

Degree programme	Type	Course
Applied Statistics	OP	4

Contact lecturer

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Group languages

You can consult this information at the [end](#) of the document.

Prerequisites

The subject is a natural continuation of the course Introduction to Financial Engineering and thus it is recommended but not required that the student has acquired the basic knowledge of that subject. It is required that the student has acquired the basic theoretical knowledge of calculus, calculus of probabilities and numerical methods.

Objectives

The objective of this course is to introduce the student to a very active area, both scientifically and professionally, such as financial mathematics. The main educational goal is to deepen in the description of the different financial assets and to show the mathematical and statistical tools used for their management and valuation, focusing on their proper use and interpretation of the results.

It is for this reason that it is required that the student has acquired the basic theoretical and practical knowledge of the subject Introduction to Financial Engineering as well as the basic theoretical knowledge of calculus, calculus of probabilities and numerical methods.

Thus, the subject is considered as a first course in financial derivatives, focusing on the description of the most relevant assets in the market, its use and its valuation. For more than 40 years, financial derivatives have played a very important role in mitigating risks, speculating or arbitraging markets and have been a fundamental part in the transfer of risk among economic agents. It is for this reason that financial derivatives have also been at the center of different financial crises.

It is also a goal that the student does a job that requires the use of the computer, and this will lead to completing the theory classes with classes of problems and case sets where the computer is present.

Learning outcomes

- CM14 (Propose the statistical model needed to analyse data sets belonging to real studies.) Propose the statistical model needed to analyse data sets belonging to real studies.
- KM17 (Recognise the statistical models for the analysis of data with different structures and complexities that frequently appear in different fields of application.) Recognise the statistical models for the analysis of data with different structures and complexities that frequently appear in different fields of application.
- KM18 (Recognise the language of applications of economics and finances, biomedical science and engineering, provided by research and innovation in the field of statistics.) Recognise the language of applications of economics and finances, biomedical science and engineering, provided by research and

- innovation in the field of statistics.
- SM16 (Select appropriate sources of information for the statistical work.) Select appropriate sources of information for the statistical work.
- SM18 (Refine the information available for subsequent statistical processing.) Refine the information available for subsequent statistical processing.

Contents

- Introduction

Introduction to financial markets

Fair value and finance

Academia vs Industry: Disclaimer

- Time value of money: Interest rates

Type of interest rates

Discount factors

Spot & forward curves

Bootstrapping method

Description of fixed income assets and valuation

- Valuation of Forwards and Futures

Description of forward and future instruments

Forward price and expected value

Currency forward price

- Interest rate derivatives

Market conventions

Description of an interest rate swap and valuation

Mechanics of swap markets

Options on bonds, caps and floors

- Mechanics of the options market

Vanilla options on equities

- Exotic Options & Securitizations

Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Study + Problem & Case Sets	67.5	2.7	
Case Studies	20	0.8	
Lectures	30	1.2	
Tutorials	25	1	

The student acquires the scientific-technical knowledge of the subject by attending to lectures and completing it with a personal study of the topics covered. The theory classes are activities in which less interactive activity is required from the student: they are conceived as a fundamentally unidirectional method of transmitting knowledge from teacher to student.

Problems and case sets are sessions with a small number of students with a double goal. On the one hand they work the scientific-technical knowledge showed in lectures to complete their understanding and to deepen in them through a variety of activities, from the typical resolution of problems to the discussion of practitioner cases. On the other hand, the problem set activities are the natural forum in which to discuss in common the development of practitioner cases work, providing the necessary knowledge to carry it out, or indicating where and how they can be acquired. The case problem sets of this subject is proposed as a way to guide the student in a statistical fieldwork in each of its stages.

This approach is aimed at promoting active learning and developing critical reasoning and the ability to analyze and summarize.

The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Case Problem Sets	25%	2.5	0.1	SM16, SM18
Exam	50%	2.5	0.1	CM14, KM17, KM18
Problem Sets	25%	2.5	0.1	CM14, KM17, KM18

To pass the subject it is necessary that the average of the case and problem sets is greater than or equal to 4 and the exam grade is greater than or equal to 3. If the student attends the recovery exam, the final grade will be the grade of the recovery exam (100%). It is not allowed to attend recovery exam to achieve higher marks. Students will be considered as non-graded if they have not submitted any of the case and problem sets. The same recovery system will be applied as for continuous assessment. The same non-assessable criterion will be applied as for continuous assessment. If a student applies for Single Assessment, consisting of an Exam (50%) and an Applied Essay (50%), the student will need to obtain a minimum of 5 in both activities to pass the subject.

In this subject, the use of Artificial Intelligence (AI) technologies is not allowed in any of its phases. Any work that includes fragments generated with AI will be considered a lack of academic honesty and may lead to a partial or total penalty in the grade of the activity, or greater sanctions in serious cases.

The performance of any irregularity in an assessment act (academic fraud, plagiarism or improper use of AI, unless this use is expressly authorized in the teaching guide), which may lead to a significant variation in the grade, means that this act will be graded with a 0. In the event that the teaching guide provides that to pass the subject it is an essential requirement to have obtained a minimum grade in this assessment act or that several irregularities occur in the assessment acts of the same subject, the final grade for this subject is 0. Apart from this, a disciplinary process may be initiated against the student who incurs any of these irregularities.

Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Bibliography

Hull, J. (2008) Options, Futures, and Other Derivatives, Prentice Hall.

Software

Excel

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Catalan	second semester	afternoon
(SEM) Seminars	1	Catalan	second semester	afternoon