EAE Business School

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Syllabus

- **Course:** Fundamentals of Mathematics
- **Cerdits:** 6 ECTS
- **Program:** ADE
- **Module:** Basic subject
- **Subject:** Mathematics
- **Code:** 802310
- **Abbreviation:** MA01
- **Subject Coordinator:** PhD. Joaquín Azcue
- **Academic year:** 2023-2024
- **Session:** October
- **Semester:** First (first, fall Semester)
- **Campus:** Barcelona
- **Last Revised:** 31/01/2023
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00 Table of Contents

01 Faculty

01.1 Subject coordinator

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02 Presentation

02.1 Description

Fundamental of Mathematics is a basic core subject taught in the first semester of the first year in the Business Administration and Management Degree. This component of the degree aims to academically inform future managers and directors so as they may be able to understand the usefulness of mathematical language to formulate and treat economic phenomena with precision.

This subject will introduce students to the basic concepts of differential and integral calculus, which will form the basis for modeling and solving problems of the economy and business and other subjects such as Statistics, Financial Mathematics, Microeconomics, Macroeconomics, among others.

2.2 Relevant professional applications

The student will be made aware that Mathematics does not represent a subject in itself but should be instead understood as a tool to be employed later in other fields (finances, economic analyses, etc.) a tool with which they will be able to analyse different cases and make informed professional decisions.

03 Competences

03.1 Subject Competences

Specific Competences

CEMAT1. Students will have a strong knowledge of basic concepts and elements of linear algebra, differential calculus and integral calculus, as well as their applications to the context of administration and economics.

CEMAT2. Students will be versed in basic terminology and will be able to use mathematical language appropriately.

CEMAT3. Students will be able to analyze and synthesize quantitative information. Translate a real problem into a mathematical statement and propose problem-solving strategies.

CEMAT6. Students will be able to outline a variable function graph by previously studying its main characteristics.

CEMAT7. Students will be able to solve optimization problems for functions of one or several variables.

CEMAT8. Students will be able to apply integral calculus to problems determining flat areas.

CEMAT9. Students will be able to use math software to solve exercises and problems.

General Competences

GG12. Student will show a strong command of user level Information and Communication Technologies (ICT) in all professional activity.

CG13. Students will show an ability to apply advanced technical tools and techniques to the analysis and resolution of professional problems.

Basic Competences

GB1. Students will demonstrate knowledge of their area of study, which is based in, and yet surpasses, general secondary school education. While knowledge will be acquired primarily via advanced textbooks, students will also demonstrate aspects that imply vanguard knowledge of their field of study.

GB3. Students will demonstrate the ability to gather and interpret relevant data (usually within their area of study) and contribute an informed opinion which includes reflections on relevant social, scientific or ethical issues.

04 Program

1. REAL NUMBERS

1.1 Introduction and definition

1.2 Classification

1.3 Properties

1.4 Intervals. Notation.

1.5 Errors

1.6 Percentages

1.7 Basic concepts: Factorial numbers, Polynomials, Exponential numbers and Logarithms

2. SUCCESSIONS AND SERIES OF REAL NUMBERS

2.1. Introduction and definition

2.2. Arithmetic and geometric progressions

2.3. Sequence limit

2.4. Numerical series

3. GRAPHIC REPRESENTATION OF BASIC FUNCTIONS

3.1. Introduction

3.2 The line and the concept of slope

3.3. Parables

4. LIMIT OF A FUNCTION OF A VARIABLE

6.1. Introduction. Concepts.

6.2. Finite limit at one point. Properties

6.3. Infinite limit at one point

6.4. . Finite limit of a function at infinity

6.5. . Infinite limit of a function at infinity

6.6. . Operations with limits

6.7. Asymptotes. Tangent line equation.

5. DERIVATIVES

7.1. Average Variation Rate.

7.2. Derived from a function at a point. (Graphical interpretation of the derivative).

7.3. Derived function. (Derived from elementary functions. Nth derivatives)

7.4. Derivative operations

7.5. Derivability and Continuity. Continuity and Discontinuity. Types of discontinuity.

7.6. Differentiability of a function

6. PRINCIPLES OF INTEGRATION

01. Introduction.

02. Antiderivative or primitive of a function

03. Main Properties

04. Simple or inmediate integrals

05. Substitution rule

05. Integrating by parts

7. BASIC COMBINATORY

5.1. Combinatorial numbers

5.2. Pascal's triangle

5.3. Newton's Binomial

5.4. Introduction to combinatorics

5.5. Combination without repetition

5.6. Combinatorial with repetition

9. Application of Corporate Social Responsibility in the math fundamentals to ensure a better sustainable community and continuity in the awareness of its importance.

