Universitat de Lleida

DEGREE CURRICULUM

COMPUTER ORGANIZATION

Coordination: VILAPLANA MAYORAL, JORDI

Academic year 2019-20

Subject's general information

Subject name	COMPUTER ORGANIZATION
Code	102365
Semester	1st Q(SEMESTER) CONTINUED EVALUATION
Typology	<table><tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr><tr><td>Bachelor's degree in Digital Interaction and Computing Techniques</td><td>1</td><td>COMMON</td><td>Attendance-based</td></tr></table>
Course number of credits (ECTS)	6
Type of activity, credits, and groups	<table><tr><th>Activity type</th><th colspan="2">PRALAB</th><th>TEORIA</th></tr><tr><th>Number of credits</th><td>3</td><td>3</td><td>3</td></tr><tr><th>Number of groups</th><td>1</td><td>2</td><td>1</td></tr></table>
Coordination	VILAPLANA MAYORAL, JORDI
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING
Teaching load distribution between lectures and independent student work	Overall, the subject has 60 class hours and 120 hours of individual student work.
Important information on data processing	Consult this link for more information.
Language	Catalan.
Distribution of credits	The distribution of credits counting on the group's deployment that is done in the subject is the following: Jordi Vilaplana: 9

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
VILAPLANA MAYORAL, JORDI	jordi.vilaplana@udl.cat	6	Mondays and Wednesdays from 8h to 9h. Arrange by email or Virtual Campus. Office 00.

Subject's extra information

Subject taught during the first semester of the 1st year of the degree.

It corresponds to the subject "Structure of Computers" within the module of "Basic Formation".

In order to attend the subject, previous knowledge of logical circuits is not required. It is enough to have the knowledge acquired in post-compulsory secondary education.

Learning objectives

- Learn the formats of representation of the information in a computer system and the rules of treatment of this information.
- Study the operation of combinational and sequential basic blocks and their function within a computer.
- Implement simple programs written in assembler.
- Know how to identify, differentiate and understand the operation of a computer, its components, as well as the basic Von-Neumann structure.
- Understand the execution stages of an instruction.
- Be able to propose a basic structure for a repertoire of instructions.
- Identify the components of the control unit and its interaction.
- Know how to help other members of the group in case of need.
- Find and justify the most appropriate solution in a given time.

Competences

Basic Competences

- **CB01.** That students have demonstrated to possess and understand knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that imply knowledge coming from the vanguard of his/her field of study.

Transversal Competences

- **CT3.** Acquire training in the use of new technologies and information and communication technologies.
- **CT5.** Acquire essential notions of scientific thought.

General Competences

- **CG3.** Use adequate hardware and software platforms to develop and execute interactive digital applications.
- **CG5.** Know the basic subject areas and technologies needed to learn and develop new methods and technologies, and those that help to adapt to new situations.
- **CG7.** Solve problems through initiative, determination, independence and creativity.
- **CG8.** Capacity for abstraction and critical, logical and mathematical reasoning.

Specific Competences

- **CE2.** Capacity to understand and master the basic concepts of discrete mathematics, logics, algorithmic and computational complexity, and its application to solve computational problems.
- **CE3.** Basic knowledge of the use and programming of computers, operating systems and databases, and their use in the development of interactive applications.
- **CE4.** Capacity to know, understand and evaluate the structure and architecture of computers, as well as the basic components that conform them.

Subject contents

1. Introduction
    1. Von Neumann architecture
    2. Interconnection structures
    3. Functional units
    4. Execution of a program
2. Digital representation of the information
    1. Coding of information
    2. Numbering systems
    3. Binary arithmetic
    4. Representation of signed numbers
    5. Alphanumeric coding
3. Digital logic
    1. Switch algebra
    2. Operators and logic gates
    3. Logical functions
    4. Simplification of logical functions
    5. Incompletely specified functions
4. Logical circuits
    1. Two-tiered gate structures
    2. Analysis and synthesis of combinational circuits
    3. Basic combinational blocks
        1. Decoder
        2. Encoder
        3. Multiplexer
        4. Demultiplexer
        5. Comparator
5. Directory of instructions
    1. Introduction
    2. Directory of instructions
    3. Format of the instructions
    4. Address modes
    5. Types of instructions
    6. Analysis of the specific repertory of the KIT Simulator.
6. Control unit
    1. Introduction and functions
    2. Control signals

Methodology

Big Groups: Theory Classes (3 ECTS)

These classes will explain the theoretical contents of the subject, accompanied by illustrative examples. As material of support of the class the slides of the subject will be followed.

Small Groups: Problem Classes / Laboratory (3 ECTS)

In these classes the resolution of the collection of problems associated with the theoretical explanations of the subject will be alternated, along with the realization of directed practices. The material of the practices will be uploaded to the Virtual Campus. The student must attend the laboratory classes with the previously read statements.

Self-employed Work (not face-to-face)

It is recommended that the student solves the problems not resolved in the class of the problem collection in order to practice and obtain feedback from the teacher.

Development plan

Week	Description	Activity BG	Activity SM
1	Presentation + T0: Introduction	Presentation + T0	-
2	T1: Digital representation of the information	Theory	Theory
3	T1: Digital representation of the information	-	Theory
4	T2: Digital logic	Theory	Problems
5	T2: Digital logic	Theory	Problems
6	T3: Logical circuits	Theory	Laboratory: Practice 1
7	T3: Logical circuits	Theory	Laboratory: Practice 1
8	T3: Logical circuits	Theory and problems	Problems
9	Partial exam		
10	T4: Instruction set	Theory	Problems
11	T4: Instruction set	Theory and problems	Problems
12	T4: Instruction set	Theory and problems	Laboratory: Practice 2
13	T5: Control unit	-	Laboratory: Practice 2
14	T5: Control unit	Theory and problems	Problems
15	T5: Control unit	Theory and problems	Practice 2 Exam
16	Partial exam 2		
17	Partial exam 2		
18			
19	Recuperation exam		

Evaluation

Acr.	Evaluation activities	Weighting	Minimum note	Group	Compulsory	Recoverable
P1	1st partial exam	30%	No	No	Yes	Yes
P2	2nd partial exam	40%	No	No	Yes	Yes
PRA	Practices	20%	No	No	Yes	No
PROB	Problems	10%	No	No	Yes	Yes

Acr.	Evaluation activities	Weighting	Minimum note	Group	Compulsory	Recoverable
Final grade = 30% * P1 + 40% * P2 + 20% * PRA + 10% * PROB To pass the subject, the final grade must be greater than or equal to 5.						
If you have not passed the subject, you can go to the recovery exam. In this case the note will be calculated as follows: **Final grade** = 80% * recuperation grade + 20% * PRA						

Bibliography

- Lloris A., Prieto A., Parrilla L. Sistemas digitales. McGraW-Hill.
- Floyd T. Fundamentos de sistemas digitales. Prentice-Hall.
- Hammacher C., Vranesic Z., Zaky S. Organización de computadores (5th edition). McGraw-Hill.
- Ercegovac M.D., Lang T. Digital Systems and Hardware/Firmware Algorithms. Jhon Wiley and Sons.
- Gascón M., Leal A., Peinado B. Problemas pràcticos de diseño lògico. Paraninfo.

EXTENDED BIBLIOGRAPHY

- Estructura y Diseño de Computadores. La interfaz hardware/Software.(4th edition). Patterson D.A., Hennesy J.L, Edit. Reverte, 2011.
- The Principles of Computer Hardware. Clements, A. Editorial OxfordUniversity Press.
- Organización de computadores(5ª edición). Hammacher C., Vranesic Z.,Zaky S., McGraw-Hill.