TECHNICAL SHEET OF THE SUBJECT

Data of the subject	
Subject name	Financial Mathematics
Subject code	E900006931
Mainprogram	Grado en Análisis de Negocios/Business Analytics
Credits	6,0 ECTS
Type	Obligatoria (Grado)
Department	Departamento de Métodos Cuantitativos

Teacher Information	
Teacher	
Name	María Elena González Antolín
Department	Departamento de Métodos Cuantitativos
EMail	mgantolin@icade.comillas.edu
Teacher	
Name	María Eugenia Fabra Florit
Department	Departamento de Métodos Cuantitativos
Office	Alberto Aguilera 23
EMail	mefabra@icade.comillas.edu
Phone	2239
Teacher	
Name	Óscar Díez Alonso
Department	Departamento de Métodos Cuantitativos
EMail	odiez@comillas.edu

SPECIFIC DATA OF THE SUBJECT

Contextualization of the subject
Contribution to the professional profile of the degree
The subject is designed to provide students with the knowledge and the resources that are needed to analyze and compare financial operations that are held in an environment characterized by certainty, as well as the foundations to solve problems associated with many kinds of financial transactions.
Prerequisites

Mathematics at high school level.

Competencies - Objectives

Competences

GENERALES

CG02	Capacidad de análisis de datos masivos procedentes de diversas fuentes: texto, audio, numérica e imagen
	RA2 Ser capaz de obtener información de operaciones financieras y, a partir de ella, identificar su estructura.
CG03	Resolución de problemas y toma de decisiones en un entorno de datos masivos tanto cuantitativos como cualitativos
	RA1 Conocer las herramientas matemáticas básicas que les capacite para plantear y resolver los problemas reales planteados en el mundo de la empresa
CG11	Capacidad para aprender y trabajar autónomamente en la sociedad de la información
	RA1 Ser capaz para aplicar los conocimientos obtenidos en contextos nuevos
	RA2 Ser capaz para aprender nuevos métodos y teorías de forma autónoma en su vida profesional

ESPECÍFICAS

CE17	Adquirir la capacidad para la resolución de los problemas planteados en el entorno empresarial utilizando las herramientas matemáticas
	RA3 Conocer los modelos matemáticos que permiten analizar y comparar de operaciones financieras ciertas en tiempo discreto

THEMATIC BLOCKS AND CONTENTS

Contents - Thematic Blocks

BLOCK 1: FUNDAMENTAL ELEMENTS OF FINANCIAL MATHEMATICS

Topic 1: FINANCIAL CAPITALS AND FINANCIAL OPERATIONS

1.1 Financial capital: definition and unit of measure

1.2 Financial operations: definition

1.3 Financial operations: classification

Topic 2: FINANCIAL LAWS

2.1 Financial law as a criteria to project financial capitals

2.2 Commonly used laws of accumulation

2.3 Commonly used laws of discount

Topic 3: FINANCIAL EQUILIBRIUM

3.1 The equation of financial equivalence

3.2 The financial equilibrium of a financial operation

3.3 Income and effective rates. The rules of the Spanish Central Bank: TAE

3.4 Outstanding balance. Definition and calculation methods

BLOCK 2: FINANCIAL OPERATIONS IN THE LONG RUN

Topic 4: VALUATION OF ANNUITIES

4.1 Annuities: definition and classification

4.2 The value of constant annuities

4.3 The value of variable annuities

4.4 Application to financial decisions. NPV and IRR

Topic 5: PRIVATE LOANS

5.1 Concept and general overview

5.2 Classical amortization methods

5.3 Mortgage loans

BLOCK 3: INTRODUCTION TO MARKET VALUATION

Topic 6: OPERATIONS WITHIN "FIXED INCOME" MARKETS

6.1 Public promissory notes (Treasury Bills)

6.2 Government bonds

6.3 The market value of a loan

6.4 The term structure of interest rates (TTIR)

TEACHING METHODOLOGY

General methodological aspects of the subject

In-class Methodology: Activities

Magistral class: The teacher will explain the subject's basic concepts as well as the relations between them, with emphasis on the fact that the same principles can be applied to study a wide range of financial operations. The material explained in each class will be based on the material taught in the previous ones; for this reason, to obtain the best results it is key to deeply assimilate previously learnt concepts. In addition, the student is recommended to bring to each class the material that corresponds to it.

