270643 - APA - Advanced Processor Architecture

Coordinating unit: 270 - FIB - Barcelona School of Informatics
Teaching unit: 701 - DAC - Department of Computer Architecture
Academic year: 2019
Degree: MASTER’S DEGREE IN INNOVATION AND RESEARCH IN INFORMATICS (Syllabus 2012). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: English

Degree competences to which the subject contributes

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.

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

General:
CG1. Capability to apply the scientific method to study and analyze 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.

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 detail: superscalar, multithreaded, multicore, vector and graphics processors. Besides, the course analyzes some recent research proposals and provides insight into future trends.
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Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 54h 36.00%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h 0.00%</td>
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<tr>
<td></td>
<td>Hours small group: 0h 0.00%</td>
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<tr>
<td></td>
<td>Guided activities: 0h 0.00%</td>
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<td>Self study: 96h 64.00%</td>
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</tbody>
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Content

**Introduction**

Degree competences to which the content contributes:

**Superscalar processors**

Degree competences to which the content contributes:

**Vector processors**

Degree competences to which the content contributes:

**Multithreaded processors**

Degree competences to which the content contributes:

**Multicore processors**

Degree competences to which the content contributes:

**Graphics processors**

Degree competences to which the content contributes:

**Future challenges and opportunities**

Degree competences to which the content contributes:
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:**