05 Teaching Method

Considering the characteristics of the subject, both theoretical and practical, and the profile of the students, the learning design of the subject has been articulated around three groups of methodologies from EAE´s Life-ED Methodology:

ME1. Interactive class presentations

ME3. Independent work

ME4. Case study/problem solving based learning

06 Learning Activities

The following learning activities are undertaken in line with competencies stipulated for this subject and consistent with the teaching methodologies proposed:

Evaluation activities	Hours	On-site delivery
AF1. Content exposition with student participation	26	100%
AF2. Problem solving exercises and case studies with student participation	28	100%
AF4. Study and preparation of teaching units	68	0%
AF5. Completion of exercises and case studies	28	0%
AF6. Systematic resolution of problems	24	0%
AF13. Written / oral evaluations	6	100%

07 Assessment

Assessment Item	Assessed Specific skills	Weight
EV1. Final written exam on the entirety of the subject studied	CEMAT01, CEMAT02, CEMAT03, CEMAT06, CEMAT07, CEMAT08, CG13, CB1, CT8	40%
EV2. Mid-term written test	CEMAT01, CEMAT02, CEMAT03, CEMAT06, CEMAT07, CEMAT08, CG13, CB1, CT8	20%
EV3. Exercises, problems, reporting, homework - Exercices and problems - Tests	CEMAT01, CEMAT02, CEMAT03, CEMAT06, CEMAT07, CEMAT08, CEMAT09, CG12, CG13, CB3, CT8	40%

"The maximum grade that students will be able to obtain in the revaluation tests [...] shall be 5,0. In addition, "the grade of the revaluation tests shall in any case constitute the final grade of the subject". Thus, **only students who, having completed the midterm exam, the final exam and having carried out 100% of the continuous evaluation activities of the subject**, and have suspended (final grade of the subject below 5) will be entitled to the revaluation examination.

One time assessment: The one time assessment consists of an exam that is equivalent to 100% of the grade of the subject. The exam, and therefore the course, is passed with a grade of 5 out of 10 in this final exam. In order to take one time assessment it is necessary to send a written request to the professor during the first 15 working days of the course.

08 Learning Resources

Subjects	Resources	Type
Units 1 - 4	Class Slides, notes and exercises	Class and Blackboard

09 Code of Academic Conduct

The section 27.2 of the Universal Declaration of Human Rights stipulates that everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.

Thus, the moral and patrimonial rights of the authors of literary, musical, artistic, scientific and academic creations, whether they have been published or not, are protected by means of different national and international regulations. In the case of Spain, the Legislative Royal Decree 1/1996, of April the 12th, approved the consolidated version of the Law of Intellectual Property, regularizing, clarifying and harmonizing the legal provisions for the time being in force on this matter.

In this respect, special attention must be given to previously obtaining the corresponding authorization from the owner of the copyrights of any material, particularly before its distribution to the students and by means of the virtual campus. EAE Barcelona takes no responsibility for the non-compliance with this rule on the part of the users, either members of the teaching community or students.

The following materials that can be duplicated without the requirement of previous authorization:

- Laws and regulations.
- Court decisions.
- Acts, agreements, deliberations and decisions from public bodies.
- Any material distributed under the Creative Commons license, whenever its author and credits are mentioned.
- Any material published under the ISBN of EAE Barcelona or EAE Madrid.
- Any material, whose rights belong to EAE Barcelona or EAE Madrid.
- Any work that is in the public domain.

Furthermore, the quotation right is the inclusion of extracts from protected documents or materials, in this particular case, elaborated by the members of the teaching community- with the exception of textbooks and university handbooks- when such extracts are used to accompany educational activities.

The excerpts that can be used on the basis of the quotation right must fulfil the following requirements

- They must be previously published works.
- The source and author must be mentioned, whenever it is possible.
- They must deal exclusively with the teaching field.
- The inclusion of the excerpt must necessarily come with an analysis or explanation of it.

Concerning the material elaborated by the professors, in case it has been published previously, the agreements with the magazine or publication where it appeared must be considered.

As is apparent from the preceding paragraphs, plagiarism is a fraudulent activity that may result in serious sanctions, both of academic and legal nature. Academic honesty is one of the pillars on which the School's commitment to education is based, and the members of its teaching community are particularly conscious and prepared to perceive this kind of actions. Keeping in mind the difficulty that arises when trying to conceptualize plagiarism, it has been considered appropriate to delimitate clearly its contents and significance in these regulations and policies.

Plagiarism is understood as the appropriation of someone else's works, pretending that they are one's own; that is to say, without explicitly confirming its source. Plagiarism can consist on the complete or partial unauthorized copy of someone else's work, or the presentation of a copy as an original own work, impersonating the true author. Some examples of plagiarism are:

- Presenting someone else's work as one's own, regardless of whether the copy is complete or partial.
- Paraphrasing a text using different words, with small changes in the language, without quoting the source in order to feign.
- Purchasing or obtaining a work and presenting it as one's own.
- Using someone else's ideas or sentences as the basis to write a work without quoting its author.

In line with the section 10 of the Academic Code of Conduct of Students of EAE Barcelona, without prejudice to the academic sanctions resulting from its application, the Academic Commission will promote the pertinent legal actions if the plagiarism violates the applicable regulation in matters of intellectual property.

10 Bibliography

10.1 Basic Bibliography

- Buell, D. (2021). Mathematics, Computing, and Arithmetic. In Fundamentals of Cryptography (pp. 99-122). Springer, Cham.

10.2 Complementary Bibliografía

- Barboianu, C. (2021). What is Mathematics: School Guide to Conceptual Understanding of Mathematics. PhilScience Press.