

<p>POLI ESCOLA SUPERIOR TECNOLOGIA GESTÃO</p> <p>TÉCNICO GUARDA</p>	<h1>SUBJECT DESCRIPTION</h1>	<p><b>MODELO</b> PED.013.03</p>
---	------------------------------	-------------------------------------

Course	Topographic Engineering				
Subject	Mathematical Analysis I				
Academic year	2023/2024	Curricular year	1st	Study period	1st semester
Type of subject	Compulsory	Student workload (H)	Total: 182	Contact: 60	ECTS 6,5
Professor(s)	César Gonçalves				
<input checked="" type="checkbox"/> Area/Group Coordinator <input type="checkbox"/> Head of Department	Graça Tomaz <small>(select)</small>				

## PLANNED SUBJECT DESCRIPTION

### 1. LEARNING OBJECTIVES

It aims that the student acquires knowledge and skills in terms of theoretical foundations and techniques for calculating the level of the syllabus provided. It is also intended that students develop reasoning, comprehension, and interpretation, as well as the ability to apply the acquired knowledge to solve specific problems related to the purview of the respective course.

### 2. PROGRAMME

#### 1- Real Functions of Real Variable.

- 1.1- Definition and basic concepts.
- 1.2- One-to-one functions; onto functions; monotone functions; limited functions; even and odd functions; periodic functions.
- 1.3- Composite function and inverse function.
- 1.4- Study of elementary functions: exponential function; logarithmic function; circular trigonometric functions and their inverses.
- 1.5- Limits, definition and fundamental theorems. Lateral limits. Fundamental theorems on limits.
- 1.6- Continuity, definition and properties. Bolzano-Cauchy and Weirstrass theorems.

#### 2- Differential Calculus on IR.

- 2.1- Notion of derivative and geometric interpretation. Lateral Derivative. Derivation rules. Derivative of composite function and inverse function. Tangent straight equation and normal straight equation to the graph of a function.

	<h2>SUBJECT DESCRIPTION</h2>	<b>MODELO</b> PED.013.03
---	------------------------------	-----------------------------

2.2- Rolle, Lagrange and Cauchy theorems. Cauchy rule for limits calculation.

2.3- Extremes and monotony. Inflection points and direction of concavity of the graph of a function. Complete study of functions.

### 3- Primitives.

3.1- Primitive notion. Immediate primitives. General methods of primitivation.

3.1.2- Primitivation by parts.

3.1.3- Primitivation by substitution.

3.4- Primitivation of powers of trigonometric functions.

3.5- Primitivation of reducible fractions to rational fractions.

### 4- Integral Calculus in IR.

4.1- Riemann integral and fundamental properties. Fundamental Theorem of Integral Calculus.

4.2- Integration by parts and by substitution.

4.3- Applications of integral calculus to the calculation of areas.

## 3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The programmatic contents are set in accordance with the UC objectives, with a view to the development of calculus and mathematical thinking as support, and thus allowing students to foster the skills of logical reasoning and abstraction, in a controlled manner, demanding and effective, and its application in other Curricular Units, as well as future employment within the area of Topographic Engineering.

## 4. MAIN BIBLIOGRAPHY

### *Required:*

- Apostol, T. M. (1985). Calculus, vol. II., Jonh Wiley & Sons, New York.
- Azenha, A. (2000). Elementos de Cálculo Diferencial em  $\mathbf{R}$  e  $\mathbf{R}^n$ , McGraw-Hill.
- Ferreira, J. Campos (2005). Introdução à Análise Matemática. Fundação Calouste Gulbenkian.
- Gonçalves, C. R. (2021), Análise Matemática I – Resumo teórico, exercícios ilustrativos e exercícios propostos, IPG.
- Gonçalves, C.R. (2022), Caderno de Exercícios, material didático elaborado no âmbito da UC de Análise Matemática I, ESTG-IPG.
- Silva, J C (1994). Princípios de Análise Matemática Aplicada, McGRAW-HILL, Lisboa.



<p><b>POLI</b> ESCOLA SUPERIOR TECNOLOGIA GESTÃO</p> <p><b>TÉCNICO</b> <b>GUARDA</b></p>	<p><b>SUBJECT DESCRIPTION</b></p>	<p><b>MODELO</b> PED.013.03</p>
--	-----------------------------------	-------------------------------------

**DATE**

**September 18, 2023**

Clique

**SIGNATURES**

Professor

\_\_\_\_\_

(signature)

Area/Group Coordinator

\_\_\_\_\_

(signature)