

## Applied Mathematics for Management

UGRA\_006550

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Departments	Dept. of Operations, Innovation & Data Sciences
Teaching Languages	English, Spanish, Catalan
ECTS	6
Teacher responsible	Montserrat Adell Jordi - jordi.montserrat4@esade.edu Oltean Marius - marius.oltean@esade.edu

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### Course Goals

After completing this course, students will be able to:

- Recognize and use mathematical language fluently in appropriate situations.
- Understand, relate and use the concepts and theoretical models of basic matrix algebra and one and two variable calculus; implement these concepts in applications to a wide variety of business problems.
- Use mathematical reasoning and understand basic demonstrations.
- Comfortably employ mathematical software in day to day problem solving.
- Be ready for the new AI and Business Analytics era.

### Previous knowledge

Basic knowledge of single variable functions, limits, continuity and derivatives as well as solving systems of linear equations is required.

### Prerequisites

"Smoothing Maths", with the conditions stipulated in the Syllabus of that course to be able to progress to "Applied Mathematics for Management", in case it is required by the Program Management.

### Teaching methodology

To achieve the objectives of the course, the course sessions will be of the following types:

- **Lectures** dedicated to the theoretical exposition of the main concepts of each topic.
- **Participatory sessions:** Each section will be divided into 3 groups where students will work on problems in randomly assigned teams.

### Description

### Course contribution to program

Mathematics is an essential tool for quantitative information analysis, for the creation and interpretation of models to explain the economic and financial reality of the business environment and for the development of structured reasoning processes. We are living presently in a digital revolution wherein the management, transformation, and analysis of large amounts of quantitative data have become not only key assets, but absolute necessities within any business field.

The main concepts that will be learned in this course are basic linear algebra, one variable calculus and two variable calculus. The course activities will lay the foundation for students to reason logically through real world problems requiring the application of mathematical methods, to assess critically the practical usefulness and interpretation of mathematical results, and to connect these with applications in economics and statistics.

## Short description

The main concepts that will be learned in this course are basic linear algebra, one variable calculus and two variable calculus.

### Program Learning Objectives

## BBA20–Bachelor of Business Administration (BBA)

- General Management Skills
  - Apply fundamental concepts and tools from different business management disciplines to explain a business-related problem.
- Systemic Thinking
  - Analyse a business problem using tools, frameworks and perspectives in an integrative way.
- Self-Development
  - Develop one's own work by being consistent and flexible in the face of changes.

### Bibliography

Sydsaeter, K.; Hammond, P.; Strom, A. and Carvajal, A., Essential Mathematics for Economic Analysis (Sixth Edition), Pearson (Book)

### Content

#	Topic
1	Unit 1: Linear Algebra · Topic 1: Matrices. · Topic 2: Diagonalization. · Topic 3: Dot Products.
2	Unit 2: One Variable Calculus · Topic 4: Limits, Continuity and Derivatives · Topic 5: Taylor Approximations and Single Integrals
3	Unit 3: Two Variable Calculus · Topic 6: Two Variable Functions. · Topic 7: Partial Derivatives. · Topic 8: Unconstrained Optimization. · Topic 9: Constrained Optimization. · Topic 10: Double Integrals.

### Assessment

Tool	Assessment tool	Category	Weight %
Written and/or oral exams	The evaluation activities contributing to the final grade for this course will include two exams, individual assessments and class participation.	Ordinary round	
Written and/or oral exams		Retake	

## PROGRAMS

BBA20-Bachelor of Business Administration (BBA) (Undergraduates: Business)  
BBA20 Year 1 (Basic)

BBA23-Bachelor of Business Administration (BBA) (Undergraduates: Business)  
BBA23 Year 1 (Basic)

DBAI23-Double Degree in Business Administration and Artificial Intelligence for Business (Undergraduates: Business)  
DBAI23 Year 1 (Basic)

GBD23-Double Degree in Business Administration and Law (Undergraduates: Law)  
GBD23 Year 1 (Basic)