ipb
INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Mathemathics for Business			Field of study	Mathematics	
Bachelor in	International Business Management			School	School of Technology and Management	
Academic Year	2022/2023	Year of study	1	Level	1-1	ECTS credits	6.0
Type	Semestral	Semester	1	Code	8487-711-1103-00-22	

Workload (hours)	162	Contact hours	T	-	TP	50	PL	-	TC	-	S	-	E	-	OT	10	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)	Joao Paulo Pais de Almeida

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Perform a qualitative analysis of a function of one real variable, calculate its derivatives of any order and solve problems concerning applications of the derivative.
2. Compute the definite integral of elementary functions over an interval, apply integral calculus in determining areas of regions of the plane and compute the mean value of a function.
3. Perform the elementary operations of matrix algebra, solve matricial equations and identify special matrices.
4. Check if a square matrix is invertible and compute its inverse.
5. Classify and solve systems of linear equations in matrix notation using Gauss' method and Cramer's rule.
6. Compute the determinant of a square matrix.

Prerequisites

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

Course contents

Functions of one real variable. Derivativation. Integration Matrices and Determinants. Systems of linear equations.

Course contents (extended version)

1. Matrices and Systems of Linear Equations
   - Matrices and Matrix Operations.
   - The inverse of a matrix. Algebraic properties of matrices
   - Elementary Matrices and the method of Gauss elimination for finding the inverse of a matrix.
   - The matricial form of a system of linear equations.
   - Classification of systems of linear equations.
   - Solving systems of linear equations: The method of Gauss elimination.
   - Linear systems and matrix inversion.
2. Functions, Graphs and Limits
   - Functions. The graph of a function. Linear functions. Functional models.
   - Limits and continuity. Limits involving infinity. Asymptotes.
   - The exponential and logaritmic functions.
3. Differentiation
   - The derivative. Properties of the derivative. Techniques of differentiation. High order derivatives.
   - The Chain Rule. Implicit differentiation.
   - Applications of the derivative to Business and Economics.
4. Integration
   - Antidifferentiation: The indefinite integral. Integration by substitution. Integration by parts.
   - The definite Integral and the Fundamental Theorem of Calculus.
   - Applying definite integration: the area between curves and the average value of a funtion.
   - Additional applications of integration to Business and Economics

Recommended reading

1. Anton, H and Rorres, C. (2013). Elementary Linear Algebra: Applications Version, 11th Edition, Wiley
2. Dowling, E. T. (2009). Schaum's Outline of Mathematical Methods for Business and Economics, McGraw-Hill
3. Hoffmann, L. and Bradley, G (2012). Applied Calculus for Business, Economics, and the Social and Life Sciences, McGraw-Hill
4. Jacques, I. (2012). Mathematics for Economics and Business, 7th Edition, Pearson

Teaching and learning methods

In class, topics of the course unit will be introduced and explored during the lessons. Resolution of exercises will complement the theoretical concepts. Outside class students must solve practical exercises to improve skills and, whenever they consider useful, they should use computer or calculator. There wil be extra individual or group oriented tutorial sessions whenever it becomes necessary.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
   - Final Written Exam - 100%
2. Alternative 2 - (Regular, Student Worker) (Final)
   - Intermediate Written Test - 60% (Course contents for 1st partial exam: Differentiation; Integration.)
   - Intermediate Written Test - 40% (Course contents for 2nd partial exam: Matrices and linear Systems, Functions, Graphs and Limits;)

Language of instruction

English

Electronic validation

Joao Paulo Pais de Almeida	Carla Sofia Veiga Fernandes	Nuno Filipe Lopes Moutinho	Paulo Alexandre Vara Alves
19-10-2022	19-10-2022	24-10-2022	24-10-2022

Electronic validation

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19-10-2022	19-10-2022	24-10-2022	24-10-2022