



Faculty of Economics and Business

# BACHELOR IN ECONOMICS

## FIRST YEAR

<b>Course</b>	Mathematics I	<b>Code</b>	802344
<b>Module</b>	Basic Formation	<b>Area</b>	Mathematics
<b>Nature</b>	Basic	<b>Credits</b>	6
<b>Year</b>	1	<b>Semester</b>	1

### COORDINATION

<b>DEPARTMENT</b>
Economic Analysis
<b>COORDINATOR AND CONTACT</b>
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<b>TEACHING ACTIVITIES</b>	<b>% OF TOTAL CREDITS</b>	<b>ATTENDANCE</b>
Lectures	30%	100%
Classes	10%	50%
Tutorials	6%	100%
Assessment activities	4%	100%
Homeworks and class assignments	20%	0%
Time to study	30%	0%

### SYNOPSIS

<b>BRIEF DESCRIPTION</b>
Introduction to functions of several variables. Differentiation Problems. Integration of functions



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of one variable.		
<b>PRE- REQUISITES</b>		
It is recommended a fluent handle of differentiation of one variable.		
<b>OBJECTIVES</b>		
Students should acquire the mathematical skills they need in order to solve economic analysis problems and to understand technical literature on economic theory.		
<b>COMPETENCES</b>		
General: CG1,CG2,CG4 Transversal: CT1,CT2,CT3 Specific: CE8,CE9		
<b>LEARNING METHODOLOGY</b>		
A mixed methodology of teaching and learning will be used in all educational activities with the aim of encouraging students to develop a collaborative and cooperative attitude in the pursuit of knowledge.		
<b>TOPICS COVERED (SYLLABUS)</b>		
Differential Calculus with two variables Level curves and slopes First and second order partial derivatives and elasticities. Differentiation and linear approximation. Gradient properties Quadratic approximation Composition of functions. The chain rule Homogeneous functions Integration Area and Definite Integrals. The fundamental theorem. Economic Applications Indefinite Integrals Integration by Parts. Integration by substitution Introduction to Double Integrals		
<b>ASSESSMENT</b>		
<b>EXAMS</b>	% Share of Final Grade	50%
Examen final		
Other activities	% Share of Final Grade	30%



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Midterm exams		
Other Activities	% Share of Final Grade	20%
Exercises and active participation		
<b>ASSESSMENT CRITERIA</b>		
<p>Minimum requirement in Final Exam: 3.5 points out of 10 of which 2.25 for differential calculus and 1.25 for integral calculus. This minimum grade is requested in both calls, ordinary and extraordinary call. In any call (ordinary or extraordinary), the final exam is 50% of the final evaluation.</p>		
<p>Any student will be graded with "Exam: not taken" in February in the following cases:</p>		
<ul style="list-style-type: none"><li>a) He has no grades in any midterm or final exam</li><li>b) He only has grade in the first two midterm exams.</li></ul>		
<p>Any student not taking the "extraordinary call" exam will be graded with "Exam: not taken"</p>		
<p><b>Continuous assessment in the extraordinary examination:</b> in case one student has failed the ordinary examination, having attended the final exam and participated in the continuous assessment, the mark to be considered as continuous assessment for that extraordinary examination will be the final mark obtained in the ordinary examination.</p>		



## TIMETABLE

Week	Contents	Practical classes	Homework
1 <sup>a</sup>	<b>LECTURE 1: Functions of two variables</b> Functions of many variables Domain and Range Graphs. Level Curves Partial derivatives. Economic application	Solution of some exercises from the Problem Set 1	Reading Material: Textbook Chapter 11 Exercises: Problem Set 1
2 <sup>a</sup>	<b>LECTURE 1: Functions of two Variables</b> Partial Derivatives. First order. Elasticity of a one variable function. Partial Elasticities Marginality	Solution of some exercises from the Problem Set 1	Reading Material : Textbook Chapters 11 and 12. Exercises: Problem Set 1
3 <sup>a</sup>	<b>LECTURE 1: Functions of two variables</b> Second order partial derivatives The hessian Matrix Schwartz Theorem	Solution of some exercises from the Problem Set 1	Reading Material : Textbook Chapters 11 and 12 Exercises : Problem Set 1
4 <sup>a</sup>	<b>LECTURE 2: Linear and Quadratic Approximation</b> Differentiation. Linear Approximation The Tangent Plane Linear approximation with elasticities	Solution of some exercises from the Problem Set 2	Reading Material : Textbook Chapters 12 Exercises : Problem Set 2
5 <sup>a</sup>	<b>LECTURE 2: Linear and Quadratic Approximation</b> Properties of the gradient Implicit differentiation along a level curve. Slopes.	Solution of some exercises from the Problem Set 2	Reading Material : Textbook Chapter 12 Exercises : Problem Set 2
6 <sup>a</sup>	<b>LECTURE 2: Linear and Quadratic Approximation</b> Quadratic Approximations Taylor's Formula	Solution of some exercises from the Problem Set 2	Reading Material : Textbook Chapter 7, 12 Exercises : Problem Set 2
7 <sup>a</sup>	<b>LECTURE 3: Multivariable Calculus</b> The composite function. Dependence Schemes. Partial derivatives of the composite function. The Chain rule	Solution of some exercises from the Problem Set 3 Midterm Exam	Reading Material : Textbook Chapter 12 Exercises : Problem Set 3
8 <sup>a</sup>	<b>LECTURE 3: Multivariable Calculus</b> The composite function. Economic Applications	Solution of some exercises from the Problem Set 3	Reading Material : Textbook Chapter 12 Exercises : Problem Set 3



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9 <sup>a</sup>	<b>LECTURE 3: Multivariable Calculus</b> Homogeneous Functions Euler Theorem.	Solution of some exercises from the Problem Set 3	Reading Material : Textbook Chapter 12 Exercises : Problem Set 3
10 <sup>a</sup>	<b>LECTURE 4: Integration I</b> Calculating the area under a Curve The Definite Integral of a Continuous Function The fundamental Theorem of Integral Calculus Compound function integral	Solution of some exercises from the Problem Set 4	Reading Material: Textbook Chapter 9 Exercises: Problem Set 4
11 <sup>a</sup>	<b>LECTURE 4: Integration I</b> Marginal functions Indefinite Integrals Antiderivative. Some Basic Integrals	Solution of some exercises from the Problem Set 4	Reading Material: Textbook Chapter 9 and 10 Exercises: Problem Set 4
12 <sup>a</sup>	<b>LECTURE 4: Integration II</b> Change of Variables Integration by Parts	Solution of some exercises from the Problem Set 4	Reading Material: Textbook Chapter 9 Exercises: Problem Set 4
13 <sup>a</sup>	<b>LECTURE 4: Integration II</b> Double Integrals	Solution of some exercises from the Problem Set 4	Exercises: Problem Set 4
14 <sup>a</sup>		Midterm Exam	Exercises: Problem Set 4



## RESOURCES

### BASIC BIBLIOGRAPHY

Essential Mathematics for Economic Analysis  
Third Edition Prentice Hall  
Sydsaeter and Hammond

### COMPLEMENTARY BIBLIOGRAPHY

Introduction for Mathematical Economics Third Edition - Schaum's Outlines – Mc Graw Hill - Edward T. Dowling

Further Mathematics for Economic Analysis. Second Edition. Prentice Hall. Sydsaeter, Hammond, Seierstad and Strom

### OTHER RESOURCES

Mathematical software (Maple, Matlab, Python, Derive or similar)