

**MASTER EN DIRECCIÓN FINANCIERA Y CONTABLE DE LA
EMPRESA**
(Official Master's Degree in Accounting and Financial Management)

SUBJECT

Name: Data Analytics

Type of subject: Compulsory

Credits: 3 ECTS

Professor: Raul Merino/ Francesco Spinoglio

COURSE DESCRIPTION

Introduction

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Objectives

General objective: Learn how to use Python to collect and filter data, and how to design a data driven strategy to design an investment portfolio for the long term.

CE1. Identifying the main elements of quantitative analysis and getting a grasp of its inner workings.

CE2. Comparing the different approaches to data analysis and their main features.

CE3. Understand how to select the best companies to invest in by analyzing qualitative and quantitative data.

CE4. Learn how to design a diversified portfolio for the long term using quant analysis and data driven metrics.

Methodology

There will be 4 sessions of four and a half hours each. The course will combine lectures with case discussions, and exercises. During the discussion of some cases, the students might be divided in groups using the role-playing approach.

Evaluation criteria

Grading will be done through:

- Class participation (20%)
- Report of Cases (40%): Some cases will be presented in class by a group of students and (when asked) in written format by all students.
- Final exam / Individual report (40%)

Total course

Students need to obtain a minimum of 5 in the final exam to pass the course. This condition applies to both the regular exam and the retake exam. The final course grade of students that do not obtain **a minimum of 5 in the exam** will have a retake exam opportunity that will be programmed in accordance with the academic calendar. If a student has to retake the exam, his **maximal grade for the course will be a 5**.

Students are required to **attend 80% of classes**. Failing to do so without justified reason will imply a Zero grade in the participation/attendance evaluation item and may lead to suspension from the program.

Plagiarism is to use another's work and to present it as one's own without acknowledging the sources in the correct way. All essays, reports or projects handed in by a student must be original work completed by the student. By enrolling at any UPF BSM Master of Science and signing the "Honor Code," students acknowledge that they understand the schools' policy on plagiarism and certify that all course assignments will be their own work, except where indicated by correct referencing. Failing to do so may result in automatic expulsion from the program."

Contents

FIRST PART: Phyton and data analysis.

1. Introduction to Python

- **Objective:** Gain a foundational understanding of Python, its uses, and how to set up a working environment.
- **Example:** Students will run basic Python commands, exploring fundamental concepts such as variables, data types, and simple functions.

2. Loading Data from various sources

- **Objective:** Learn how to import data from multiple sources (e.g., CSV, Excel, databases) into Python.
- **Example:** Students will practice importing datasets and loading them into Python for further analysis.

3. Working with DataFrames

- **Objective:** Understand what a DataFrame is and how to manipulate and analyze data using this structure.
- **Example:** Students will load data into a DataFrame, calculate key metrics, and extract insights from the data.

4. Data Visualization

- **Objective:** Learn how to create meaningful visual representations of data using Python libraries.

- **Example:** Students will generate various plots to visualize trends and patterns in the data.

5. Applying Models

- **Objective:** Understand how to apply basic analytical models to data for predictive analysis and decision-making.
- **Example:** Students will implement linear regression or other statistical models to analyze datasets and make predictions.

SECOND PART: Data driven, Technical and Fundamental analysis in Financial Markets.

6. Macroeconomic Analysis:

- **Objective:** to learn how to correctly read some macroeconomic indicators that usually give clues about financial markets. Put/call ratio and bond yields.
- **Example:** Selection of the best economic indicators, making a good mix between lagging, coincident and leading indicators.

7. Technical analysis:

- **Objective:** learning to read a chart based on the data provided by moving averages, Dow Theory, gaps and Fibonacci retracements.
- **Example:** Design a long-term strategy based on the data and manage a simulated portfolio of €100,000.

8. Fundamental analysis:

- **Objective:** learn to read the key data of a company to determine the relationship between price and value by applying Graham's Formula and some specific valuation multiples.
- **Example:** Select companies based on the price/value ratio to include in a simulated portfolio.

9. Quantitative Analysis and Data Driven:

- **Objective:** learn how to read a Montecarlo simulation applied to the investment world and use the Data Driven methodology to analyze the situation of a company.
- **Example:** Selection of companies to include in the portfolio and portfolio management following the valuation of the free platform Systematic Value Investment.

10. Modern Portfolio Theory:

- **Objective:** learn how to design a diversified portfolio considering the Sharpe Ratio and levered beta.
- **Example:** preparation of a long-term investment portfolio and presentation of the portfolio in front of the class.

Reading Materials/ Bibliography/Resources

Bio of Professor

Raúl Merino

Raúl Merino has over a decade of full-time experience in the industry as a Risk Quant. He holds a PhD from Universitat de Barcelona (UB), where his research focused on decomposition formulas in stochastic volatility models under the supervision of Josep Vives. Raúl also has a Master's degree in mathematics for Financial Instruments from Universitat Autònoma de Barcelona (UAB) and the Centre de Recerca Matemàtica (CRM), as well as a Diploma of Advanced Studies in Quantitative Economics from Universidad Nacional de Educación a Distancia (UNED). For seven years, he taught as an Assistant Professor at Universitat Pompeu Fabra (UPF). His research interests lie in stochastic analysis and applied mathematics, with a particular focus on applications to mathematical finance.

Francesco Spinoglio

Francesco Spinoglio holds a PhD Cum Laude from the University of Barcelona and has been operating in the financial markets since 2017. He holds a Master's degree in Blockchain, Smart contracts and cryptoeconomics from the University of Alcalá and has published several academic articles on the banking world and the decentralized finance sector, including Redefining Banking Through Defi: a New Proposal for Free Banking Based on Blockchain Technology and DeFi 2.0 Model (Journal of New Finance) and Concentrated liquidity in Uniswap V3: A new strategy to optimize the capital bear market (Journal of New Finance). He is CEO and co-founder of Fórmula cripto, a technical analysis script programmer and consultant for Spain for Elementum Internacional, a Swiss-based gold and silver trading company. His areas of interest are fully related to financial markets, blockchain and the global economy, with some technical notes about derivatives and their use in commodities, cryptocurrencies, and decentralized finance.