SUBJECT TEACHING GUIDE

G649 - COMPUTER STRUCTURES

Degree in Computer Systems Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering			Type and Year	Compulsory. Year 2
Faculty	Faculty of Sciences				
Discipline	Subject Area: Computer Structures Compulsory Module				
Course unit title and code	G649 - COMPUTER STRUCTURES				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA
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3.1 LEARNING OUTCOMES
- Knowing the basic principles of the von Neumann architecture which governs current computers.
- Understanding the structure and operation of a simple computer, and be able to make their own designs.
- Understand which factors influence the performance of computers and hardware and software aspects involved in these factors.
- Initiated in the techniques and performance evaluation models of computers that allow them to analyze, understand and compare different models and computer architectures.
- Understand the concept of memory hierarchy to minimize the effects of the growing distance between the location of the data and instructions and processor.
- Understanding the design and operation of the system I / O and peripherals are connected as the rest of the computer.
- Being able to program the functions Input / Output low level according to different techniques.
- Knowing the characteristics and components of existing computer systems.
- Be able to solve problems with initiative, decision making and creativity.
- Being able to interpret technical documents related to Computer Engineering.
- Learning to acquire knowledge independently, to work in groups and acquire leadership skills.
- Being able to communicate effectively, both in writing and orally knowledge, techniques, results and ideas related to the content of the subject studied.

4. OBJECTIVES
The main objective is that students know and understand the basic principles of Computer Engineering, especially those related to Computer Structure. Students must be able to design a simple computer based on its basic components and analyze the performance of the various component parts.

6. SUBJECT PROGRAM	
CONTENTS	
1	Input-output systems: - Definition of I/O - Memory unit basics: memory kinds, memory map and performance measures - Memory hierarchy - I/O controllers
2	Input/Output management in the Raspberry Pi: - Description of the I/O subsystem in the Raspberry Pi - Most basic device: GPIO - Example of driver programming to handle LEDs and pushbuttons
3	I/O Management: - I/O Management - I/O Management phases - Drivers - I/O Performance - I/O management through polling - Timers - ARM ISA exceptions - I/O management through interrupts - Programming the timer - DMA data transfers
4	Other I/O devices in the Rasperry Pi: - Serial communication: SPI interface and display management - Analog I/O: audio devices (PWM)
5	Interconnection devices: buses: - Introduction: computer components - Bus structure - Performance of a bus - Main design elements of a bus - Sample interconnects: PCI bus, APB bus, PCI Express.
6	Memory Unit and mass storage devices: - Main memory: organization and connection - Mass storage devices; Single-State Drives

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Global exercises evaluation	Written exam	No	Yes	70,00
Laboratory exercices	Laboratory evaluation	No	Yes	30,00
Additional evaluation tests that increase the mark	Work	No	No	0,00
TOTAL				100,00

Observations

Information about each test will be announced with sufficient time, including date, contents and its weight on the overall grade, excepting the additional evaluation works. Tests will be carried out outside the scheduled sessions for the course if so required due to time and space constraints. Tests of continuous assessment will not remove content from following tests.

Additional evaluation tests that increase the mark will be carried by electronic means (Moodle) or handwritten, and some will be performed during lectures or practical sessions; this additional mark will only be considered when at least 70% of the in-person works have been delivered, and if the average final mark (excluding additional works) is equal or greater than 4.5 points (out of 10).

Recovery period (Extraordinary Call):
The recovery will be made only from those assessment sections that have not exceeded the minimum required grade, and must be submitted to all the subject included in the different tests carried out during the course.
The recovery of the theory and problems sections will consist of a single exam that will be carried out on the date of the extraordinary call set by the center.
In the Laboratory section, it will be mandatory to take at least 50% of the tests of previous knowledgement performed at the beginning of each practice to be able to take the recovery test. The recovery test will consist of the development of a practice similar to those carried out during the course. The exam will be held in the laboratory after the Extraordinary Call, on a date set by the teacher.

Observations for part-time students

Part-time students in the ordinary call may choose to follow the continuous evaluation of theory, problems and laboratory tests, or perform only as described in the call for recovery.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

“Digital design and computer architecture. ARM Edition”. S.L. Harris, D.M. Harris. Morgan Kaufmann, cop. 2016

“Computer Organization and Design: the hardware/software interface. ARM Edition”. D. Patterson, J. Hennessy, Morgan Kaufmann 2017

“Organización y Arquitectura de Computadores”. W. Stallings. 7ª Edición. Prentice-Hall, 2006