UAB
Universitat Autònoma de Barcelona

# Financial Data Analysis

2026/2027

Code: 104412
Credits: 6

| Degree programme | Type | Course |
|---|---|---|
| Computational Mathematics and Data Analytics | OP | 4 |

## Contact lecturer

Name : Albert Ferreiro Castilla

Email : albert.ferreiro@uab.cat

## Group languages

You can consult this information at the end of the document.

## Prerequisites

The subject focuses on the applications of mathematical and statistics tools that have been acquired in previous courses, in particular it requires that the student has acquired the basic theoretical knowledge of calculus, calculus of probabilities, time series 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 show the student the different applications of mathematical and statistical concepts in financial engineering, focusing on their proper use and interpretation of results.

Thus, the subject is set as a high-level journey by the most relevant quantitative units present in the financial industry to introduce the most fundamental economic and financial concepts and show the most commonly used techniques. From the application of time series used in macroeconomic studies, to the numerical calculation by means of Monte Carlo methods present in front offices to price financial derivatives, throughout optimization techniques in risk-return models used by fund managers and loss calculation techniques found in risk departments.

For this reason the course focuses on applications and requires the student to have acquired the basic theoretical knowledge of calculus, calculus of probabilities, time series and numerical methods.

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

- CM32 (Assess the degree of compliance with the requirements necessary to apply each advanced statistical procedure.) Assess the degree of compliance with the requirements necessary to apply each advanced statistical procedure.
- CM33 (Draw relevant conclusions from applied problems by applying advanced statistical methods.) Draw relevant conclusions from applied problems by applying advanced statistical methods.
- KM27 (Recognise the advantages and disadvantages of different statistical methodologies when applied to different disciplines.) Recognise the advantages and disadvantages of different statistical methodologies when applied to different disciplines.
- KM28 (Identify the most appropriate modelling for a chronological series.) Identify the most appropriate modelling for a chronological series.

- SM33 (Use summary graphs of time-varying data.) Use summary graphs of time-varying data.
- SM34 (Analyse data using the time series model.) Analyse data using the time series model.

## Contents

*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 synthesize.

*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 |
|---|---|---|---|---|
| Exam | 50% | 2.5 | 0.1 | CM32, CM33, KM27, KM28, SM33, SM34 |
| Case Sets | 25% | 2.5 | 0.1 | CM32, CM33, KM27, KM28, SM33, SM34 |
| Case Problem Sets | 25% | 2.5 | 0.1 | CM32, CM33, KM27, KM28, SM33, SM34 |

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

Arratia, A. (2014) Computational Finance, an introductory course with R, Atlantis Press.

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

Ruppert, D. (2010) Statistics and Data Analysis for Financial Engineering, Springer.

## Software

R

### 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