Course guide
270643 - APA - Advanced Processor Architecture

Last modified: 02/02/2024

Unit in charge:	Barcelona School of Informatics
Teaching unit:	701 - DAC - Department of Computer Architecture.

Degree:	MASTER'S DEGREE IN INNOVATION AND RESEARCH IN INFORMATICS (Syllabus 2012). (Optional subject).

Academic year: 2023   **ECTS Credits:** 6.0   **Languages:** English

LECTURER

Coordinating lecturer:	ANTONIO MARIA GONZÁLEZ COLÁS
Others:	Segon quadrimestre: ANTONIO MARIA GONZÁLEZ COLÁS - 10

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEE4.1. Capability to analyze, evaluate and design computers and to propose new techniques for improvement in its architecture.

Generical:
CG1. Capability to apply the scientific method to study and analyse of phenomena and systems in any area of Computer Science, and in the conception, design and implementation of innovative and original solutions.
CG4. Capacity for general and technical management of research, development and innovation projects, in companies and technology centers in the field of Informatics Engineering.
CG5. Capability to apply innovative solutions and make progress in the knowledge to exploit the new paradigms of computing, particularly in distributed environments.

Transversal:
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Basic:
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.

TEACHING METHODOLOGY

The course consists of lectures given by the professor.

LEARNING OBJECTIVES OF THE SUBJECT

1.This course focuses on the study of processor microarchitecture. It analyzes different microarchitectural schemes to improve performance, diminish complexity and cost, reduce energy consumption and increase reliability of microprocessors. The different contemporary families of microarchitectures are studied in detailed: superscalar, multithreaded, multicore, vector and graphics processors. Besides, the course analyzes some recent research proposals and provides insight into futre trends.

STUDY LOAD

Type	Hours	Percentage
Hours large group	54,0	36.00
Self study	96,0	64.00

Total learning time: 150 h

CONTENTS

Introduction

Superscalar processors

Vector processors

Multithreaded processors

Multicore processors

Graphics processors

Future challenges and opportunities

GRADING SYSTEM

An assignment is given to each student or group of students. The assignment typically consists of studying recent research literature on a hot topic related to the course, and presenting it to the whole class.

BIBLIOGRAPHY

Basic:
- González, A.; Latorre, F.; Grigorios, M. Processor microarchitecture: an implementation perspective. San Rafael, Calif.: Morgan & Claypool, 2011. ISBN 1608454525.
- Hennessy, J.L.; Patterson, D.A. Computer architecture: a quantitative approach. 6th ed. Cambridge, MA: Elsevier, Morgan Kaufmann, 2019. ISBN 9780128119051.
- Sorin, D.J.; Hill, M.D.; Wood, D.A. A primer on memory consistency and cache coherence. San Rafael, California: Morgan & Claypool Publishers, 2011. ISBN 9781608455645.