Universitat de Lleida

DEGREE CURRICULUM

COMPUTER SCIENCE BASICS

Coordination: LERIDA MONSO, JOSEP LLUIS

Academic year 2018-19

Subject's general information

Subject name	COMPUTER SCIENCE BASICS
Code	102109
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION
Typology	

Degree	Course	Character	Modality
Not informed	1	COMMON	Attendance-based
Bachelor's Degree in Automation and Industrial Electronic Engineering	1	COMMON	Attendance-based
Bachelor's Degree in Mechanical Engineering	1	COMMON	Attendance-based
Bachelor's Degree in Energy and Sustainability Engineering	1	COMMON	Attendance-based

Course number of credits (ECTS)	6
Type of activity, credits, and groups	

Activity type	PRAULA	TEORIA
Number of credits	3	3
Number of groups	6	3

Coordination	LERIDA MONSO, JOSEP LLUIS
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING
Teaching load distribution between lectures and independent student work	40% Classroom 60% Autonomous Work
Important information on data processing	Consult this link for more information.
Language	Catalan
Office and hour of attention	Contact by email with the teacher: jlerida@diei.udl.cat valenti.pardo@udl.cat jmsola@diei.udl.cat

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
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Subject's extra information

This is a mainly practical course in which the study is based on the resolution of recommended exercises. Individual work is essential for acquisition of the skills and the correctly use computer tools that will be used during the course. No previous programming knowledge required.

You can find the following collections of teaching materials in the Virtual Campus: http://cv.udl.cat

- Introduction to the Computer Basics
- MATLAB Programing
- Collections of problems, Examples, Solutions and extra materials

The use of the Virtual Campus is essential to access the resources of the course, notifications, deadlines information, teaching plan and assessment.

Learning objectives

The instrumental nature of the computer programming course make it very useful in many areas and professional fields. The computer programming provides a variety of specific solutions for the professional development in the field of Industrial Engineering, but also plays an essential role in the area of process engineering, control systems and automation. The main objective for this course is that students learn to design and implement on a programmable device, efficient and quality solutions to different types of problems. In addition to manage the programming environment and the solving techniques, this course pretend to introduce the students to the basic components of a programmable device as well as to acquire the conception and practice of how to write a program, compile and run knowledge.

This overall objective can be divided into the following more specific objectives:

1. Identify the basic components of a computer or programmable device, its functionality and the process of

interaction with the other components.
2. Learn and understand the syntax and semantics of a high-level language.
3. Use correctly the basic structures of high-level programming language: conditionals and iterators.
4. Use properly a top-down design to address complex problems.
5. Evaluate and validate the quality of the solution according to the results.
6. Acquire practical skills in solving real problems in interpreted environments.

Competences

University of Lleida strategic competences

- UdL3. Mastering ICT's.

Degree-specific competences

- EPS5. Capacity of abstraction and of critical, logical and mathematical thinking.

Degree-transversal competences

- GEM3 i GEEIA3. Basic knowledge of the use and programming of computers, operating systems, databases and computer programs with applications in engineering.

Subject contents

1 Preliminaries

- 1.1 Von Neumann Architecture
- 1.2 Evolution and Current status of programmable systems
- 1.3 Operating Systems: Functions, current OSs, Virtualization
- 1.4 Information representation

2 Introduction to Problem Solving for Engineering

- 2.1 Computational Thinking
- 2.2 Algorithmic Thinking

3 Programming and Algorithms

- 3.1 Getting started. Interface and basic syntax in MATLAB.
- 3.2 Introduction to programming in MATLAB
  - 3.2.1 M-File Scripts
  - 3.2.2 Control Flow and operators
  - 3.2.3 User-defined Functions. Top-down algorithm design
  - 3.2.4 Input/Ouput Functions
- 3.3 Vectors and Matrices
- 3.4 Access to Files and Databases in Matlab
- 3.5 Toolboxes and Advanced tools in MATLAB

4 Solving a case of Study

Methodology

The activities will be divided into two parts that complement each other: lectures and laboratory.

- Lectures: theoretical concepts are introduced and activities and raise issues that require the application of theoretical concepts for its resolution. We discuss different solutions, analyzing the results and efficiency.
- Laboratory: Laboratory classes are taught in small groups of students, thus promoting dialogue and participation from them. A number of problems or activites that require a solution programmed with gradual difficulties are posed. Students seek and implement an algorithmic solution to the real problems posed. It is discussed individually and / or in groups the best techniques to solve the problems. Each practice session gradually add the concepts seen in the lectures.

