

# Syllabus

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**Course:** Financial Math

**Credits:** 6 ECTS

**Program:** ADE

**Module:** Finance

**Subject:** Basic subject

**Code:** 802402

**Abbreviation:** MA16

**Subject Coordinator:** PhD. Cristina Tomas

**Academic year:** 2022-2023

**Session:** October

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## 01 Faculty

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### 01.1 Subject coordinator

**Cristina Tomàs, Ph.D.**

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## 02 Presentation

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### 02.1 Description

Mathematics for finance is a discipline that uses mathematical tools to evaluate operations where flows of funds can be translated, either in the realm of monetary or real economy.

The financial calculation provides professionals in economic sciences with powerful tools that will enable them to advise successfully on different tasks, such as insurance, banks, new ventures, as well as general economic activity. Accountants, economists, business administration graduates and actuaries require knowledge and a good command of financial calculation. Handling notions of financial calculation in an adequate manner will give the student a high level of competence, thus being able to give a solid opinion, elaborate good reports, etc.

This course is the first of the finance block in the bachelor's in business administration. The objective is to be able to offer the student the different financial tools, which are the basis for the rest of financial courses, both from the theoretical and practical point of view.

### 02.2 Relevant professional applications

The student will be made aware that financial math is a tool which enable them to analyze different cases and improve their professional decisions from a financial standpoint.

## 03 Competences

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### 03.1 Subject Competences

#### Specific Competences

- CEFIN01-** Students will be versed in the basic terminology of finance in relation to income, interest rates, financial markets as well as financial products.
- CEFIN04-** Students will be versed in basic financial investments, business financing, market and financial product research methods
- CEFIN06-** Students will be able to engage in teamwork.
- CEFIN07-** Students will be able to identify problems, obstacles and opportunities and know how to propose improvements and innovative strategic solutions in the financial field.

#### General Competences

- CG02-** Students will show the ability to communicate orally and in writing on the results of learning, applied logic and decision making processes and show the ability to participate in debates on relevant topics.
- CG04-** Students will be able to manage acquisition, structuring, analysis and visualization of data in their field of study and critically assess the results of this management.
- CG06-** Students will display the ability to identify obstacles and opportunities in their learning processes and propose improvements and develop strategies or solutions in a responsible and autonomous manner. Student will demonstrate planning and organizational skills which achieve objectives within the established deadlines and, at the same time, produce quality work, in a clear and orderly fashion, via effort, perseverance and a desire for personal and professional growth.

- CG08-** Student will show sophisticated analytical abilities being able to dissect problems and premises while investigating the relationships between them by identifying implications and consequences in order to judge consistency.
- CG09-** Students will show an ability to understand the organizational and technical aspects of a company's activity, labour standards and the relationships between planning, industrial and commercial strategies, quality control and profits.

### Basic Competences

- CB1-** 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.
- CB2-** Students will know how to apply acquired knowledge to their work or specialized activities in a professional manner and will possess skills such as problem solving along with the ability to defend and develop thesis within their area of study.
- CB3-** 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.
- CB4-** Students will be able to communicate information, ideas, problems and solutions to an expert and non-expert audience.

## Transversal Competences

- CT02-** Students will show the ability to communicate orally and in writing on the results of learning, applied logic and decision making processes and show the ability to participate in debates on relevant topics.
- CT04-** Students will be able to manage acquisition, structuring, analysis and visualization of data in their field of study and critically assess the results of this management.
- CT06-** Students will display the ability to identify obstacles and opportunities in their learning processes and propose improvements and develop strategies or solutions in a responsible and autonomous manner. Student will demonstrate planning and organizational skills which achieve objectives within the established deadlines and, at the same time, produce quality work, in a clear and orderly fashion, via effort, perseverance and a desire for personal and professional growth.
- CT08-** Student will show sophisticated analytical abilities being able to dissect problems and premises while investigating the relationships between them by identifying implications and consequences in order to judge consistency.
- CT9-** Students will show an ability to understand the organizational and technical aspects of a companies' activity, labor standards and the relationships between planning, industrial and commercial strategies, quality control and profits.

