

Course Unit	Informatics			Field of study	Informatics	
Bachelor in	Renewable Energy Engineering			School	School of Technology and Management	
Academic Year	2023/2024	Year of study	1	Level	1-1	ECTS credits 6.0
Туре	Semestral	Semester	1	Code	9910-743-1103-00-23	
Workload (hours)	162	Contact hours	T - TP T - Lectures; TP - Lectures a	- PL 60 T nd problem-solving; PL - Problem-	C - S - solving, project or laboratory; TC -	E · OT · O · Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Isabel Maria Lopes

- Learning outcomes and competences
- At the end of the course unit the learner is expected to be able to:

- At the end of the course unit the learner is expected to be able to: 1. Recognizing the need and advantages of automatic data processing 2. Use tools for processing and analysis of large volumes of data 3. Use an interactive tool of high performance oriented to execution of tasks that involve numerical calculations 4. Acquire fundamental knowledge to solve problems using the programming 5. Define structures and models of basic data to support the modelling of problems in the context of experimental sciences 6. Take advantage of the evaluation of expressions entered in the MATLAB command window 7. Conceive algorithms for scientific program solving 8. Encode routines and small programs in the integrated development environment of the MATLAB

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 spreadsheets. Data introduction and editing. Spreadsheet formatting. Charts. Formulas and functions. Introduction to MATLAB. Arrays. Plotting. M-Files. Operators. Branching statements and loops.

Course contents (extended version)

- 1. EXCEL Spreadsheet
 - Definition
 - Features
 - Areas of application
 - Basic concepts: book, sheet and cell
 Structure of the Microsoft Excel spreadsheet

 - Main features of the working environment Taskbar and ribbon tabs

- Features and habon tabs
 Features and basic operations
 EXCEL Formatting
 Text, numbers and date/time
 Alignment, borders and lines, controlling the text direction and union of cells
 - Fonts

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- Fonts
 Borders, background color and patterns
 Changing columns widths and row heights
 Fit the cell to content and hiding rows and columms
 Automatic and conditional formatting
 EXCEL Charts

- Creating a chart Chart elements and chart types

- Chart elements and chart types
 Chart options
 Chart formatting
 EXCEL Formulas and functions
 Arithmetic, relational and logical operators
 Entering, editing and copying formulas
 Using relative, absolute, and mixed references
 Beferencing cells outside the worksheat
- Using relative, absolute, and mixed references
 Referencing cells outside the worksheet
 Inserting functions into formulas
 Categories of functions: date and time, math and trigonometry, statistical, and logical
 Categories of functions: lookup and reference, database and text
 MATLAB Introduction
 MATLAB presentation
 The MATLAB environment
 Commands and expressions
 Variables

 - · Variables · Elementary mathematical built-in functions

- List of elementary built-in functions
 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
 7. MATLAB Plotting
 Introduction to plotting
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- Bi-Dimensional plots
 Three-Dimensional plots
- Multiple plots
 Special plots: histograms, bar, slice and functions
 Annotation and formatting plots

Course contents (extended version) Tools for plot editing Save, open, print and export List of built-in functions for plots manipulation MATLAB – M-Files Introduction to M-Files Input and output data Scripts Scripts Scripts Functions: basic structure, the parameter list of variables and subfunctions MATLAB - Operators Arithmetic opeartors Participated eventors Relational operators Logical operators Coperator precedence Test functions List of built-in functions for operators MATLAB – Branching statements and loops The if construct The switch-case construct The for loop

- The for loop
- The while loop The break statement
- The continue statement
 Summary of MATLAB language constructs

Recommended reading

- "Fundamental do Excel 2010", M. J. Sousa, FCA –Editora de Informática, 2011
 "Microsoft Office Excel 2010 Bible", J. Walkenbach, Wiley Publishing, 2010
 "MATLAB 7&6 Curso Completo", V. Morais, C. Vieira, FCA–Editora de Informática, 2006
 "MATLAB Programming for Engineers", S. J. Chapman, 4th Ed., Thomson Learning, 2008
 "MatLab Textos de Apoio e Caderno de Exercícios", L. Alves, I. Lopes, 2011

Teaching and learning methods

The course unit will be taught using lectures exposing theoretical concepts, practice classes for problem solving, and teacher-oriented self learning.

Assessment methods

- Alternative 1 (Regular, Student Worker) (Final, Supplementary)

 Intermediate Written Test 30% (Excel component)
 Final Written Exam 70% (MatLab component)

 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

Portuguese

Electronic validation			
Isabel Maria Lopes	Tiago Miguel Ferreira Guimaraes Pedrosa	Ana Maria Alves Queiroz da Silva	José Carlos Rufino Amaro
06-10-2023	07-10-2023	14-10-2023	31-10-2023