

**COURSE DATA****Data Subject**

<b>Code</b>	35943
<b>Name</b>	Financial mathematics
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2023 - 2024

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. Period</b>	<b>year</b>
1315 - Degree in Finance and Accounting	Faculty of Economics	2	First term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1315 - Degree in Finance and Accounting	14 - Financial mathematics	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
GONZALEZ BAIXAULI, EUSEBIO CRISTOBAL	113 - Financial and Actuarial Economics

**SUMMARY**

The main objective of this subject is to provide students with a solid and generic framework to analyse complex financial transactions. On completion of this course the student should be able to quantify the financial variables in any particular transaction and take the appropriate decisions based on the measurement of the cost and return on the transaction for the borrower and the lender, respectively.

This generic aim can be expressed through the following particular goals:

- To obtain an overview of the scope of Financial Mathematics.
- To master the fundamental concepts of Financial Mathematics.
- To accurately apply the standard valuation model in financial mathematics for the analysis of the most usual financial transactions.
- To develop skills to be applied in the analysis of new financial transactions that could come out in the financial markets.

This course is part of the FINANCE module. This is a mandatory subject of 6 ECTS (150 hours). The contents will be the basis for the development of the other disciplines that make up this module, such as



Fixed Income Markets or Bank Analysis and Management.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

No prior knowledge is required.

## COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

### 1315 - Degree in Finance and Accounting

- CM4FYC 1 Conocer los fundamentos básicos que rigen las operaciones y los mercados financieros.
- CM4FYC 2 Capacidad para aplicar correctamente un modelo de valoración común para el análisis de las operaciones financieras de inversión y financiación.

## LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

1. Basic knowledge for the identification and use of mathematical techniques specific to the financial assessment.
2. Ability to correctly interpret financial information extracted from applications and cases in the financial world.

## DESCRIPTION OF CONTENTS

### 1. Fundamentals

- 1.1 Introduction.
- 1.2 Simple interest and simple discount.

### 2. Theory of compound interest

- 2.1 Compound interest rule.
- 2.2 Accumulation and discount factors.
- 2.3 Effective and nominal interest rates.



### 3. Financial value of payments: introduction to annuities

- 3.1 Financial value of a set of payments. Financial addition.
- 3.2 Annuities. Financial value of an annuity.
- 3.3 Valuing constant annuities.
- 3.4 Valuing annuities varying in geometric progression.

### 4. Complex annuities

- 4.1 Valuing annuities payable monthly.
- 4.2 Other complex annuities.

### 5. Financial transaction: financial equivalence and outstanding balance

- 5.1 Definition and classification.
- 5.2 General approach.
- 5.3 Outstanding balance. Concept, calculation methods and evolution.

### 6. Cost and return: effective rates

- 6.1 Effective rate of a pure financial transaction.
- 6.2 Effective rate of a financial transaction whit additional terms and conditions.
- 6.3 A.P.R.(T.A.E. in the Spanish case).

### 7. Amortization of a debt: general analysis

- 7.1 Definition.
- 7.2 Financial equivalence.
- 7.3 Outstanding balance.
- 7.4 Total payment descomposition.
- 7.5 Other variables and relationships.
- 7.6 Dynamics of the main variables. Amortization schedule.

### 8. Loans with predetermined rates

- 8.1 Bullet loan.
- 8.2 Level-payment fixed-rate loan.
- 8.3 Constant principal repayments loan.
- 8.4 Other loans:loans with fractional interest payments.



**9. Adjustable-rate loans**

- 9.1 Adjustable-rate amortization transactions.
- 9.2 Adjustable-rate loans with fixed term.
- 9.3 Adjustable-rate loans with no fixed term.

**10. Bonds**

- 10.1 Bonds issue: concept and types.
- 10.2 Financial analysis of a bond.
- 10.3 Bond's market value.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Computer classroom practice	15,00	100
Classroom practices	15,00	100
Study and independent work	30,00	0
Readings supplementary material	15,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	15,00	0
<b>TOTAL</b>	<b>150,00</b>	

**TEACHING METHODOLOGY**

This course includes two hours of theory classes (lecture) and two hours of practical classes per week, one of them held in the computer lab so that the total amount is four hours of class each week. Students will be split into two groups of normal classroom practice and two practice groups in the computer rooms.

Practical classes will consist of solving exercises, real case studies, class presentations and discussions of readings. The material for the development of theoretical and practical classes will be available to students in the Virtual Classroom ([www.aulavirtual.uv.es](http://www.aulavirtual.uv.es)) in advance. Students are reminded that attendance is compulsory in all classroom activities in this subject.

