

MATHEMATICS

Degree in Finance

Code: 10201

Main Scientific Area: Mathematics and Physics

Lecturer: Ricardo Jorge Castro Gonçalves

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 60h Total Workload: 108h

ECTS: 6,0

Objectives

It is intended with this course give mathematical basic formation for the specific courses of the undergraduate programme, in order to help students to develop their capacities of calculation, logical and abstract reasoning, acquiring the necessary knowledge for applications in the most diverse scientific branches, specially on management and finances. Using some generalized techniques, it is intended to give some knowledge of the Operational Research's paper in the resolution of decision's problems, as:

- supplying a scientific and structuralized boarding in the taking of decisions, for resolution of complex problems in the operations (activities) of an organization, usually in situation of scarce resources;
- representing systems of the real world, using mathematical models and algorithms in an optimization perspective;
- serving as social process.

Learning Outcomes

- Know basic elements of Linear Algebra, in order to develop capacities of abstraction, reasoning and clarity of language.
- Operate with matrices and solve systems of linear equations using matrix calculations.
- Calculate the determinant of a matrix.
- identify and characterize decision problems, optimization, and general management associated with real-world situations;
- represent identified problems by different forms, such as mathematical models and graphs;
- understand and apply algorithms to solve some types of important problems; - analyse, in a critical way, the

obtained solutions.

Course Contents

1. Linear Algebra 1.1. Matrices. Matrix language. Matrix operations. Matrices as representation of concrete situations. 1.2. Systems of linear equations. Approach to the study of systems of linear equations. Systems of two equations and two unknowns. Systems of three equations and three unknowns. Systems of m equations and n unknowns. Solving systems of linear equations. Limitations of the methods of solving systems of linear equations. Gauss elimination method. Characteristic of a matrix and another discussion of system of linear equations. Algorithm to determine the inverse matrix. 1.3. Determinants. Definition and properties. Algorithm for the calculation the determinant of any order. The determinants and the inverse of a matrix. Determinants in solving systems of linear equations. 2. Operational Research: introduction. 2.1. Operational Research: methodological initiation. 4/11 1 2.2.Linear Optimization. Introduction to linear optimization. Fundamental concepts. Primal Simplex Algorithm. Duality in Linear Programming. Sensitivity Analysis in Linear Programming. 2.3. Particular Cases of Linear Programming: Transports and Assignment.

Recommended Bibliography

Gonçalves, R. (2022). Álgebra Linear - teoria e prática (3ª ed.). Lisboa: Sílabo.

Learning and Teaching Methods

The contents, dealing with two distinct themes with strong interconnection, allowing students to develop their calculation and logical and abstract thinking skills, acquiring the necessary knowledge for application in scientific areas in the areas of Management.

Assessment Methods

Bachelor in Business Management

Two presential tests (T1 and T2), both without a minimum grade, with the following weighting:

$$T=50\%T1 + 50\%T2$$

Attendance (A) with the following wiighting: 5%A

Final grade: 95%T+5%A or95%EXAM+5%A

Bachelor in Finances

Final grade:

Period of continuous evaluation and exam period: 85% UC Evaluation + 15% Project

Special and Exceptional period: Exam classification

UC Evaluation (50 hours)

The evaluation takes place in two distinct moments: in the period of continuous evaluation (between 19.09.2023 and 19.12.2023 and including two presential tests (T1 and T2), both without a minimum grade, with the following weighting: 50%T1 + 50%T2) and in the exam period, in accordance with the RACC.

Project (10 hours)

The evaluation takes place in a single moment: in the period of continuous evaluation, between 03.01.2024 and 13.01.2024. The classification of the Project is only subject to grade improvement through an oral test. In the exam period, the classification of the Project comes from the grade obtained in the continuous evaluation. In special and exceptional periods, the classification of the Project is not considered. The evaluation elements and the respective weights are:

- 40%: Oral presentation (10-15 minutes) and public defense of the Project (5-10 minutes), open to the community of 1st semester teacher's and external entities.
- 30%: Digital Portfolio and related documents
- 30%: Project quality mention attributed by the Mentors (including self-evaluation and hetero-evaluation)

Whereas that

- Students attending for the first time: the project is mandatory, in compliance with the evaluation criteria defined for this purpose.
- Retained students in 1st year: the 15% of the weight coming from the Project will be converted into elements of continuous evaluation to be defined by the professor of each UC. Continuous evaluation will take place from 19.09.2023 to 13.01.2024.
- Student workers: they do not carry out the project if and only if they justify the impossibility to attend classes. When authorized, the 15% of the weight coming from the Project will be converted into elements of continuous evaluation.