## **04 Program**

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### **Topic 1 Introduction to Financial Mathematics**

- 1.1. Financial Amount
- 1.2. Financial Equivalence
- 1.3. Financial Transaction
- 1.4. Financial Laws
- 1.5. Financial Factor

### **Topic 2 Simple Financial Regimes**

- 2.1. Simple Interest (Post-Paid)
- 2.2. Pre-Paid Simple Interest
- 2.3. Commercial Discount
- 2.4. Rational Discount
- 2.5. Equivalence between interest and discount simple rates

### **Topics 3 Applications of Practical Financial Regimes**

- 3.1. Banking Accounts
- 3.2. Deposits with Yield in Kind
- 3.3. Commercial Effects
- 3.4. Discount for Early Payment
- 3.5. Corporate Promissory Note
- 3.6. Treasury Bills
- 3.7. Sale Repurchase (REPO)

### **Topic 4 Compounded Financial Regimes**

- 4.1. Nominal Interest Rate vs. Effective Interest Rate
- 4.2. Equivalence between Effective Interest Rates
- 4.3. Compound Interest
- 4.4. Nominal Discount Rate vs. Effective Discount Rate
- 4.5. Equivalence between Effective Discount Rates
- 4.6. Compound Discount
- 4.7. Equivalence between Interest Rates and Discount Rates
- 4.8. Continuous compounding
- 4.9. Common Maturity & Average Maturity
- 4.10. Calculating TAE (EAR) according to Banco de España Regulation

**Topic 5 Annuities and Perpetuities**

- 5.1. Annuities: Concept & Elements
- 5.2. Classification
- 5.3. Constant Annuities/Perpetuities
- 5.4. Geometric Annuities /Perpetuities
- 5.5. Arithmetic Annuities/Perpetuities
- 5.6. Instalments

**Topic 6 Loans**

- 6.1. Concept
- 6.2. Types of Loans
- 6.3. Single Repayment Loan
- 6.4. Constant Payment Loans
- 6.5. Variable Payment Loans
- 6.6. Financial Leasing
- 6.7. Loans with Exclusion Period
- 6.8. Early Termination
- 6.9. Cost, Return & EAR 78

**Topic 7 Corporate Bond issue**

- 7.1. Definitions
- 7.2. Normal Issue
- 7.3. Issue with Premiums and Constant Lot
- 7.4. EAR

**Topic 8.** Application of Corporate Social Responsibility in the business management to ensure a better sustainable community and continuity in the awareness of its importance.



## 05 Teaching Method

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Taking into account 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:

- ME1.** Interactive class presentations
- ME3.** Independent work
- ME4.** Case study/problem solving based learning

## 06 Learning Activities

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

<b>Evaluation activities</b>	<b>Hours</b>	<b>On-site delivery</b>
<b>AF1.</b> Content exposition with student participation	24	100%
<b>AF2.</b> Problem solving exercises and case studies with student participation	24	100%
<b>AF4.</b> Study and preparation of teaching units	44	0%
<b>AF5.</b> Completion of exercises and case studies	25	0%
<b>AF6.</b> Systematic resolution of problems	25	0%
<b>AF13.</b> Written / oral evaluations	8	100%

## 07 Assessment

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Assessment Item	Assessed Specific skills	Weight
EV1. Final written exam on the entirety of the subject studied	CEFIN01, CEFIN02 CEFIN03,CEFIN04 CEFIN05, CEFIN07	40%
EV2. Mid-term written test	CEFIN01, CEFIN02 CEFIN03,CEFIN04 CEFIN05, CEFIN07	20%
EV3. Exercises, problems, reporting, homework - Exercises and problems - Statistical report of a business case	CEFIN01, CEFIN02 CEFIN03,CEFIN04 CEFIN05, CEFIN06	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.

## 08 Learning Resources

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Subjects	Resources	Type
Units 1 - 5	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 work
- 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 taken into account.

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

- O'REGAN, Gerard. Basic Financial Mathematics. In: *Guide to Discrete Mathematics*. Springer, Cham, 2021. p. 423-444.

### 10.2 Complementary bibliography

- E. Navarro & J.M. Nave. Fundamentos de Matemática Financiera. Antoni Bosch, editor
- M. Bonilla, A. Ivars & I. Moya. Matemática de las operaciones financieras. Teoría y práctica. Ed. Thomson
- M.C. González. Análisis de las operaciones financieras. Ed. Thomson – Civitas
- E. Levi. Curso de matemática financiera y actuarial (Volumen I). Bosch, Casa Editorial
- P. Alegre, C. Badia, M. Borrell, T. Sancho. Ejercicios de Matemática financiera. Ed. AC
- V. Nieto de Alba. Matemática de las operaciones financieras. Ed. ICAI
- Rodríguez. Matemática de la financiación. Ed. Ediciones de la Universidad de Barcelona
- ROSS, Stephen, et al. Fundamentals of Corporate Finance. New York: Irwin- McGraw, 2010. ISBN: 0073530689.
- BREALEY, Richard, et al. Fundamentals of Corporate Finance. New York: Irwin- McGraw, 2011. ISBN: 0078034647
- D'Alessio, Stocchetti, Basic Financial Accounting 2020, Next, 2020