ISCTE IUL
Instituto Universitário de Lisboa
University Institute of Lisbon

# FUC - Ficha de Unidade Curricular
# Curricular Unit's File

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| **Code** | L5027 |
| **Name (PT)** | Matemática |
| **Name (EN)** | Mathematics |
| **Regime** | Semestral |
| **Level** | 1.º Ciclo |
| **Teaching language** | Português , Inglês |
| **School** | Escola de Tecnologias e Arquitectura (ISTA) |
| **Departament** | DM |
| **Scientific area** | Matemática (Mat) |
| **Responsible academic staff** | Cristina Isabel Correia Diogo |
| **Pre-requisites** | N.A. |
| **Objectives** | The overall goal of this course is to introduce students to the fundamental concepts of Linear Algebra and Diferential Calculus in Rn. We will develop skills in the aforementioned concepts and apply them in solving problems in economics and management. |
| **Learning outcomes** | LG1. Apply concepts and solve exercises of matrix algebra and determinants;<br>LG2. Apply concepts and solve exercises of vector spaces;<br>LG3. Apply concepts and solve exercises of differential calculus in Rn;<br>LG4. Apply those concepts to solve problems in economics and management. |
| **Syllabus** | 1. Matrices<br>Definitions and operations with matrices<br>Linear combination. Linear dependence and independence<br>Matrix inverse<br><br>2. Systems of linear equations<br>Gaussian elimination. Classification.<br><br>3. Determinants<br>Definition and properties<br>Matrix inverse<br><br>4. Vector Spaces<br>Vector subspaces<br>Span, base and dimension<br>Coordinate vectors and change of basis<br><br>5. Linear transformations<br>The matrix of a linear transformation<br>Kernel and range<br>Change of basis.<br>Eigenvalues and eigenvectors. Diagonalization<br>Quadratic forms<br><br>6. Inner product<br>Inner product and norm<br>Orthogonality<br>Orthonormal basis<br><br>7. Differential Calculus in Rn<br>Topology<br>Functions of several variables<br>Domains<br>Limits and continuity<br>Partial derivatives<br>Directional derivatives<br>Differentiation<br>Gradient and Jacobian matrix<br>Chain rule |

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| **Assessment** | Continuous assessment consists:<br>1. Midterm test (30%)<br>2. Group assignment (20%)<br>3. Final test (50%)<br>Minimum grade of 8 out of 20 for the midterm and final test.<br>Assessment by examination consists of doing an exam in the 1st examination period.<br>Students who have failed may take the exam in the 2nd examination period.<br>Students are required to take an oral exam, if the grade is higher than 16. |
| **Teaching methodology** | LM1. Expositional: presentation of the theoretical concepts<br>LM2. Participative: solving exercises and problems<br>LM3. Active: group assignment<br>LM4. Autonomous work: individual study should be complemented with the bibliography and by solving exercises and problems given by the lecturer, according to the class planning. |
| **Demonstration of the syllabus coherence with the curricular unit's objectives** | The consistency of the syllabus with the learning goals (LG) is described as follows:<br>LG1 - Items 1 - 3 in the Syllabus<br>LG2 - Items 4 - 6 in the Syllabus<br>LG3 - Item 7 in the Syllabus<br>LG4 - Items 1 - 7 in the Syllabus |
| **Demonstration of the coherence between the teaching methodologies and the learning outcomes** | The learning-teaching methodologies are aimed to develop student's main learning competences that allow to fulfill each of the learning goals. The main links between the learning-teaching methodologies and the respective goals are as follows:<br><br>LM1. LG1 - LG3<br>LM2. LG1 - LG4<br>LM3. LG1, LG2<br>LM4. LG1 - LG4 |
| **Main Bibliography** | |
| **Complementary Bibliography** | |