

**Code:** 81005

**Subject name:** Financial mathematics

### **GENERAL CHARACTERISTICS**

**ECTS:** 3

**Language/s:** English

**Type:** Obligatory

**Teachers:** José Sáez Madrid / Pablo Larraga López

### **DESCRIPTION**

#### **BRIEF DESCRIPTION AND JUSTIFICATION**

The objective of the subject is to know and understand the mathematical fundamentals that the economist needs to analyze the economic environment. In the subject, one learns to use with rigor the basic mathematical terminology that allows to formalize the mathematical models and to transmit the ideas that they represent, as well as to model mathematically examples of problems that arise in the financial activity and to solve them by the foundations acquired. We apply the knowledge acquired to know in depth the mortgage products and their methods of amortization.

On the other hand within the agenda is devoted a section to the fundamentals of advice and financial planning.

#### **Competencies**

As a consequence of the acquisition of the contents of the subject, the student will be able to:

CE2. Apply the most relevant models and quantitative techniques of more extensive use in the praxis of the sector for the treatment of financial information, using the modelling of financial operations at an advanced level. (Modelling of financial transactions).

#### **Prerequisites**

Requirements legally established to access postgraduate programs:

Degrees in the field of social, scientific or technological sciences.

## Contents

1. Basic Concepts and Time Value of Money
  - a. Simple and compound capitalization and discount
  - b. Spot and forward interest rates
2. Valuation of monetary assets
3. Net Present Value (NPV), Internal Rate of Return (IRR) and Annual Percentage Rate (APR)
4. Profitability and financial income
5. Formation transactions
6. Loans and repayment operations
7. Mortgage products and depreciation methods
  - a. Requirements and documentation necessary for the granting of the mortgage loan
  - b. Amortization methods: French and linear
8. Financial Operations in Financial Planning and Counselling
  - a. The client and the financial advisory
  - b. Establishment of the client-planner relationship
  - c. Compilation of customer data and goal setting
  - d. Determination of the client's financial economic status
  - e. Analysis of financial income, loans and borrowings
  - f. Development of an investment plan

## METHODOLOGY

### TRAINING ACTIVITIES:

Training activities	ECTS	Competencies
Lectures presenting concepts and procedures	1,3	CE2
Practical sessions (exercises, case resolution)	0,4	CE2
Assignments by Students	0,4	CE2
Seminars or tutorials	0,2	CE2

Personal study activities	0,6	CE2
Assessment sessions	0,1	CE2
Internship in Company		
TOTAL	3	

### EXPLANATION OF TEACHING METHODOLOGY

There are two types of training activities:

#### 1.- Exposition and reading of theory on matter

It corresponds to the exposition of the subject by the teacher and to the study of the subject by the student. In this activity we try to know the theoretical foundations of financial mathematics, as well as the basic concepts of those for calculations of profitability and financial income.

#### 2.- Practical exercises and case discussion

It corresponds to the preparation by the students of the practices corresponding to each theoretical theme. In this activity the specific competence of modeling financial operations is developed. This section takes into account both the practical sessions, the seminars and tutorials that are developed during the course, and the sessions of continuous evaluation. The work is done both individually and in working groups. They aim to identify the most appropriate techniques for solving the problems of financial mathematics and to acquire fluency in solving the problems posed. On the other hand, special attention is given to the calculation of amortization methods in the case of mortgage loans and to the application of financial mathematics within the scope of financial planning and counseling.

### METHODS OF EVALUATION

#### Methods of evaluation

Methods of evaluation	Weight	Competencies
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Final exam	40%	CE2
Partial exams	50%	CE2
Following up activities	10%	CE2
Homework and presentations		
Experimental work or fieldwork	-	
Projects	-	
Evaluation of the company or institution	-	
Participation	-	

### LEARNING OUTCOMES

At the end of the course the student should be able to:

- Know the basic fundamentals of capitalization and discount.
- Calculate different types of profitability and financial income.
- Apply the knowledge of financial mathematics to the calculation of mortgage loans.
- Understand the fundamentals of financial planning and analysis.

### EVALUATION

The final grade of the course responds to criteria of continuous evaluation and will be the result of applying the following percentages: 40% for the grade obtained in the final exam, 50% for the grade of the partial exams and 10% for the delivery of class exercises and other follow-up activities (works and presentations)..

### EVALUATION OF COMPETENCIES

In all the evaluation activities of the subject, the specific competence of interpretation and analysis of financial operations modeling is evaluated, in which students must be able to apply the basic concepts of financial mathematics to real problems and situations.

## **Bibliography**

## **Bibliography**

Bonilla Musoles, M., A. Ivars Escortell y I. Moya, (2006); Matemáticas de las Operaciones Financieras: Teoría y Práctica. Editorial Thomson, Madrid.

Miner J., (2003), Curso de Matemática Financiera; MC Graw Hill. Madrid.

Miner, J., (2005), Matemática Financiera; MC Graw Hill. Madrid

## **PREVIOUS CHANGES**

## **LAST REVISION**