SUBJECT TEACHING GUIDE

G650 - Computer Organisation

Degree in Computer Systems Engineering

Academic year 2022-2023

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	G650 - Computer Organisation				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Web	https://personales.unican.es/bosquejl/				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA
Name of lecturer	JOSÉ LUIS BOSQUE ORERO
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Other lecturers	BORJA PEREZ PAVON

3.1 LEARNING OUTCOMES
- Knowing the principles of the von Neumann architecture of current computers.
- Understanding the structure and operation of a simple computer, and be able to make their own designs.
- Assimilating the principles of design and use of the micro-instruction, and their impact on the cost and performance of new designed computers.
- Assimilating the principles of design and use of the micro-instruction, and their impact on the cost and performance of new designed computers.
- Introducing to the students in the techniques of performance evaluation of computers that allow them to analyze, understand and compare different computer architectures.
- Being able to relate to the basic concepts that have an influence in the improvement of the computer performance.
- Understand the problem of power consumption and its impact on the design of computers.
- Understand the concept of memory hierarchy to minimize the effects of the growing distance between the location of the data and instructions, with respect to the processor.
- Understand the concept of virtual memory. Knowing the needed hardware support to minimize their impact on the performance of memory access.
- Assimilate the concept of segmentation and how can improve the processor productivity and the problems arising from this technique.
- 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 autonomously.
- Learning to work in groups and acquire leadership skills.
- Being able to communicate effectively, both writing and specking, knowledge, techniques, results and ideas related to the content of the subject studied

4. OBJECTIVES

This course focuses on the study of the physical structure of computers as well as analysis of their performance. It is planned as a continuation of the subject "Computer Structure" studied in the 1st semester of the 2nd year. In particular it focuses on the following main areas:

1. Understand what factors influence the performance of computers.
2. Addressing improving processor performance from an specific architecture.
3. Be knowledgeable about the technological conditions and the effects of its multifarious development between various elements of the computer. In particular it should be understood as the memory subsystem must be prepared to minimize the effects of the growing distance between the location of the data and instructions and processor.
4. Understand the concept of virtual memory. Knowing what kind of hardware support what we have to minimize their impact on the performance of memory access.
5. Getting into the current high-performance architectures such as SIMD and vector, Multi-Threading architecture, multicore, and GPU clusters.

6. COURSE ORGANIZATION

CONTENTS	
1	Lesson 1: Evaluation and Analisys of computer performance and Energy Consumption
2	Lesson 2: Memory Hierarchy
3	Lesson 3: The Processor: Datapath and control unit
4	Lesson 4: Pipelined processors
5	Lesson 5: Parallel Architectures

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
30% of the final mark Minimum mark: 4.0 There will be three exams throughout the course, one for each thematic block of practices.	Laboratory evaluation	No	Yes	30,00
40% of the final mark Minimum mark: 5.0 Duration: 3 hours for the students with all the subject and arround 90 minutes for the rest. The exam will include a theorical part and some exercises. It will be made in the dates proposed by the Faculty.	Written exam	Yes	Yes	40,00
30% of the final mark Minimum mark: 5.0 Duration: between 60 and 90 minutes The exam will include a theorical part and some exercises of the Theme 2_ Memory Hierarchy.	Written exam	No	Yes	30,00
TOTAL				100,00

Observations

The internship and continuous assessment marks will be saved for the extraordinary exam within the same academic year.

Students with an internship grade higher than 4.0 will keep the grade for one academic year. If they do not pass the subject in that year, they will have to repeat the internship in the following academic year.

For students with a practice grade higher than 4.0, the grade will be kept for one academic year.

Observations for part-time students

Part-time students can choose between the ordinary continuous assessment or a single test that will include an examination of theory plus practical examination in the laboratory.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Digital design and computer architecture. Sarah L. Harris, David Money Harris. Waltham, Morgan Kaufmann, cop. 2016. ISBN: 978-0-12-800056-4