Practical class: In each session we will discuss the exercises that the student worked out at home and we wil present new probems to be solved in class. Quizzes will be administered as independent activities. The work may be submitted upon teacher's request at the end of a class. Students are expected to actively participate in the practical sessions with an adequate knowedge of the material, which will contribute to the student's overall score on the subject

Midterm exams: depending of the topic, midterm exams they will have different formats and be more or less comprehensive; they will be designed to assess the student's understanding of the subject

Non-Presential Methodology: Activities

Preparation for the magistral class: At the end of each class the students are supposed to figure out what they have learned and supplement it with the provided material. The student who does not achieve an optimum performance in the master class will be expected to talk yto their teacher in order to identify the sources of their problem.

Preparation for the practical class: The student is expected to solve the exercises that the teacher will indicate before each practical class.

Preparation and analisis of midterm exams: At the end of each topic, the student is expected to review all the concepts that they have have learned and understand the relationships that exist between them and with the concepts learned in previous topics. When the student receives a graded test they should critically analyze their mistakes and talk to the professor in case the score does not correspond with their expectations.

Assignment I: once having made a group of three, the students are expected to select an actual loan and analyze it. They are expected to submit two reports, one at the beginning of the course and another at the end, by so reflecting their understanding progress.

Assignment II: once having made a group of three, the students are expected to solve a case study of a financial operation with computer support.

SUMMARY STUDENT WORKING HOURS

CLASSROOM HOURS
NON-PRESENTIAL HOURS
ECTS CREDITS: 6,0 (0 hours)

EVALUATION AND CRITERIA

Evaluation activities	Evaluation criteria	Weight
Tests for all groups in each specialty	• To understands concepts • To properly apply these concepts to solve the problems that relate to financial operations	65 %
Continuous evaluation exams	• To understands concepts • To properly apply these concepts to solve the problems that relate to financial operation	15 %
Assignments	• To identify quality information • To identify the relevant information for a given problem • To correctly interpret the information provided by a financial institution • To correctly apply the methodology related to specific cases	15 %
Active class participation	• To correctly perform the required work • To actively participate in class activity	5 %

Ratings

If the final examination score exceeds the average of the continuous evaluation tests, the weight of the examination would be 70% and the test score would be 10%

These are the weights that each activity/skill will receive in the student's overall course score that we will apply to students that are enrolled for the first time. Students with 'dispensa de escolaridad' or students who will take the final exam on 'tercera convocatoria' or higher will receive the highest between the final exam score and the score determined as for the students enrolled for the first time (the latter will ONLY be applied to the activities that the student will decide to undertake).

WORK PLAN AND SCHEDULE

Activities	Date of realization	Delivery date
Assignment 1	week 2	week 3
Assignment 2	week 1 to 11	week 12
Assignment 3	week 12	week 13

BIBLIOGRAPHY AND RESOURCES

Basic Bibliography

TEXTBOOK

Bonilla Musoles, MA, Ivars Escortell, AN & Ismael Moya CL 2006, *Matemática de las operaciones financieras: teoría y práctica,* Thomson, Madrid.

WEB SITES

Banco de España: http://www.bde.es/

Tesoro Público: http://www.tesoro.es/

Complementary Bibliography

TEXTBOOKS:

Bonilla Musoles, MA & Ivars Escortell, MA 1994, *Matemáticas de las operaciones financieras : (teoría y práctica), AC,* Madrid.

Gil Peláez, LO, Baquero, MJ, Gil, MA & Maestro, ML 1991, *Matemática de las operaciones financieras: problemas resueltos,* AC, Madrid.

Pablo López, AN 2000, *Manual práctico de matemática comercial y financiera,* Centro de Estudios Ramón Areces, Madrid.

Pablo López, AN 2002, *Valoración financiera,* Centro de Estudios Ramón Areces, Madrid.

Pablo López, AN de 2003, *Matemática de las operaciones financieras I*, UNED, Madrid.