Students are expected to participate actively in class, both in practice and in theory. Moreover, students should arrive early enough at the beginning of the class and with the mobile phone off. They are not allowed to use the phone during class, neither to speak nor write text messages. Also, students should refrain from speaking continuously with peers in class. Obviously, there can (and should) be comments and questions regarding the content of the class, but they should be directed to the lecturer.



Additionally, students are encouraged to use the lecturer's tutoring schedule through the course and to discuss any doubts or clarification needs.

The methodology for teaching the subject of Financial Mathematics is a combination of active methodologies that seek significant, constructive and autonomous learning. Under this methodology, both teachers and students are jointly responsible for the students' learning.

For the lectures, students should previously read the notes available in the course's Virtual Classroom and the required text included in the bibliography. After the reading, students should write down the main doubts/questions arisen in the interpretation of the material. The lecturer will combine during the lecture his/her explanations with the active participation of the students (they should raise their doubts, try to help their classmates, and participate in discussions in group about the most controversial concepts). The objective is to improve the autonomous capacity of the students (individual work at home previous to the lecture) as well as their ability to work in groups, to argue and defend ideas (debate groups), and their oral and written communication skills.

The practical lessons will consist of the resolution of exercises by the teacher and/or the student. For the performance of these classes, students will be provided with a questionnaire of exercises, part of which will be used for personal work. In addition, students will be required to complete exercises, tests and individual or group case studies, which must be handed in to the teacher or presented in class. In the practical lessons carried out with a computer in the computer room, problems will be solved using Excel (software commonly used in companies).

An important element of learning is the lecturer's personal tutorials. Doubts and any questions that might arise during the teaching-learning process will be individually answered. Therefore, students are encouraged to use them regularly. It is recommended to make an appointment for tutoring via email to avoid waiting times.

## EVALUATION

The subject of Financial Mathematics will be assessed on the basis of the following aspects: 1) Final exam, which will consist of theoretical and practical questions and will allow obtaining up to 70% of the final mark (7 points out of 10). 2) The remaining 30% will be obtained from the activities carried out by the student during semester, including the assignment of solved problems, the follow-up tests and any other type of continuous assessment.

The continuous assessment is considered to be recoverable. This applies to both the first and second calls. In any case, in order to pass the course, it is considered an essential requirement to pass the final exam (answering at least 50% of the exam correctly), which is compulsory. In case of failing the synthesis exam, the maximum grade that the student can obtain as the sum of all the components will be 4.5 points.

The assessment tests will be subject to the provisions of Article 13 on fraudulent performance of assessment tests of the "Reglament d'avaluació i qualificació de la Universitat de València per a títols de grau i màster, ACGUV 108/2017 de 30 de mayo". Likewise, the rest of the assignments and assignments that can be assessed will be subject to the regulation on plagiarism detailed in Article 15.2 of the aforementioned regulation. Any possible change of date and/or time of the final assessment tests will be governed by the procedure and deadline established in Article 9.2 of the aforementioned Regulations.





In particular, in the event that the dates and times of the final assessment exams of subjects in the same degree course in which the student has enrolled coincide, if the change is to be made for this subject, a written request must be submitted to the head of the department responsible at least one month before the start of the official exam period. You can send your request electronically to: [dep.economia.finacera@uv.es](mailto:dep.economia.finacera@uv.es) only from your [alumni.uv.es](mailto:alumni.uv.es) email address. An e-mail sent from a private address will not be accepted. In order to be able to take advantage of the additional call, the student must justify that he/she has taken the coinciding exam.

## REFERENCES

### Basic

- Navarro, E. (2019): Matemáticas de las operaciones financieras. Ediciones Pirámide. Madrid.
- Zima, P. and R.L. Brown (1996): Schaums outline of theory and practice of Mathematics of Finance, 2nd Edition. McGraw-Hill, New York.

### Additional

- Baquero, M.J. y Maestro, M.L. (2003): Problemas Resueltos de Matemática de las Operaciones Financieras. Editorial AC. Madrid.
- De Pablo, A. (1998): Matemáticas de las operaciones financieras, Tomos I y II, Tercera Edición, Editorial UNED. Madrid.
- Meneu, V., Jordá, M.P. y Barreira, M.T. (1994): Operaciones financieras en el mercado español. Editorial Ariel Economía. Barcelona.
- Navarro, E. y Nave, J.M. (2001): Fundamentos de Matemáticas Financieras. Antoni Bosch Editor. Barcelona.
- Dalton, B. (2008): Financial products: an introduction using mathematics and Excel, Cambridge University Press.