INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Mathematics			Field of study	Mathematical and Quantitative Methods								
Bachelor in	Public Management and Administration			School	School of Public Management, Communication and Tourism								
Academic Year	2021/2022	Year of study	1	Level	1-1	ECTS credits	6.0						
Type	Semestral	Semester	2	Code	9165-315-1205-00-21								
Workload (hours)	162	Contact hours	T -	TP 60	PL -	TC -	S -	E -	OT 20	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): Ana Ester Veiga Rodrigues

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Read, write and use mathematical language fluidity.
2. Solve easily problems envolving mathematical expressions.
3. Recognize the meaning of formulas and be able to use them to solve problems.
4. Use functions to modelling and solving problems.

Prerequisites

Before the course unit the learner is expected to be able to:
use basic knowledge of mathematics.

Course contents

Study and representation of real functions. Function limits. Continuity. Derivatives. Applications of the derivative. Solve problem using derivative.

Course contents (extended version)

1. Real functions of a real variable
   - Formula and graph of a function.
   - Characteristics of functions: zeros, sinal and domain.
   - Polinomial functions: affine, quadratic and polynomial with degree greater than 2.
   - The algebra of fuctions. Division algorithm and Ruffini's rule.
   - Monotonicity. Relative extrema for a function.
   - Rational and irracional functions. Domain and range.
   - Piecewise function. Absolute value function.
   - Injectivity. Inverse function. Identity function. Composition of functions.
2. Limit of a function
   - Heine's limit definition. One sided limits. Limit properties.
   - Indeterminate forms of limits.
   - Asymptote of functions.
3. Continuity of a function
   - Continuity of a function at a point, on a set.
   - Local properties of continuous functions.
4. Exponential and Logaritmic Functions
   - Exponential function: definition, graph and properties. Exponential equations and inequalities
   - Logarithm function: definition, graph and properties. Logarithmic equations and inequalities.
5. Differentiation
   - Interpretations of the derivative. Differentiation formulas.
   - Derivative function. Derivative and continuity.
   - Applications of the derivatives.
   - Sketch graphs.

Recommended reading

1. Costa, Belmiro; Rodrigues, Ermelinda. (2017). Novo Espaço. Matemática A. 12º Ano. (1ª Edição). Porto: Porto Editora.
2. Neves, Morais A. ; Guerreiro, Luís; Silva, António. (2010). Matemática A. 10º Ano. (1ª Edição). Porto: Porto Editora.
3. Neves, Morais A. ; Guerreiro, Luís; Silva, António. (2011). Matemática A. 11º Ano. (1ª Edição). Porto: Porto Editora.
4. Santos, Fernando B. (2005). Sebenta de Matemáticas Gerais. Lógica, limites e continuidade. (8ª Edição). Lisboa: Plátano Editora.
5. Sarrico, Carlos. (2005). Análise Matemática. Leituras e exercícios. (6ª Edição). Lisboa: Gradiva.

Teaching and learning methods

The lessons are structuralized with the following components: - written exposition and verbal communication of the program contents; - illustrations with examples and counterexample; - resolutions of problems; - exercises resolutions, and subsequent presentation and discussion;

Assessment methods

1. Distributed evaluation - (Regular, Student Worker) (Final)
   - Intermediate Written Test - 50%
   - Final Written Exam - 50%
2. Final Evaluation - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 100% (All course contents)

Language of instruction

Portuguese

Electronic validation

Ana Ester Veiga Rodrigues	Bernadete de Lourdes Bittencourt	Elisabete da Anunciacao Paulo Morais	Luisa Margarida Barata Lopes
30-03-2022	30-03-2022	30-03-2022	04-04-2022