

Faculty of Sciences

SUBJECT TEACHING GUIDE

G676 - Multiprocessors

Degree in Computer Systems Engineering

Academic year 2023-2024

1. IDENTIFYING DATA										
Degree	Degree in Computer Systems Engineering			Type and Year	Optional. Year 4					
Faculty	Faculty of Sciences									
Discipline	Subject Area: Computer Engineering Mention in computer Engingeering									
Course unit title and code	G676 - Multiprocessors									
Number of ECTS credits allocated	6	Term Semeste		er based (1)						
Web										
Language of instruction	Spanish	English Friendly	No	Mode of o	delivery	Face-to-face				

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA
Name of lecturer	JOSÉ LUIS BOSQUE ORERO
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Other lecturers	JULIO RAMON BEIVIDE PALACIO RAFAEL MENENDEZ DE LLANO ROZAS BORJA PEREZ PAVON



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3.1 LEARNING OUTCOMES

- To know the basic principles of parallelism and its applications to different computing levels

- To know the basic models of parallel programming: shared memory and message passing

- To know the basic models of parallel architectures: SIMD, MIMD, SMP, CC-NUMA & NUMA

- To know typical node (server) implementations: GPUs & CMPs

- To know the design trends on servers, datacenters, cloud computing and supercomputers

- To know the fundations of interconnection networks for parallel systems

- To know the fundations of message passing with emphasis on MPI

4. OBJECTIVES

The goal is that the student knows the foundations of modern computers, especially those exploiting high levels of parallelism. Emphasis will be put on big severs and systems entailing thousands of cores. The main applications will be oriented to datacenters, clouds and supercomputers.

6. COURSE ORGANIZATION					
CONTENTS					
1	Introduction to Multiprocessors				
2	Large-scale multiprocessors: HPC, datacenters and clouds. Programming with MPI				
3	Basics of interconnection networks for parallel systems				
4	Thread-level parallelism. Coherency, synchronization and consistency. Snooping and directories.				
5	Data-level parallelism: SIMD & GPUs				
6	Final evaluation				

7. ASSESSMENT METHODS AND CRITERIA								
cription Type		Final Eval.	Reassessn	%				
Technical work focused on programming GPUs and multiprocessors	Laboratory evaluation	No	Yes	50,00				
It will consist of a written exam including all the topics managed on the subject.	Written exam	Yes	Yes	30,00				
Technical work focused on current results on modern parallel computers and technologies. Formal written informs and public expositions will be required.	Oral Exam	Yes	Yes	20,00				
TOTAL 100,00								
Observations								
The final mark will be obtained from the average of the three evaluated parts: laboratory duties, written exam and technical work. It is compulsory to obtain at least 3,5 points over 10 on the exams of Theory and Laboratory for passing the subject.								
Observations for part-time students								

The students on this situation will take the written exam together with a technical work that can entail 70% of the final mark. It is compulsory to obtain at least 3,5 points over 10 on each part for passing the subject.



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8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Computer Architecture

J.L. Hennessy and D.A. Patterson

Ed. Morgan Kaufmann 2012

Principles and Practices of Interconnection Networks

W.J. Dally and B. Towles Ed. Morgan Kaufmann 2004