

Course Unit	Informatics		Field of study	Informatics	
Bachelor in	Chemical Engineering		School	School of Technology and Management	
Academic Year	2023/2024	Year of study	1	Level	1-1
Type	Semestral	Semester	1	ECTS credits	6.0
Workload (hours)			162	Contact hours	
			T	-	TP
			PL	60	TC
			S	-	E
			OT	-	O
			Code 9125-755-1104-00-23		

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Hélder Miguel Gonçalves Pereira, Isabel Maria Lopes

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Use an interactive tool of high performance oriented to execution of tasks that involve numerical calculations
2. Acquire fundamental knowledge to solve problems using the programming
3. Define structures and models of basic data to support the modelling of problems in the context of experimental sciences
4. Take advantage of the evaluation of expressions entered in the MATLAB command window
5. Code Programs of intermediate complexity in the MATLAB integrated development environment(IED)

### Prerequisites

Before the course unit the learner is expected to be able to:

Have a basic understanding of computer operation and its potential

### Course contents

Introduction to MATLAB. Arrays. Plotting. M-Files. Operators. Branching statements and loops. Data Import and Export. Characters and Strings.

### Course contents (extended version)

1. MATLAB – Introduction
  - MATLAB presentation
  - The MATLAB environment
  - Commands and expressions
  - Variables
  - Elementary mathematical built-in functions
  - List of elementary built-in functions
2. MATLAB – Arrays
  - Notion of vector, matrix and array
  - Definition of row and column vectors
  - Matrix concept
  - Definition of matrices
  - Matrix sizes
  - Indexing of vectors and matrices
  - Operations on vectors and matrices
  - Functions for manipulating matrices
  - Multidimensional arrays
  - List of built-in functions for matrix calculation
3. MATLAB – Plotting
  - Introduction to plotting
  - Bi-Dimensional plots
  - Three-Dimensional plots
  - Multiple plots
  - Special plots: histograms, bar, slice and functions
  - Annotation and formatting plots
  - Tools for plot editing
  - Save, open, print and export
  - List of built-in functions for plots manipulation
4. MATLAB – M-Files
  - Introduction to M-Files
  - Input and output data
  - Scripts
  - Functions: basic structure, the parameter list of variables and subfunctions
5. MATLAB - Operators
  - Arithmetic operators
  - Relational operators
  - Logical operators
  - Operator precedence
  - Test functions
  - List of built-in functions for operators
6. MATLAB – Branching statements and loops
  - The if construct
  - The switch-case construct
  - The for loop
  - The while loop
  - The break statement
  - The continue statement
  - Summary of MATLAB language constructs
7. Data Import and Export
  - Standard File Formats
  - Workspace Variables and MAT-Files
  - Low-Level File I/O
8. Characters and Strings
  - Text in String and Character Arrays
  - Analyze Text Data with String Arrays
  - Formatting Text
  - Search and Replace

**Recommended reading**

1. V. Morais, C. Vieira, "MATLAB Curso Completo", FCA–Editora de Informática, 2013
2. V. Morais, C. Vieira, "MATLAB 7&6 Curso Completo", 3ª Ed. , FCA–Editora de Informática, 2006
3. William J. Palm III, "Introdução ao MATLAB para Engenheiros", McGraw Hill, 2013
4. S. J. Chapman, "MATLAB Programming for Engineers", 6th Ed. , Cengage Learning, 2019
5. S. J. Chapman, "MATLAB Programming with Applications for Engineers", International Edition, Cengage Learning, 2013

**Teaching and learning methods**

In the theoretical component of classes, the method used is the expository method, which makes possible the transmission of knowledge in a continuous and less time-consuming manner. In the practical component of classes, the most used method is the active one, enhancing the activity of students through the resolution of practical exercises.

**Assessment methods**

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary)
  - Intermediate Written Test - 40% (Matlab component)
  - Intermediate Written Test - 60% (MatLab component)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100% (Includes one or more supplementary exercises intended to replace the intermediate test.)

**Language of instruction**

1. English
2. Portuguese

**Electronic validation**

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06-10-2023	07-10-2023	07-10-2023	10-10-2023