

MATEMÁTICA APLICADA À ELECTRÓNICA

Code: 322066

Main Scientific Area: Technologic innovation

Lecturer: Ana Margarida Miranda Gonçalves

Language of Instruction: Portuguese

Regime: S2

Contact Hours: 60h Total Workload: 48h

ECTS: 6,0

Objectives

The knowledge about functions, indispensable to the understanding of the world in which we live, will be amplified with the numerical and geometric function's study, using real life examples from other sciences like physics, geometry or geography. Trigonometric functions and complex numbers will be emphasised.

Learning Outcomes

Skills to develop: understand real functions, trigonometric functions and their practical applications; understand the algebraic and trigonometric form of a complex number; operate with complex numbers; operate with matrices and solve systems of linear equations using matrix calculations.

Course Contents

Chapter 0 - Real functions of real variable

0.1. Algebraic expressions and polynomials

0.1.1. Numerical and algebraic expressions and their properties of operations

0.1.2. Polynomial operations

0.2. Equations and inequalities

0.2.1. 1st degree equations and inequalities

0.2.2. 2nd degree equations and inequalities

0.3. Real functions of real variable

0.3.1. Notion of function

0.3.2. Features of a function

0.3.3. Notion of injectivity and surjectivity

0.3.4. Zeros of a function and sign of a function

0.3.5. Monotony of a function and extremes of a function

0.3.6. Intuitive study of the continuity of a function

0.3.7. Affine function: graph and properties

0.3.8. Quadratic function: graph and properties

Chapter 1. Trigonometric functions

1.1. Sine, cosine and tangent function

1.1.1. Definition and Properties

1.1.1.1. Domain, Counterdomain, zeros, periods, parity, asymptotes and monotony

1.1.1.2. Relationships between trigonometric functions

1.1.1.3. Optimization problems involving trigonometric functions

Chapter 2. Complex numbers

2.1. Complex numbers set: definition and properties

2.2. Complex operation

2.3. Geometric representation and interpretation

2.4. Complex equations

2.5. Problem solving

Chapter 3. Matrices

3.1 Concepts

3.2 Matrix operations

3.3 Matrices as representation of concrete situations

Chapter 4. Systems of linear equations

4.1 Concepts

4.2 Resolution of systems of linear equations

4.3 Limitations

4.4 Gaussian elimination method

Recommended Bibliography

Spivak, M: Cálculos, New York, W. A. Benjamim

Strang, G. (2009). Introduction to linear algebra (4th ed.). Wellesley: Cambridge Press.

Gonçalves, R. (2015). Álgebra Linear: teoria e prática. Lisboa: Sílabo.

Learning and Teaching Methods

The understanding, manipulation and application of the concepts of trigonometric functions, complex numbers, matrices and systems provide a base set of mathematical knowledge required for the proper functioning of other units of the course curriculum. They also allow to develop the scientific reasoning and the mathematical ability to the application of the mathematical concepts.

Assessment Methods

Continuous assessment including two tests and the project work.

The weighting of these elements for the final grade will be:

1st Test - 45%

2nd Test - 45%

Project work - 10%