270160 - APC - PC Architecture

Coordinating unit: 270 - FIB - Barcelona School of Informatics
Teaching unit: 701 - AC - Department of Computer Architecture
Academic year: 2017
Degree: BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2010). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: - Fermin Sánchez Carracedo (fermin@ac.upc.edu)
Others: - Agustin Fernández Jiménez (agustin@ac.upc.edu)
           - David López Álvarez (david@ac.upc.edu)
           - Josep-Llorenç Cruz Díaz (cruz@ac.upc.edu)

Prior skills

Basic knowledge of computer architecture

Degree competences to which the subject contributes

Specific:
CT3.6. To demonstrate knowledge about the ethical dimension of the company: in general, the social and corporative responsibility and, concretely, the civil and professional responsibilities of the informatics engineer.
CT6.2. To demonstrate knowledge, comprehension and capacity to evaluate the structure and architecture of computers, and the basic components that compound them.
CT8.1. To identify current and emerging technologies and evaluate if they are applicable, to satisfy the users needs.

Generical:
G2. SUSTAINABILITY AND SOCIAL COMPROMISE: to know and understand the complexity of the economic and social phenomena typical of the welfare society. To be capable of analyse and evaluate the social and environmental impact.
G4. EFFECTIVE ORAL AND WRITTEN communication: To communicate with other people knowledge, procedures, results and ideas orally and in a written way. To participate in discussions about topics related to the activity of a technical informatics engineer.

Teaching methodology

The student attends class and study the material presented.
During the course does a report about the subject and makes a public presentation.
By the end of the course makes a practice of assembling and repairing computers in Reutilitza workshop.

Learning objectives of the subject

1. Be able to describe the architecture of a current personal computer
2. Having a historical overview of the evolution of processors, semiconductor memories, storage devices, motherboards and BIOS
3. Be able to describe the characteristics of the memory types that can be found on a PC
4. Being able to explain how the motherboards, chipsets and buses work, and how they affect computer performance
5. Being able to explain the basic principles of the BIOS and know how adjust the BIOS of the computer
6. Be able to describe the components that allow to add new features to a computer
7. Being able to explain the operation and the reason for the existence of graphics cards
8. Being able to describe the transfer system with input/output and storage systems, the basic operating principles and the parameters to consider when incorporating them into a computer
9. Be able to describe some current tools to evaluate the elements in a computer
10. Having a vision of the possible evolution in the short/medium term of all the elements studied
11. Increasing the ability of oral and written communication
12. Acquire a commitment to values such as solidarity, justice and progress
13. Increasing sensitivity to the environment

**Study load**

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 56h</th>
<th>37.33%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>4h</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>6h</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>84h</td>
</tr>
</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>Brief history of microprocessors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree competences to which the content contributes:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Microprocessors for PCs</th>
</tr>
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<tbody>
<tr>
<td>Degree competences to which the content contributes:</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Memories for PCs</th>
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</thead>
<tbody>
<tr>
<td>Degree competences to which the content contributes:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motherboards, BIOS, chipsets and buses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree competences to which the content contributes:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graphic cards</th>
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<tbody>
<tr>
<td>Degree competences to which the content contributes:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage Devices: Hard Drives, CD, DVD, other</th>
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<tbody>
<tr>
<td>Degree competences to which the content contributes:</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Input/ output/ devices</th>
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<tbody>
<tr>
<td>Degree competences to which the content contributes:</td>
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</table>

<table>
<thead>
<tr>
<th>Performance Evaluation Software</th>
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<tbody>
<tr>
<td>Degree competences to which the content contributes:</td>
</tr>
</tbody>
</table>
### Planning of activities

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Hours: 42h 24m</th>
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<tbody>
<tr>
<td>Theory classes: 0h</td>
<td></td>
</tr>
<tr>
<td>Practical classes: 0h</td>
<td></td>
</tr>
<tr>
<td>Laboratory classes: 0h</td>
<td></td>
</tr>
<tr>
<td>Guided activities: 4h</td>
<td></td>
</tr>
<tr>
<td>Self study: 38h 24m</td>
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</table>

**Description:**
Preparation of course work

**Specific objectives:**
11, 12, 13

<table>
<thead>
<tr>
<th>Public presentation of the course work</th>
<th>Hours: 8h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 0h</td>
<td></td>
</tr>
<tr>
<td>Practical classes: 0h</td>
<td></td>
</tr>
<tr>
<td>Laboratory classes: 0h</td>
<td></td>
</tr>
<tr>
<td>Guided activities: 0h</td>
<td></td>
</tr>
<tr>
<td>Self study: 8h</td>
<td></td>
</tr>
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</table>

