COURSE DATA

Data Subject	
Code	36445
Name	Finance and data science
Cycle	Grade
ECTS Credits	4.5
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1406 - Degree in Data Science	School of Engineering	4	Second term

Subject-matter

Degree	Subject-matter	Character
1406 - Degree in Data Science	22 - Finance and Data Science	Optional

Coordination

Name	Department
LIERN CARRION, VICENTE	257 - Business Mathematics
RAMIREZ LOPEZ, FEDERICO	172 - Business Finance

SUMMARY

Finance and Data Science is an optional course with 4.5 ECTS offered by the Department of Business Finance and the Department of Business Mathematics. It is taught during the second semester of the fourth year of the Degree in Data Science.

The proper use and treatment of data is a priority in the field of Finance. The models of Economy, Business and Finance, which arise as a simplified abstraction of a complex and changing reality, in many cases mark decisive actions by handling a reduced number of variables. For this reason, this course tries to show students how investment decisions require the necessity not only of having access to the data, but also of handling them.

In this course, concepts from Mathematics, Statistics and Quantitative Methods in Management will be applied in Finance. The necessary tools for the analysis of investment projects and portfolio selection in different contexts are introduced. It is intended that the students learn to search, select, and assess the information and instruments suitable for finance and can draw conclusions as to whether an investment meets some pre-set objectives.

The subject is divided into two blocks. The first block, Finance, is dedicated to giving a global vision of the Financial Management and the investment concept, the analysis methods of investment projects are presented. In addition, the relationship between investment and financing is set, and finally, the profitability and risk of portfolios are analyzed. The second block, Optimization-based Investment Models, begins by showing some optimization techniques under conditions of uncertainty with one and several objectives (in the context of Fuzzy Logic). From this perspective, investment portfolio models are introduced, and finally different investment and social responsibility contexts are analyzed.

Theory lectures will be taught in Spanish, and the recitation sessions and the computer labs will be taught according to the Course Guide available in the web page of the Degree in Data Science.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Since the students have taken courses in Mathematics and Statistics during the first two years of the degree, no further background in those areas will be needed. Regarding the field of Economics and Business, the students have already taken the courses of Business and Data Science, and Quantitative Methods in Management, so no further background will be required either.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1406 - Degree in Data Science

- (CG05) Analysis and synthesis capability in the preparation of reports and in the defence of ideas.
- (CG07) Ability to autonomously make decisions and to properly and originally elaborate reasoned arguments, in order to obtain reasonable and contrastable hypotheses.
- (CT05) Ability to evaluate the advantages and disadvantages of different methodological and / or technological alternatives in different fields of application.
- (CE05) To understand the most relevant fields of application of data science and understand how data science is used to base and perform decision-making based on data
- (CE12) Ability to design and start solutions based on data analysis in the field of medicine and business, taking into account the specific requirements of this type of use cases.
- (CB2) Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- (CB5) Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

Apply quantitative and economic concepts to investment decisions, as well as learn financial data valuation techniques (CB2, CG07, CE12).
Search, select and assess the appropriate information for making financial decisions (CB5, CG05).
Select portfolios of securities using financial and non-financial criteria (CT05, CE05).
Use statistical and fuzzy techniques to treat investment uncertainty (CB2, CG07, CE12).

DESCRIPTION OF CONTENTS

1. Financial Management and the investment concept

1.1. What is the Financial Management and its objective?
1.2. Economic structure and financial structure.
1.3. The concept of investment.
1.4. Financial characteristics of an investment.
1.5. Calculation of Net Cash Flows.

2. Methods of analysis of investment projects

2.1 Net Present Value (NPV). The opportunity cost of capital.
2.2 The Payback Period.
2.3 The Internal Rate of Return (IRR).
2.4 Sensitivity analysis. Financial profitability threshold.

3. Relationship between investment and financing concepts

3.1 Economic risk and financial risk.
3.2 Weighted average cost of capital.
3.3 Adjusted Present Value (APV).
3.4 The effect of debt on expected net cash flows and the discount rate.

4. Securities Market. Return and risk of investment portfolios.

4.1 Securities Market.
4.2 Return and risk of a security.
4.3 Return and risk of an investment portfolio.

5. Optimization under uncertainty

5.1 Introduction to Fuzzy Logic.
5.2 Linear Programming.
5.3 Nonlinear Programming.
5.4 Multicriteria optimization.

6. Investment portfolio models

6.1 Mean-Variance model.
6.2 Portfolio models in uncertainty environments.
6.3 Modifications of the Markowitz model. Diversification and size of the portfolio conditions.
6.4 Including non-financial data to portfolio models.

