UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: COMPUTER ARCHITECTURE FUNDAMENTALS
Code: 42307
Type: BASIC
ECTS credits: 6
Degree: 347 - DEGREE PROGRAMME IN COMPUTER SCIENCE ENGINEERING (CR)
Academic year: 2022-23
Center: 108 - SCHOOL OF COMPUTER SCIENCE OF C. REAL
Group(s): 20 21 22 23
Year: 1
Duration: C2
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: N
Web site:
Bilingual: N

Lecturer: **JAVIER DORADO CHAPARRO** - Group(s): **21**

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Lecturer: **SANTIAGO GARCIA TALEGON** - Group(s): **21 22 23**

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Lecturer: **JUAN CARLOS LOPEZ LOPEZ** - Group(s): **23**

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Lecturer: **INOCENTE SANCHEZ CIUDAD** - Group(s): **21 22**

Building/Office	Department	Phone number	Email	Office hours
Fermín Caballero/A 1.9	TECNOLOGÍAS Y SISTEMAS DE INFORMACIÓN	6490	inocente.sanchez@uclm.es	

Lecturer: **XAVIER DEL TORO GARCIA** - Group(s): **20 21 22 23**

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2. Pre-Requisites

This course has as a prerequisite the course "Computer Technology", taught in the first term of the first year in the Computer Science Degree.

3. Justification in the curriculum, relation to other subjects and to the profession

The objective of this course is for the student to know and understand the basic structure and functioning of a modern computer, as well as the basic concepts linked to the instruction set architecture. In the practical aspect of the course, the student will learn the basic fundamentals of low-level programming.

On the other hand, the course provides the fundamentals on computer organization that are then used and extended in courses in the context of "Computer Engineering" (Computer Organization and Computer Architecture), as well as in those belonging to the Specific Technology Module of Computer Engineering, subjects for which it is a previous requirement.

4. Degree competences achieved in this course

Course competences

Code	Description
BA04	Basic knowledge about the uses and programming of computers, operating systems, data bases, and digital programmes with applications in engineering.
BA05	Knowledge about the structure, organization, functioning, and inter connexions of digital programmes, with their application in engineering problems.
CO09	Ability to know, understand, and assess the structure and architecture of computers, and their basic components.
INS01	Analysis, synthesis, and assessment skills.
INS04	Problem solving skills by the application of engineering techniques.
INS05	Argumentative skills to logically justify and explain decisions and opinions.
PER02	Ability to work in multidisciplinary teams.
PER04	Interpersonal relationship skills.
PER05	Acknowledgement of human diversity, equal rights, and cultural variety.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Knowledge of the structure of a CPU, identification of its functioning units, and explanation of their role in the execution of instructions.

Knowledge of the organization of input/output subsystems, and their interface with the CPU.

Understanding of the principles of computer architecture.

Ability to connect the evolution of the architecture of a CPU and its instruction ranges. Identification of the differencies between CISC and RISC philosophies.

Low-level computer programming.

Additional outcomes

6. Units / Contents

Unit 1: Introduction.

- **Unit 1.1** What is a computer? Functional description: von Neumann architecture.
- **Unit 1.2** Origin and historical evolution of computers.
- **Unit 1.3** Characteristic parameters of computers.

Unit 2: Memory.

- **Unit 2.1** Hierarchy of memories.
- **Unit 2.2**

Unit 3: Machine language and assembler language.

- **Unit 3.1** Instructions Set Architecture (ISA).
- **Unit 3.2** Addressing modes.
- **Unit 3.3**

Unit 4: Data Path and Control Unit.

- **Unit 4.1** Data Path description.
- **Unit 4.2** Control Unit functions.
- **Unit 4.3** Phases of execution of an instruction.
- **Unit 4.4** Microinstructions and control signals.
- **Unit 4.5** Control Unit design: wired or microprogrammed.

Unit 5: Input/Output System.

- **Unit 5.1** Input/output modules.
- **Unit 5.2** I/O modes: by program, interrupts and direct memory access (DMA).

Unit 6: Arithmetics for Computers.

