UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Linear Algebra

Academic Year 2025/2026

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Computer Engineering

3. Cycle

1st

4. Course Unit

Linear Algebra (L9002)

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 SÍLVIA ALEXANDRA CARRAPATO CHÁ

12. Assistants

13. Teaching Language

Portuguese

14. General Objectives

The main objective of this curricular unit is to understand the concepts and the general properties of linear algebra, as preliminary to the disciplinary areas of engineering in general.

15. Specific Objectives

The student should know about systems of linear equations and matrices, vector spaces, linear tranformations, eigenvalues and eigenvectors, among other fundamental concepts of linear algebra.

16. Skills to be acquired

Solve systems of linear equations; analyse matrices and their properties; realize operations between matrices; compute determinants; identify vector spaces and their properties; describe the concepts of basis and dimension; describe the concept of linear map; identify the null space and the range of a linear map; find a matrix of a linear map; determine the eigenvalues and eigenvectors of real square matrices; apply the knowledge gained through exercises.

17. Teaching Methodology

The Curricular Unit is structured into theoretical/practical sessions, supported by a weakly tutorial session.

In theoretical/practical sessions, there will be an exposition of the subject, included in the Curricular Unit 's program, with emphasis on examples.

In tutorial sessions, exercises provided to students will be solved, within the scope of the topics taught in theoretical/practical sessions with supervision from the teacher.

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18. Course Unit Program

1. Systems of linear equations and matrices
1.1. Systems of linear equations.
1.2. Matrices and elementary row operations.
1.3. Matrix algebra.
1.4. The inverse of a square matrix.
1.5. Matrix equations.
1.6. Determinants.
2. Vector spaces Rn
2.1. Vectors in Rn.
2.2. Definition of vector space in Rn.
2.3. Subspaces in Rn.
2.4. Basis and dimension.
2.5. Inner product in Rn.
3. Linear tranformations from Rn to Rm
3.1. Definition and properties.
3.2. The null space and the range of a linear transformation.
3.3. Isomorphisms.
3.4. Matrix representation of a linear transformation.
4. Eigenvalues and eigenvectors of real square matrices
4.1. Definitions and properties.
4.2. Diagonalization.

19. Assessment Methods

The assessment is based on two written midterm tests.

20. Didactic Resources

Recommended bibliography. In addition, notes relating to the topics taught in theoretical/practical sessions will be made available to students, which include exercises. All materials used in the classes will be shared through the Moodle platform. Classes will be taken using a whiteboard and multimedia projection.

21. Sustainability Objectives

SDG 9: Industry, Innovation, and Infrastructure. Linear equation systems enable the modeling and solving problems in engineering, logistics, and transportation networks.
SDG 4: Quality Education. Vector spaces develop abstract thinking and crucial mathematical skills.
SDG 13: Climate Action. Linear applications enable the environmental phenomena modeling.
SDG 3: Good Health. Eigenvalues and eigenvectors allow the analysis of epidemiological and biomathematical models.

22. Keywords

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Linear Algebra
Matrix
Vector Space
Linear Transformation
Eigenvector and Eigenvalue

23. Main Bibliography

Author(s):	J. DeFranza & D. Gagliardi		
Title:	Introduction to linear algebra with applications		
Edition:		Year:	2009
Local:	New York		
Publisher:	McGraw-Hill		

Author(s):	E. Giraldes, V. H. Fernandes & M. P. M. Smith		
Title:	Curso de álgebra linear e geometria analítica		
Edition:		Year:	1995
Local:	Lisboa		
Publisher:	McGraw-Hill		

Author(s):	A. Monteiro		
Title:	Álgebra linear e geometria analítica		
Edition:		Year:	2001
Local:	Lisboa		
Publisher:	McGraw-Hill		

24. Complementary Bibliography

Author(s):	S. Lang		
Title:	Linear algebra		
Edition:	3rd ed.	Year:	1987
Local:	New York		
Publisher:	Springer		

Author(s):	S. J. Leon		
Title:	Linear algebra with applications		
Edition:	8th ed.	Year:	2010
Local:	Upper Saddle River, USA		
Publisher:	Pearson Education, Inc.		

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Ficha técnica MIP / MIP Datasheet	
Título / Title	Course Unit Program 'ÁLGEBRA LINEAR': Academic Year 2025/2026
Autor / Author	Prof. Doutora SÍLVIA ALEXANDRA CARRAPATO CHÁ
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