Development plan

Dates (Weeks)	Description	Face-to-Face Activity	FH (2) (Hours)	Autonomous Activity	AH (3) (Hours)
Week 1	Course Presentation	Exhibition events and methodology	1	Academic guide review	1
	T1.1 Von Neumann Architecture, memory and processor	Lecture and participatory classes	1	Study	2
	T1.4 Information representation	Lecture and participatory classes	2	Study	2
Week 2	T1.2 Evolution and Current status of programmable systems	Lecture and participatory classes	2	Study	2
	T1.4 Representation of Integer numbers	Lecture and participatory classes	2	Study	2
Week 3	T1.3 Operating Systems	Lecture and participatory classes	2	Study	2
	T1.4 Representation of Alphanumeric data. Problems	Lecture and Problem Based Learning	2	Resolució d'exercicis i Study	4
Week 4	T2. Computational Thinking	Lecture and participatory classes	2	Study	2
	Lab. Getting started	Laboratory	2	Practical Activity, Software installation and Introduction	2 4
Week 5	T2. Algorithmic Thinking	Lecture and participatory classes	2	Study	2
	Lab. Built-in functions and graphical representation	Laboratory	2	Practical Activity	4
Week 6	T3. Control Flow and operators	Lecture, participatory classes and exercises	2	Exercises	4
	Lab. Scripts i Entrada/Sortida	Laboratory	2	Practical Activity (LAB03)	4
Week 7	T3. Control Flow and operators Problems	Lecture, participatory classes and exercises	2	Practical Activity (LAB04)	4
	Lab. (Lab04)	Laboratory	2	Practical Exercise	4
Week 8	T3. Iterative sentences and Problems	Lecture, participatory classes and exercises	2	Exercises	4

	T3. Problems	Problem Based Learning	2	Problem Solving	4
Week 9	**PA1. Evaluation Test - 1**	Individual written exam	2		
Week 10	T3. User Functions	Lecture, participatory classes and exercises	2	Exercises	2
	Lab. (Lab05)	Laboratory	2	Practical Exercise	6
Week 11	Project – Session 1	Solution design	2	Case of Study	6
Week 12	**PLAB 1. Avaluable Practice**	Case of study	2		
	Lab. (Lab06) Morning Group	Laboratory	2	Practical Exercise	4
Week 13	T3. Vector and Matrices	Lecture, participatory classes and exercises	2	Problem Solving	4
	Lab. (Lab06) Evening Group	Laboratory	2	Practical Exercise	4
Week 14	Project – Session 2	Solution design	2	Case of Study	8
	Lab. (LAB07)	Laboratory	2	Practical Exercise	4
Week 15	**PLAB 2. Avaluable Practice**	Case of study	2		
	T3. Files access from Matlab	Laboratory	2	Case of study	7
Week 16 Week 17	**PA2. Evaluation Test - 2**	Individual written exam	2		
Week 18	Qualifications and Tutoring session				
Week 19	Recovery Test	Individual written exam	2		

(2) FH = Face-to-Face Hours
(3) AH = Autonomous Hours

Evaluation

Objectives	Evaluation activities	%	Dates	O/V (1)	I/G (2)	Remarks
Continous assesment Topics 2 & 3	Evaluable practice PLAB1	15	Week 9	O	I	
Continous assesment Topics 2 & 3	Evaluable practice PLAB2	15	Week 15	O	I	
Continous assesment Topics 1 & 2 & 3	Autonomous work and classroom participation. AP	10	During all the course	O	I	
Continous assesment Temas 1 & 2 & 3	Project	10	Weeks 12 to 15	O	I	
Continous assesment Topics 1 & 2 & 3	PA1. Writting exam	20	Week 9	O	I	
Continous assesment Topics 2 & 3	PA2. Writting exam	30	Week 16 i 17	O	I	
Recovery assesment. Topics 1 & 2 & 3	Recovery assesment. Writting exam (*)	50	Week 19	V	I	Recoveries Week

(1) Mandatory / Voluntary
(2) Individual / Group

Final Marks:
In the weeks 9th and 16th / 17th will be performed the writting exams: PA1 and PA2. Each of these tests has a weight of 30% over the final mark.

The final grade is calculated by the sum of the results of the writting test (PA1, PA2) plus the classroom practices (PLAB1, PLAB2), Project and autonomous work and classroom participation (AP): **Final Mark = PA1 + PA2 + PLAB1 + PLAB2 + AP + Project.**

(*) On the 19th week the grade of the course can be recovered with a final writting exam, following the guidelines of the EPS Academic Degrees Framework. The recovery will be done through a written exam with all contents of the course with a weight of 50% of the final grade. The continuous assessment practices can not be recovered. This test can also be done by all those students having passed the ongoing assessment and want to modify their grade, assuming that the obtained score in the recovery test is the only score that will be considered for the calculation of the final mark.

Bibliography

Basic bibliography:

Matlab. A Practical Introduction to Programming and Problem Solving. Stormy Attaway. Butterworth-Heinemann; Fourth edition. 2016. (electronic UdL resource)

Essential MATLAB for Engineers and Scientists. Brian Hahn, Daniel Valentine. Academic Press; Sixth edition. 2017. (electronic UdL resource)

Breves apuntes de MATLAB. Una introducción rápida pero no trivial. Rosa Echevarria. Universidad de Sevilla. (http://personal.us.es/echevarria/documentos/IntroduccionMATLAB.pdf)