	[MATH-18] More on optimization
14/OCT	Discussion of assignments	
17/OCT	The least squares method	[MATH-19] The least squares method
17/OCT	Computer session	

20/OCT	Final exam	
20/OCT	Final exam	

6. Professor's Biography



Prof. Miguel-Angel Canela
Visiting Professor of Managerial Decision Sciences

Miguel Angel Canela teaches quantitative methods at IESE Business School. He holds a Ph. D. degree in Mathematics from the Universitat de Barcelona and has been a professor at this university for thirty years, as well as a senior consultant and director of the Master in Quality Management at the Institut Català de Tecnologia.

After some years devoted to research in mathematical analysis, Prof. Canela's interest was driven towards interdisciplinary research. His research experience covers a wide spectrum of applications, from statistics and mathematical modelling to diverse fields such as biochemistry, botany, nutrition and management science. He is actually working on the application of data mining techniques to business problems.