- **Unit 6.1** Floating point.
- **Unit 6.2** Fixed point.
- **Unit 6.3** Accuracy and rounding techniques.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	BA04 BA05 CO09	0.72	18	N	-	Teaching of the subject matter by lecturer (MAG)
Individual tutoring sessions [ON-SITE]		BA04 BA05 CO09	0.18	4.5	N	-	Individual or small group tutoring in lecturer¿s office, classroom or laboratory (TUT)
Study and Exam Preparation [OFF-SITE]	Self-study	BA04 BA05 CO09	2.1	52.5	N	-	Self-study (EST)
Other off-site activity [OFF-SITE]	Practical or hands-on activities	BA04 BA05 CO09 INS01 INS04 PER02 PER04 PER05	0.6	15	N	-	Lab practical preparation (PLAB)
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	BA04 BA05 CO09 INS04 PER02 PER04 PER05	0.6	15	Y	N	Worked example problems and cases resolution by the lecturer and the students (PRO)
Writing of reports or projects [OFF-SITE]	Self-study	BA04 BA05 CO09 INS01 INS04 PER02 PER04 PER05	0.9	22.5	Y	N	Preparation of essays on topics proposed by lecturer (RES)
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	BA04 BA05 CO09 INS04 PER02 PER04 PER05	0.6	15	Y	Y	Realization of practicals in laboratory /computing room (LAB)
Other on-site activities [ON-SITE]	Assessment tests	BA04 BA05 CO09 INS01 INS04 INS05 PER02	0.3	7.5	Y	Y	Partial test 2 of the second half of the syllabus of the subject (EVA)
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
			Partial Test 2. Compulsory activity that can be retaken. To be

Test	50.00%	50.00%	carried out within the planned dates of the final exam call. The Partial Test 1 retake will be performed at this date.
Theoretical papers assessment	10.00%	10.00%	Non-compulsory activity that can be retaken. To be carried out before end of teaching period
Laboratory sessions	30.00%	30.00%	Compulsory activity that can be retaken. To be carried out during lab sessions
Oral presentations assessment	10.00%	10.00%	Non-compulsory activity that cannot be retaken. To be carried out during the theory/lab sessions
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. The evaluation of the activities will be global and therefore must be quantified by means of a single mark. If the activity consists of several sections, each section may be evaluated separately provided students are informed in writing of this evaluation criterion at the beginning of the academic year. In the case of the activities that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria).
The partial tests will be common for all the theory/laboratory groups of the subject and will be evaluated by the lecturers of the subject in a serial way, i.e., each part of the final exam will be evaluated by the same lecturer for all the students.
A student is considered to pass the subject if she/he obtains a minimum of 50 points out of 100, taking into account the points obtained in all the evaluable activities, and also has passed all the compulsory activities.
For students who do not pass the subject in the final exam call (convocatoria ordinaria), the marks of activities already passed will be conserved for the resit/retake exam call (convocatoria extraordinaria). The oral presentations assessment (non-recoverable activity) will be conserved for the resit/retake exam call even if it has not been passed. In the case of the passed recoverable activities, the student will have the opportunity to receive an alternative evaluation of those activities in the resit/retake exam call and, in that case, the final grade of the activity will correspond to the latter grade obtained.
The qualification of the passed activities in any call, except for the partial tests, will be conserved for the next academic year at the request of the student, provided that it is equal or superior to 5 and the training activities and the evaluation criteria of the subject are not modified in the next academic year.
The failure of a student to attend the partial 1 and partial 2 tests will automatically result in her/him receiving a "Failure to attend¿ (no presentado). If the student has not passed any compulsory evaluation activity, the maximum final grade will be 40%.

Non-continuous evaluation:

Evaluation criteria not defined

Specifications for the resit/retake exam:

Evaluation tests will be conducted for all recoverable activities.

Specifications for the second resit / retake exam:

Same characteristics as the resit/retake exam call.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**
Individual tutoring sessions [PRESENCIAL][]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	52.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	22.5
Writing of reports or projects [AUTÓNOMA][Self-study]	13.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	15
Other on-site activities [PRESENCIAL][Assessment tests]	7.5

General comments about the planning: The subject is taught in 3 x 1,5 hour sessions per week. The planning is the same for groups 20, 21, 22 and 23. The planning might experience changes due to unforeseen circumstances.

Unit 1 (de 6): Introduction.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1

Unit 2 (de 6): Memory.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1

Unit 3 (de 6): Machine language and assembler language.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4

Unit 4 (de 6): Data Path and Control Unit.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4

Unit 5 (de 6): Input/Output System.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1

Unit 6 (de 6): Arithmetics for Computers.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1

Global activity	
Activities	**hours**
Other on-site activities [PRESENCIAL][Assessment tests]	7.5
Individual tutoring sessions [PRESENCIAL][]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	52.5
Class Attendance (theory) [PRESENCIAL][Lectures]	22.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	22.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	12
Writing of reports or projects [AUTÓNOMA][Self-study]	13.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	15
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Patterson, D.A., Hennessy, J.L.	Estructura y Diseño de Computadores: La interfaz hardware/software	Reverté		978-84-291-2620-4	2011	
De Miguel Anasagasti, P.	Fundamentos de los Computadores	Thomson		84-9732-294-0	2006	
Stallings, W.	Organización y Arquitectura de Computadores	Prentice Hall		978-84-8966-082-3	2006	
Angulo, J.M., García, J. y Angulo, I.	Fundamentos y Estructura de Computadores	Thomson		84-9732-180-4	2003	