



DEGREE CURRICULUM

COMPUTER SCIENCE BASICS

Coordination: LERIDA MONSO, JOSEP LLUIS

Academic year 2023-24

Subject's general information

Subject name	COMPUTER SCIENCE BASICS			
Code	102109			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Automation and Industrial Electronic Engineering	1	COMMON/CORE	Attendance-based
	Bachelor's Degree in Energy and Sustainability Engineering	1	COMMON/CORE	Attendance-based
	Bachelor's Degree in Mechanical Engineering	1	COMMON/CORE	Attendance-based
	Common branch in industrial engineering programs - Lleida	1	COMMON/CORE	Attendance-based
	Double bachelor's degree: Degree in Mechanical Engineering and Degree in Energy and Sustainability Engineering	1	COMMON/CORE	Attendance-based
	Programa Acadèmic de Recorregut Successiu - Enginyeries Industrials	1	COMMON/CORE	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRALAB		TEORIA
	Number of credits	3		3
	Number of groups	5		3
Coordination	LERIDA MONSO, JOSEP LLUIS			
Department	COMPUTER ENGINEERING AND DIGITAL DESIGN			
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			

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.

In this subject, MATLAB is used as a programming environment. MATLAB is a numerical calculation and programming platform used by millions of engineers and scientists for data analysis, algorithm development, modeling, simulation, etc. and that uses a high-level interpreted language ideal for learning. UdL students will have a free license for this software.

Specialized software used in the course:

- MATLAB

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 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/Output Functions
- 3.3 Vectors and Matrices

3.4 Access to Data Files in Matlab

3.5 Toolboxes and Advanced tools in MATLAB

4 Solving cases of Study

Methodology

The teaching modality is face-to-face, and the methodology will be as follows:

- **Lectures:** Theoretical concepts are introduced, and activities and problems that require the application of theoretical concepts for their resolution are proposed. The different solutions are discussed, analyzing their results, effectiveness, and efficiency. The study of concrete examples reinforces the new concepts introduced.
- **Laboratory classes:** Laboratory classes are taught in small groups of students, thus favoring dialogue and participation. A series of problems or activities of gradual difficulty are posed. Students search for and implement an algorithmic solution to the issues proposed. The best techniques to solve the problems raised are discussed individually or in groups from the point of view of their clarity and efficiency. Each practical session gradually includes the concepts seen in the master sessions.
- **Autonomous Work:** the student is proposed to use a series of tools, as well as carry out a series of actions to keep up with the subject:
 - Use of the Forum. A space is opened in the CV Forum tool for each thematic block and practical case. In this space, doubts can be raised regarding the content seen in the content sessions and its application to the problems in the subject's problem book available to students from the beginning of the course. Students expose their doubts, and all students are encouraged to resolve the doubts of their classmates. The teaching staff participates in clarifications or solving those doubts that have no answer from the students.
 - Resolved exercises space. In the 04_Problemes_i_Solucions folder in the Resources section, students can upload the problems they are solving from the subject problem notebook available to students from the beginning of the course. This action provides students with resources to solve doubts, learn alternative solutions, error detection, self-assessment, review, and compare different solutions.
 - The resolved practical cases can be uploaded to the virtual campus at a fixed deadline. The deadline for these activities sets the pace of the subject. Carrying out these activities favors the practice of knowledge and the self-assessment of the student's learning process.

The student's participation in the activities described above will be taken into account in the student's final evaluation.

Development plan

Check the development plan in the following document: https://cv.udl.cat/access/content/group/102109-2324/PlanificacioDocent_curs2324.pdf

Evaluation

Objectives	Assesment blocks	%	Dates	O/V (1)	I/G (2)	Remarks
Continuous assesment Topics 2, 3 & 4	1st Laboratory evaluation (PLAB1)	15	Week 10	O	I	
Continuous assesment Topics 2, 3 & 4	2nd Laboratory evaluation (PLAB2)	15	Week 15	O	I	
Continuous assesment Topics 1, 2, 3 & 4	Autonomous work and classroom participation. AP	10	During all the course	O	I	
Continuous assesment Topics 1 & 2 & 3	1st Examination block PA1. Writting exam	25	Week 8	O	I	
Continuous assesment Topics 2, 3 & 4	2nd Examination block PA2. Writting exam	35	Week 16 i 17	O	I	

Objectives	Assesment blocks	%	Dates	O/V (1)	I/G (2)	Remarks
Recovery assesment. Topics 1 & 2 & 3	Recovery assesment block. Writing exam (*)	60	Week 19	V	I	Recoveries Week

(1) Mandatory / Voluntary

(2) Individual / Group

Final Marks:

During the 9th and 16th / 17th weeks, will be performed the writing exams: **PA1** and **PA2**. Each of these tests has a weight of 25% and 35% over the final grade, respectively.

The final grade is calculated by the sum of the results of the writing test (**PA1**, **PA2**) plus the classroom practices (**PLAB1**, **PLAB2**) and autonomous work with classroom participation (AP): $PA1 + PA2 + PLAB1 + PLAB2 + AP$.

(*) On the 19th week, the course grade can be recovered with a final writing exam, following the EPS Academic Degrees Framework guidelines. The recovery will be made through a written exam with all course contents weighing 60% of the final grade. The evaluable practices can not be recovered. This exam can also be done by all those students having passed the ongoing assessment and want to modify their final grade.

Detection of plagiarism during the evaluation of an activity (exam, practices, etc.) will mean for all involved students the failure grade in the activity. Besides, It can cause the student to lose the right to be evaluated and recover the subject as established in the UdL Assessment Regulations.

Alternative assessment

The student who has the approval to be evaluated by alternative evaluation (see requirements and procedure on the [faculty website](#)) must take the two partial exams, PA1 and PA2, on the dates set in the school's examination calendar. Each test will count for 30% and 40%, respectively. The student must also take the PLAB1 and PLAB2 laboratory tests on the dates set in the teaching guide. The student will be able to recover the subject in the same terms as the rest of the students of the course.

Bibliography

Basic bibliography:

Matlab. A Practical Introduction to Programming and Problem Solving. Stormy Attaway. Butterworth-Heinemann; Fourth edition. 2016. ([Electronic resource - accesible from UdL](#))

Essential MATLAB for Engineers and Scientists. Brian Hahn, Daniel Valentine. Academic Press; Sixth edition. 2017. ([Electronic resource - accesible from UdL](#))

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