UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Introduction to Mathematical Analysis

Academic Year 2025/2026

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Computer Engineering

3. Cycle

1st

4. Course Unit

Introduction to Mathematical Analysis (L9001)

5. Scientific Area

6. Curricular Year

1st

7. Type of Curricular Unit / Semester

1st Semester

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8. Class type and workload (work time)

Theoretical classes:	
Practical classes:	
Theoretical-Practical Classes	30,00
Tutorial Guidance:	20,00

9. ECTS Credits

6,00

10. Scientific Area Coordinator

11. Regent

Prof. Doutora MARIA ADELAIDE DUARTE CARREIRA LEITE VIDEIRA

12. Assistants

Dr. JOSÉ MANUEL SILVA GUERREIRO LOUÇÃO DE MATOS

13. Teaching Language

Portuguese

14. General Objectives

To provide students with a solid foundation in differential calculus of real functions of a real variable and the study of numerical and power series. These topics are fundamental for understanding other curricular units in an Engineering degree.
To develop mathematical skills and logical-deductive reasoning, essential for the analysis and modeling of scientific and technical problems.

15. Specific Objectives

Review concepts of differential calculus in R, focusing on derivation, and apply them to optimization problems. Introduce the study of numerical series and power series, including convergence criteria and function representation, with an emphasis on applications in Engineering.

16. Skills to be acquired

Solve optimization problems with real functions. Apply convergence criteria for numerical series. Represent functions using power series. Use differential calculus in modeling and problem solving. Apply mathematical techniques to engineering contexts.

17. Teaching Methodology

The course is taught through theoretical-practical sessions, including the presentation of contents and resolution of examples. These sessions are complemented by tutorial guidance classes, focused on problem-solving and the active participation of students.

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18. Course Unit Program

1. Differential calculus in R
1.1. Generalities about real functions of real variable.
1.2. The concept of derivative
1.3. Application of derivatives to the study of functions. Optimisation issues.
1.4. Cauchy's rule.

2. Series
2.1. Motivation: infinite decimals
2.2. Numerical series: definition, properties, geometric series, convergence criteria, simple and absolute convergence
2.3. Power series: radius and interval of convergence, function representation, Taylor series, applications

19. Assessment Methods

The continuous assessment component consists of two written tests, carried out individually during the semester. Each test will cover the topics taught up to the corresponding date and will have equal weight in the final continuous assessment grade.

20. Didactic Resources

Students are provided with recommended bibliographic references and a theoretical-practical booklet, which includes examples and exercises, available on the Moodle platform. These materials complement the lectures and support independent study.

21. Sustainability Objectives

SDG 4 - Quality Education - Promote skills in logic, calculus and mathematical modelling.
SDG 8 - Decent Work and Economic Growth - Enhance employability through solid mathematical training and critical spirit.
SDG 9 - Industry, Innovation and Infrastructure - Apply mathematics to solve technical and scientific problems.

22. Keywords

Function
Derivative
Optimisation
Numerical series
Power series

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23. Main Bibliography

Author(s):	B. Louro; Ana Sá		
Title:	Cálculo Diferencial e Integral em R		
Edition:	1ª	Year:	2022
Local:	Lisboa		
Publisher:	Escolar Editora		
ISBN Code:	9789725925973		

Author(s):	Salas, Hille		
Title:	Calculus		
Edition:	10ª	Year:	2016
Local:	New Jersey		
Publisher:	John Wiley and Sons		
ISBN Code:	978-0-470-94151-5		

Author(s):	J. Campos Ferreira		
Title:	Introdução à Análise Matemática		
Edition:	11ª	Year:	2011
Local:	Lisboa		
Publisher:	Fundação Calouste Gulbenkian		
ISBN Code:	9789723113884		

24. Complementary Bibliography

Author(s):	Ron Larson, Robert P. Hostetler, & Bruce H. Edwards		
Title:	Cálculo		
Edition:	1ª	Year:	2006
Local:	São Paulo, Brasil		
Publisher:	MacGraw-Hill Interamericana do Brasil		
ISBN Code:	9788586804564		

Author(s):	António Monteiro, Isabel Serra		
Title:	Séries		
Edition:	1ª	Year:	2014
Local:	São Paulo, Brasil		
Publisher:	Edições Orion		
ISBN Code:			

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Título / Title	Course Unit Program 'INTRODUÇÃO À ANÁLISE MATEMÁTICA': Academic Year 2025/2026
Autor / Author	Prof. Doutora MARIA ADELAIDE DUARTE CARREIRA LEITE VIDEIRA
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