Course Unit	Mathematics			Field of study	Mathematics				
Bachelor in	Accounting			School	School of Technology and Management				
Academic Year	2023/2024	Year of study	1	Level	1-1	ECTS credits	6.0		
Type	Semestral	Semester	1	Code	9056-514-1105-00-23				

Workload (hours)	162	Contact hours	T -	TP 60	PL -	TC -	S -	E -	OT -	O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): Carla Sofia Veiga Fernandes

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Know and apply rules of matricial calculus
2. Know the concept of determinant of square matrices and be able to apply this appropriately
3. Solve linear systems using Cramer's rule and Gauss method
4. Recognize aspects of function behaviour, by identifying properties, also using the differential calculation
5. Find indefinite integral. Calculate a definite integral and understand its geometrical meaning
6. Understand the definition of a real function of 2 variables and use partial differentiation for solving optimization problems with and without constraints
7. Solve real-world math problems by choosing an appropriate strategy

Prerequisites

Before the course unit the learner is expected to be able to:
Know and to apply mathematical concepts taught during high school.

Course contents

Chapter1. Linear algebra; Chapter 2. Calculus in one variable; Chapter 3. Calculus with several variables

Course contents (extended version)

1. Linear Algebra
   - Concept of matrix; matrix operations
   - Determinant of a square matrix
   - Systems of linear equations: matricial form
   - Resolution of systems through the Cramer's rule and Gauss elimination method
2. Calculus In One Real Variable
   - Definition of real function of a real variable, his domain and codomain
   - Exponential and logarithmic functions
   - Limit and continuity of a function at a point and on an interval
   - The derivative of a function at a point, derivative function and rules of derivation
   - Higher order derivatives
   - Optimization problems
   - The notion of indefinite integral and immediate integrals
   - Definite integral: definition, fundamental theorem of calculus and properties of definite integral
   - Finding areas by integration
3. Calculus With Several Variables
   - Definition of functions of several variables
   - Partial derivatives and higher order partial derivatives
   - Otimization problems with and without constraints

Recommended reading

1. Gilbert Strang: Linear Algebra and its Applications; Harcourt Brace Jovanovich College Publishers, 1986
2. Luís Magalhães: Álgebra Linear como Introdução à Matemática Aplicada; Texto Editora, 1998
3. Laurence Hoffmann, Gerald Bradley Calculus For Business and Social and Life Sciences, 5ª Ed. , McGrawHill, 1992
4. J. C. Silva : Princípios da Análise Matemática Aplicada; McGraw-Hill, 1994
5. João Paulo Santos: Cálculo numa Variável Real; IST Press, 2012

Teaching and learning methods

The topics of the course unit will be introduced and explored during the lessons - resolution of exercises will complement the theoretical concepts. Outside the classes, the students must solve practical exercises and, whenever they consider useful, they should use computer and/or calculator.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
   - Intermediate Written Test - 35% (First partial test assesses the acquired skills in Chapter 1 and is held during classes.)
   - Intermediate Written Test - 45% (Second partial test assesses the acquired skills in Chapter 2 and is held during classes.)
   - Intermediate Written Test - 20% (Third partial test assesses the acquired skills in Chapter 3 and is held at the final exam's day.)
2. Alternative 2 - (Regular, Student Worker) (Supplementary)
   - Intermediate Written Test - 100% (Reproved student can repeat 1 or 2 of the partial tests referred on the Alternative 1.)
3. Alternative 3 - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 100%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Carla Sofia Veiga Fernandes	Florbela Alexandra Pires Fernandes	Oliva Maria Dourado Martins	José Carlos Rufino Amaro
04-10-2023	11-10-2023	11-10-2023	20-10-2023