TEACHING GUIDE - 2026-2027

Applied Mathematics for Business

UGRA_016390

Departments	Data, Analytics, Technology and Artificial Intelligence (DATA), Dept. of Operations, Innovation & Data Sciences
Teaching Languages	English, Spanish, Catalan
ECTS	6
Teacher responsible	Marius Oltean - marius.oltean@esade.edu

Course Goals

- Use mathematical notation to represent business-related quantitative information.
- Apply linear algebra, one-variable calculus and multivariable calculus to business-related quantitative problems.
- Optimize multivariable functions in business-related quantitative models, without and with constraints.
- Understand, interpret and clearly communicate mathematical concepts and results.

Previous knowledge

Fundamentals of one-variable functions, limits, continuity and derivatives.

Teaching methodology

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

- Lectures dedicated to summarizing and clarifying the required reading, as well as doing examples on the blackboard.
- Participatory sessions, where students will work on problems in randomly assigned teams.

Description

Course contribution to program

Mathematics is an essential tool to analyze information (both quantitively and qualitatively), to create, assess, and interpret models that explain our current world and, overall, to develop structured reasoning processes. We are living a digital revolution where quantitative data management and analysis have become not only key assets, but absolute necessities within any business field. Now more than ever, the world needs people with strong abstract reasoning abilities, capable of developing and applying theoretical models and tools to any business situation.

The main concepts that will be learned in this course are basic linear algebra, one-variable calculus and multivariable calculus. This course represents a step forward on the path of mathematical reasoning. Students have been learning concepts and procedures on these subjects throughout their academic lives, and now it is time to provide them with the necessary tools to cope with new, changing conditions that need an skillful use of mathematical methods and tools. It is not about “following a formula” but being confident about the right steps to take to solve new problems. Under this scope, students will be required to analyze logically the situation, to assess critically the practical usefulness and interpretation of mathematical results, and to connect them to applications in economics and statistics. Last but not least, the students will not only discuss practical applications but also the theoretical background that supports them.

Contribution to life skills and personal development: Mathematics is based fundamentally on logic. Logic requires ordered reasoning processes as well as consistency – that is, the elimination of contradictions – in thinking. Doing mathematics, like no other mental discipline, trains thought to be ordered and consistent. These are life skills the importance of which transcends any specific technical aptitude in any particular mathematical task, and which are absolutely fundamental for taking decisions of any kind, professionally or personally. Students will come away from this course with an enriched capacity to do precisely that, and with greater confidence in and ownership over their own responsibility and critical reasoning power to identify and solve problems. Such skills are indispensable for all four major competencies fostered by ESADE's holistic educational approach: consciousness, compassion, competence and commitment.

Short description

This is a course on Applied Mathematics for Business, covering linear algebra, one-variable calculus, multivariable calculus and multivariable optimization.

Program Learning Objectives

BBA25-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 (6th Edition), Pearson (Book)

Content

#	Topic
1	Unit 1: Linear Algebra
2	Unit 2: One-Variable Calculus
3	Unit 3: Multivariable Calculus
4	Unit 4: Multivariable Optimization

Assessment

Tool	Assessment tool	Category	Weight %
Written and/or oral exams	Final exam	Retake and ordinary round	50.00%
Individual or team exercises	Continuous assessment	Retake and ordinary round	50.00%

PROGRAMS

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

BBA25-Bachelor of Business Administration (BBA) (Undergraduates: Business)
BBA25 Year 1 (Basic)

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

GBD25-Double Degree in Business Administration and Law (Undergraduates: Law)
GBD25 Year 1 (Basic)