7. Investments and Social Responsibility

7.1 Indicators for social responsibility, social impact, and sustainability.
7.2 Socially responsible investments. Socially responsible vs. classic portfolios.
7.3 Investments with a positive social impact. Investments in vaccination campaigns in the Third World.
7.4 Sustainable investments. Investments in sustainable tourism.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	20,00	100
Laboratory practices	15,00	100
Classroom practices	10,00	100
Attendance at events and external activities	2,00	0
Development of group work	5,00	0
Development of individual work	10,00	0
Study and independent work	12,50	0
Readings supplementary material	2,50	0
Preparation of evaluation activities	15,00	0
Preparing lectures	6,50	0
Preparation of practical classes and problem	6,50	0
Resolution of case studies	7,50	0
TOTAL	**112,50**	

TEACHING METHODOLOGY

The subject is basically structured in theoretical-practical sessions and computer laboratory sessions. Depending on the type of session, a different teaching method will be chosen.

In the theoretical sessions, there will be an expository development of the lessons with the participation of the students in the resolution of specific questions. The predominant teaching method in the theoretical classes will be the participatory master class. This methodology allows large groups of students to be directed in an organized manner, offering the advantages of a master class without limiting the participation of students and the teacher-student interaction. An attempt will be made to encourage participation and discussion in class, in order to offer the student a direct involvement with the content and individual evaluation questionnaires may be carried out (CG05, CE12, CT05).

In the practical activities carried out in the classroom, learning will be promoted through problem solving, exercises(CB5, CG07), and study cases (CB2, CE05).

In laboratory work, activities will be carried out either individually or in small groups and will take place in computer labs that will promote the student learning (CB2, CG07, CE12).

EVALUATION

The evaluation in this course will be carried out through a three-way process: a final exam at the end of the semester, which will assess the level of achievement of the learning results and especially those focused on the specific competences of the subject, regarding both the contents and their application, the evaluation of the practical activities carried out by the student during the course, and the continuous assessment of the student, based on their participation and involvement in the teaching-learning process.

- The final exam (SE1) will consist of theoretical and practical questions, to assess whether the student has assimilated the key elements of the program. This test is 50% of the final grade.
- The evaluation of the practical activities (SE2) will be carried out with the grading of exercises, works, reports, oral presentations, etc. This will represent the 30% of the final grade (CB2, CG07, CE12).
- The continuous assessment (SE3) aims to develop students' competencies and stimulate daily work. It will be based on an assessment of the student participation in the classes. It will amount for the 20% of the total grade. By their very nature, continuous assessment activities are NON-RECOVERABLE (CB2, CE12).

The final grade will be the sum of the final exam, the continuous assessment, and the practical activities. It is necessary to pass the final exam (with a minimum grade of 2.5 out of 5) in order to pass the course. In the second call, the practical activities (SE2), can be recovered by means of a synthesis test based on the practical activities carried out during the course.

In any case, the evaluation system will be ruled by the Evaluation and Qualification Regulation of the University of Valencia for Degrees and Masters (https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion = Inicio & idEdictoSeleccionado = 5639).

REFERENCES

Basic

- Blanco, F.; Ferrando, M.; Martínez, F. (2015): Teoría de la inversión. Pirámide.
- Ross, S.; Westerfield, R.; Jaffe, J. (2010): Corporate Finance. Mc Graw Hill, 9th ed.
- Raufflet, E.; García de la Torre, C.; Lozano, J. F.; Barrera, E. (2016): Responsabilidad Social Empresarial. Pearson.
- Liern, V. (2016): El impacto positivo como criterio para avanzar en la inversión socialmente responsable. Editorial Real Academia de Ciencias Económicas y Financieras (https://racef.es/archivos/discursos/webracef_liern_238_2016.pdf).

Additional

- Bonilla, M.; Casasus, T.; Sala, R. (2000): Financial Modelling. Physica-Verlag.
- Chiang, A. (1996). Métodos fundamentales de Economía Matemática. 3ª Edición. McGraw-Hill, Madrid.
- Ballestero, E.; Pérez-Gladish, B.; García-Bernabeu, A. (2015): Multicriteria decisión making approaches to socially responsible investment. Searching for a responsible economy. Springer-Verlag.