UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Complements of 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

Complements of Mathematical Analysis (L9011)

5. Scientific Area

6. Curricular Year

2nd

7. Type of Curricular Unit / Semester

1st Semester

FUNDAÇÃO MINERVA CULTURA - ENSINO E INVESTIGAÇÃO CIENTÍFICA

Rua da Junqueira, 188 a 198 - 1349-001 LISBOA - Telefone 213 611 500 - Fax 213 638 307 - e-mail: info@lis.ulusiada.pt - https://www.lis.ulusiada.pt

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

13. Teaching Language

Portuguese

14. General Objectives

To provide students with essential mathematical tools for studying various disciplines in the area of Computer Engineering.
To develop analytical and operational skills in fundamental topics of applied mathematics.

15. Specific Objectives

Familiarize students with essential introductory concepts of complex analysis, multiple integrals, and ordinary differential equations.
Prepare them to apply these tools to modeling and solving concrete problems in the area of computer engineering and computational science.

16. Skills to be acquired

To develop the ability to represent and manipulate numbers and functions in the complex plane.
To differentiate and integrate functions of a complex variable.
To compute double and triple integrals in different coordinate systems.
To solve first- and second-order ordinary differential equations.
To apply mathematical techniques to the modeling and solving of problems in science and engineering.

17. Teaching Methodology

FUNDAÇÃO MINERVA CULTURA - ENSINO E INVESTIGAÇÃO CIENTÍFICA

Rua da Junqueira, 188 a 198 - 1349-001 LISBOA - Telefone 213 611 500 - Fax 213 638 307 - e-mail: info@lis.ulusiada.pt - https://www.lis.ulusiada.pt

The teaching is structured in theoretical-practical classes with presentation of the program content, resolution of examples and application of techniques.
Tutorial guidance sessions are held for practical exercises with active participation of the students.
The Moodle platform will be used to support learning with notes, cards and other materials.

18. Course Unit Program

1.Introduction to Complex Analysis
1.1 Algebraic and topological structure of the set of complex numbers
1.2.Definition and derivation of complex functions of a complex variable: Cauchy-Riemann conditions; Taylor's theorem

2.Multiple integrals
2.1. Double integral. Definition and properties. Fubini' Theorem. Double integrals in non-rectangular domains. Change of variables. Polar coordinates. The integral as a measure.
2.2. Triple integrals. Definition and properties. Fubini' Theorem. Change of variables. Cylindric and spherical coordinates. Applications.

3. Ordinary differential equations
3.1. Motivation: radioactivity decay.
3.2. First order equations. Linear equations. Separable equations. Exact equations. Applications. Existence and unicity theorem.
3.3. Second order linear equations. Existence and unicity theorem. General solution of the homogeneous equation with constant coefficients. Solution of the non-homogeneous equation. 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

? Notes and exercise sheets available on Moodle
- Recommended bibliography: Main and complementary

21. Sustainability Objectives

SDG 4 ? Quality Education ? Develop skills in logical reasoning, inductive and deductive reasoning. Modeling and problem solving.
SDG 8 ? Decent Work and Economic Growth ? Improve employability through mathematical skills and analytical skills.
SDG 9 ? Industry, Innovation and Infrastructure ? Apply mathematics to innovation and technological development.

FUNDAÇÃO MINERVA CULTURA - ENSINO E INVESTIGAÇÃO CIENTÍFICA

Rua da Junqueira, 188 a 198 - 1349-001 LISBOA - Telefone 213 611 500 - Fax 213 638 307 - e-mail: info@lis.ulusiada.pt - https://www.lis.ulusiada.pt

22. Keywords

Introduction to the study of complex variables
Multiple integrals
Ordinary differential equations

23. Main Bibliography

Author(s):	Carlos Sarrico		
Title:	Cálculo diferencial e integral para funções de várias variáveis-Leituras e exercícios		
Edition:	1ª	Year:	2009
Local:	Lisboa		
Publisher:	Esfera do Caos		

Author(s):	Miguel Ramos		
Title:	Curso elementar de equações diferenciais		
Edition:	1º	Year:	2000
Local:	Textos de Matemática da FCUL		
Publisher:	Departamento de Matemática da FCUL		

Author(s):	Adelaide Carreira e Susana Nápoles		
Title:	Variável Complexa		
Edition:	1º	Year:	2016
Local:	Lisboa		
Publisher:	DM.FCUL		

24. Complementary Bibliography

Author(s):	Tom M. Apostol		
Title:	Calculus, Vols I e II		
Edition:	2ª	Year:	1975
Local:	USA		
Publisher:	Wiley		

Author(s):	J. Stewart		
Title:	Calculus		
Edition:	7ª	Year:	2012
Local:	Belmont, CA, USA		
Publisher:	Brooks / Cole		

FUNDAÇÃO MINERVA CULTURA - ENSINO E INVESTIGAÇÃO CIENTÍFICA

Rua da Junqueira, 188 a 198 - 1349-001 LISBOA - Telefone 213 611 500 - Fax 213 638 307 - e-mail: info@lis.ulusiada.pt - https://www.lis.ulusiada.pt

UNIVERSIDADE LUSÍADA
LISBOA

Ficha técnica MIP / MIP Datasheet	
Título / Title	Course Unit Program 'COMPLEMENTOS DE ANÁLISE MATEMÁTICA': Academic Year 2025/2026
Autor / Author	Prof. Doutora MARIA ADELAIDE DUARTE CARREIRA LEITE VIDEIRA
Classificação / Classification	-
Descritores / Descriptors	-
Colaborador(es) / Colaborator(s)	-
Data Hora / Date Time	
Formato de dados / Data Format	Texto / Text, PDF
Estatuto de utilização / Usage	Acesso público / Public Access
Relação / Relation	Version 1,0

(c) Universidade Lusíada, 2025

FUNDAÇÃO MINERVA CULTURA - ENSINO E INVESTIGAÇÃO CIENTÍFICA

Rua da Junqueira, 188 a 198 - 1349-001 LISBOA - Telefone 213 611 500 - Fax 213 638 307 - e-mail: info@lis.ulusiada.pt - https://www.lis.ulusiada.pt