POLI
ESCOLA SUPERIOR
TECNOLOGIA
GESTÃO
TÉCNICO
GUARDA

SUBJECT DESCRIPTION

Course	Management					
Subject	**Mathematics I**					
Academic year	2023/24	Curricular year	1st	Study period	1st semester	
Type of subject	Compulsory	Student workload (H)	Total: 196	Contact: 90	ECTS	7
Professor(s)	Maria Manuela Simões					

☒ Area/Group Coordinator ☐ Head of Department	(select)	Graça Tomaz

PLANNED SUBJECT DESCRIPTION

1. LEARNING OBJECTIVES

It is intended to provide students basic mathematical knowledge in terms of theory and calculating techniques at the level of content contained in programmatic lines. In addition, it is intended that the student develops reasoning, comprehension and interpretation, as well as the ability to apply the knowledge acquired to solve concrete problems in the area of the respective course.

It is intended as part of this subject, that the students acquire and develop skills such as, for example, operate with complex numbers in various forms and represent them geometrically; operate with matrices and solve systems of linear equations using the matrix calculus; interpret and apply concepts related to vector spaces; master the concept of linear transformation between finite dimensional vector spaces or calculate the determinant of a matrix, and its eigenvalues and eigenvectors.

2. PROGRAMME

COMPLEX NUMBERS

Introduction. Cartesian representation of a complex.

Geometric and trigonometric representation.

Operations.

Properties.

Geometric transformations.

VECTOR SPACES

Definition. Properties.

Notion of vector subspace. Intersection, union and sum of subspaces.

Subspace spanned by a set of vectors.

Linear Independence, basis and dimension of a vector space.

MATRICES

Symbology and terminology of matrices.

Matrices equality.

Algebra of matrices and their properties.

Transposition of matrices.

Condensation and inversion of matrices.

Resolution and discussion of systems of linear equations.

DETERMINANTS

Definition and calculus rules.

Properties.

Minors and algebraic complements. Laplace Theorem.

Adjoint matrix and inverse matrix.

Rouche Theorem.

Eigenvalues and eigenvectors calculus.

LINEAR TRANSFORMATIONS

Definition and examples.

Matrix of a linear transformation

Matrix change of basis.

Kernel and image.

Rank and nullity.

Inverse of a linear transformation.

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

This subject, through the syllabus developed, aims to contribute to the formation of the student as a person and professional future.

Being a subject-based course management, the objectives consist basically in the assimilation of the syllabus proposed. The acquisition and use of skills proposed lead to a range of skills such as the ability of reasoning and abstraction or the ability of interpretation and understanding, that the student can use to critically and skillfully in other areas of science that are part of their training.

4. MAIN BIBLIOGRAPHY

Fundamental

1. Monteiro, A.; Pinto, G., Álgebra Linear e Geometria Analítica. Problemas e Exercícios, Mc Graw-hill, 1997.
2. Ribeiro, C.; Reis, L.;Reis, S., Álgebra Linear. Exerc. e Aplicações, Mc Graw-hill, 1997.
3. Giraldes, E., Curso de Álgebra Linear e Geometria Analítica, Mc Graw-hill, 1995.
4. Simões M., Marcos F.,Caderno de Exercícios Resolvidos de Álgebra Linear e Geometria Analítica, IPG, 2021.
5. Simões M., Marcos F.,Álgebra Linear e Geometria Analítica, IPG, 2021.

General

1. Magalhães, Luis T., Álgebra Linear como Introdução à Matemática Aplicada, Texto Editora, 1996.
2. Dias Agudo, F. R., Introdução à Álgebra Linear e Geometria Analítica, Esco. Editora, 1996.

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

Teaching methodology:

The methodology that will meet the objectives established for the subject will be lecture and interactive class, addressing the issues in a practical and objective way, with immediate application in solving exercises involving students in their learning and debugging.

Evaluation:

Continuous Assessment: Two written tests with a minimum of 5 values in each test and final classification (arithmetic average) greater than or equal to 10, to obtain approval.

Evaluation by final exam: normal season and time of appeal, with final classification greater than or equal to 10, to obtain approval.

Oral test mandatory for ratings above 16 points. The use of materials, calculator or mobile phones is interdicted.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

To achieve the objectives proposed, the methodology course is based on principles of theoretical and practical training.

The methods and teaching techniques use the affirmative method, with interconnection between theoretical and demonstrative technique and the method of interaction with the group, being the teacher's role in learning and enhancing coordination of various practical tasks.

7. ATTENDANCE

Not Applicable.

8. CONTACTS AND OFFICE HOURS

Professor:

Manuela Simões, msimoes@ipg.pt, office 31

Office Hours:

Wednesday: 14.00 – 16.30

Thursday: 14.30 – 16.00

Area Coordinator:

Graça Tomaz, gtomaz@ipg.pt, office 33

9. OTHERS

Not applicable.

DATE

25 de setembro de 2023