

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

Code	35804
Name	Financial mathematics
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1313 - Degree in Business Management and Administration	Faculty of Economics	2	First term
1330 - Degree in Business Management and Administration (Ontinyent)	Faculty of Economics	2	First term
1921 - D.D. in Business Management Administration-Law	Doubles Studies Faculty of Law - Faculty of Economics	2	Second term
1926 - D.D. in Tourism-Business Management Administration	Faculty of Economics	3	First term

Subject-matter

Degree	Subject-matter	Character
1313 - Degree in Business Management and Administration	7 - Financial mathematics	Obligatory
1330 - Degree in Business Management and Administration (Ontinyent)	7 - Financial mathematics	Obligatory
1921 - D.D. in Business Management Administration-Law	3 - Year 2 compulsory subjects	Obligatory
1926 - D.D. in Tourism-Business Management Administration	4 - Asignaturas de tercer curso	Obligatory

Coordination

Name	Department
GONZALEZ BAIXAULI, EUSEBIO CRISTOBAL	113 - Financial and Actuarial Economics
NAGORE GARCIA, MARIA DESAMPARADOS	113 - Financial and Actuarial Economics
SORIANO FELIPE, PILAR	113 - Financial and Actuarial Economics



SUMMARY

The main objective of this subject is to provide students with a solid and generic framework to analyze 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.

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.

OUTCOMES

1313 - Degree in Business Management and Administration

- Demonstrate capacity for analysis and synthesis.
- Have organisation and planning skills.
- Be able to use ICTs in the field of study.
- Be able to work in a team.
- Manage time effectively.
- Be able to learn autonomously.
- Be able to understand and analyse financial markets, as well as financial operations related to business.
- Be able to express oneself in formal, graphic and symbolic languages.
- Know the fundamentals that govern financial operations and markets.
- Be able to correctly apply a common valuation model for the analysis of investment and financing operations.



1330 - Degree in Business Management and Administration (Ontinyent)

- Demonstrate capacity for analysis and synthesis.
- Have organisation and planning skills.
- Be able to use ICTs in the field of study.
- Be able to work in a team.
- Manage time effectively.
- Be able to learn autonomously.
- Be able to understand and analyse financial markets, as well as financial operations related to business.
- Be able to express oneself in formal, graphic and symbolic languages.
- Know the fundamentals that govern financial operations and markets.
- Be able to correctly apply a common valuation model for the analysis of investment and financing operations.

LEARNING OUTCOMES

- To obtain an overview of the scope of Financial Mathematics.
- To analyze and describe financial transactions by using a mathematical model and to quantify the financial variables that exist in any particular financial transaction.
- To have basic knowledge of the fundamentals of Financial Mathematics in order to apply them to solve any new transaction that could come out in the financial markets.

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 with 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 decomposition.
- 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 fixed payments.

10. Bonds

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

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Classroom practices	30,00	100
Development of individual work	5,00	0
Study and independent work	40,00	0
Readings supplementary material	1,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	7,00	0
Preparation of practical classes and problem	7,00	0
Resolution of case studies	10,00	0
TOTAL	150,00	

TEACHING METHODOLOGY

There will be **a two-hour lecture plus a two-hour practice session per week**, thus totaling four classroom hours per week.

Practice sessions will consist of solving exercises, working on case studies, developing workshops, presentations and discussions, etc. Lecture slides and practice sessions guidelines and relevant materials will be uploaded onto the course's **virtual classroom** (www.aulavirtual.uv.es).

Should the students have any course-related queries, questions or feedback, or should they need any guidance or advice on practice assignments, they are encouraged to take advantage of the (voluntary) office tutorials during the lecturer's office hours.



Methodology in this subject is both self-study and working-in-groups oriented in lectures and, especially, in practice sessions (example classes). Specifically, the methodology to be used is as follows:

For the lectures, students should previously read the notes available in the course's **virtual classroom** (www.aulavirtual.uv.es). 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.

Example classes, in turn, will be carried out combining two different strategies. On the one hand, the lecturer will solve standard problems in the classroom in order for students to learn to identify the key aspects of the corresponding approach in each unit. On the other hand, students will have to solve analogous problems, sometimes in the classroom, and usually as a part of their homework. Occasionally some solved problems will have to be handed in, and this will be part of the continuous assessment.

EVALUATION

The course grade will be based on:

- 1) The final examination marks (up to 70% of the final grade). The final exam will be administered according to the official schedule and it will include questions and problems regarding both theory and practice (exercises).
- 2) The remaining 30% can be obtained through activities developed by the student during the term, such as: problem solving, periodic assessment tests, and any other type of continuous assessment tasks.

The final grade will be given by the sum of the previous concepts. Nonetheless, in order to get a passing grade at the end of the term, **the student must pass the final exam** (answer at least 50% of the exam questions correctly), **which is compulsory**. In case of failing the exam, the maximum grade that the student can obtain as the sum of all the items will be 4.5 marks.

For the second examination call, the same criteria of evaluation and weighting as for the first call will be used. Those students who are evaluated on the second call will maintain the grade obtained in section 2 above, and they will not be allowed to complete any tasks or homework that had not been previously considered for the first call.

Exams will be regulated by Article 13 on examination fraud of the “Reglament d’avaluació i qualificació de la Universitat de València per a títols de grau i màster, ACGUV 108/2017”. Additionally, all the assessment tasks and homework will be subject to the regulation on plagiarism detailed in Article 15.2 of the same “Reglament”.

Any possible change of the date and/or hour of a final exam will be administered under the terms and conditions established by Article 9.2 of the above-mentioned “Reglament”.



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.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

BAM

In relation to the Teaching Methodology and the Assessment (sections 8 and 9 of the academic guide):

In those groups in which is required due to the number of enrolled students, the theory class will be conducted online while the practical classes will be taught face-to-face.

If, due to the evolution of the pandemic, any lectures could not be given face-to-face, neither in the theory groups nor in the practical ones by indication of the competent educational administration following the recommendations of the health authorities, all teaching would be carried out online using the available tools from the University of Valencia. In this situation, the weighting of the continuous assessment with respect to the final grade may be strengthened to the detriment of the weighting of the exam.

In that case, the final weight of the continuous assessment, never less than 30%, would depend on the moment in which this circumstance occurred. Likewise, if the final exam could not be face-to-face, it would be replaced either by an online exam to be carried out through the Virtual Classroom of the University of Valencia or by a final project, as agreed in each degree.



All the details corresponding to the matters indicated above - new weighting of the continuous assessment and new weighting of the exam, as well as the format of the latter - will be duly reported in the event of the aforementioned circumstance.

BAM-LAW

The modality of classes for students will depend on the social and health conditions and the restrictions established by the competent authorities.

In the case of **online teaching**, classes will be given by videoconference, preferably synchronous, using Blackboard Collaborate, Teams, Skype or the tool that the lecturer considers appropriate to optimize the student's teaching-learning process during the scheduled program sessions, **which remain the same days and times**.

In the case of **blended teaching**, the students will have to access the classroom in alternate weeks according to the initial of their last name (A-M or L-Z). The classes will be broadcast so that the students will have face-to-face teaching one week, and the next week they will follow the classes in streaming.

In the case of **face-to-face teaching** in Double Degree in Business Administration and Management + Law, students shall attend classes during the established timetable, in classrooms where attendance does not exceed 50% of their capacity.