**Description:**
Public presentation of the course work

**Specific objectives:**
11, 12, 13

<table>
<thead>
<tr>
<th>Subject presentation</th>
<th>Hours: 2h 48m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 2h</td>
<td></td>
</tr>
<tr>
<td>Practical classes: 0h</td>
<td></td>
</tr>
<tr>
<td>Laboratory classes: 0h</td>
<td></td>
</tr>
<tr>
<td>Guided activities: 0h</td>
<td></td>
</tr>
<tr>
<td>Self study: 0h 48m</td>
<td></td>
</tr>
</tbody>
</table>

**Description:**
Attendance and class participation

**Specific objectives:**
12, 13

<table>
<thead>
<tr>
<th>Microprocessors</th>
<th>Hours: 11h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 8h</td>
<td></td>
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<tr>
<td>Practical classes: 0h</td>
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</tr>
<tr>
<td>Laboratory classes: 0h</td>
<td></td>
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<tr>
<td>Guided activities: 0h</td>
<td></td>
</tr>
<tr>
<td>Self study: 3h</td>
<td></td>
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</tbody>
</table>
### Memory

**Description:**
Attendance and class participation

**Specific objectives:**
1, 2, 10, 12, 13

**Hours:**
- Theory classes: 4h
- Practical classes: 0h
- Laboratory classes: 0h
- Guided activities: 0h
- Self study: 1h 30m

### Talks presentations and reports

**Description:**
Attendance and class participation

**Specific objectives:**
2, 3, 10, 12, 13

**Hours:**
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 0h
- Guided activities: 0h
- Self study: 0h 48m

### Sustainability and social commitment talk

**Description:**
Attendance and class participation

**Specific objectives:**
12, 13

**Hours:**
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 0h
- Guided activities: 0h
- Self study: 0h 48m
### Motherboards and expansion buses

**Description:**
Attendance and class participation

**Specific objectives:**
2, 4, 6, 10, 12, 13

**Hours:** 5h 30m
- Theory classes: 4h
- Practical classes: 0h
- Laboratory classes: 0h
- Guided activities: 0h
- Self study: 1h 30m

### First session of public presentations

**Description:**
The student makes a public presentation about the technical report developed

**Specific objectives:**
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

**Hours:** 2h 48m
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 0h
- Guided activities: 0h
- Self study: 0h 48m

### Input/output and storage

**Description:**
Attendance and class participation

**Specific objectives:**
2, 6, 8, 10, 12, 13

**Hours:** 11h
- Theory classes: 8h
- Practical classes: 0h
- Laboratory classes: 0h
- Guided activities: 0h
- Self study: 3h

### Second session of public presentations

**Hours:** 2h 48m
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 0h
- Guided activities: 0h
- Self study: 0h 48m
Description:
The student makes a public presentation about the technical report developed

Specific objectives:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

Graphic cards

Description:
Attendance and class participation

Specific objectives:
2, 6, 7, 10, 12, 13

Hours:
7h
Theory classes: 4h
Practical classes: 0h
Laboratory classes: 0h
Guided activities: 0h
Self study: 3h

Media buses

Description:
Attendance and class participation

Specific objectives:
2, 6, 8, 10, 12, 13

Hours:
2h 48m
Theory classes: 2h
Practical classes: 0h
Laboratory classes: 0h
Guided activities: 0h
Self study: 0h 48m

Third session of public presentations

Description:
The student makes a public presentation about the technical report developed

Specific objectives:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

Hours:
2h 48m
Theory classes: 2h
Practical classes: 0h
Laboratory classes: 0h
Guided activities: 0h
Self study: 0h 48m
### Bios, chipsets and formfactors

**Description:**
Attendance and class participation

**Specific objectives:**
2, 4, 5, 10, 12, 13

<table>
<thead>
<tr>
<th>Hours</th>
<th>Theory classes: 2h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 0h</th>
<th>Guided activities: 0h</th>
<th>Self study: 0h 48m</th>
</tr>
</thead>
</table>

### Fourth session of public presentations

**Description:**
The student makes a public presentation about the technical report developed

**Specific objectives:**
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

<table>
<thead>
<tr>
<th>Hours</th>
<th>Theory classes: 2h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 0h</th>
<th>Guided activities: 0h</th>
<th>Self study: 0h 48m</th>
</tr>
</thead>
</table>

### Overclocking, thermal throttle and refrigeration

**Description:**
Attendance and class participation

**Specific objectives:**
2, 9, 10, 12, 13

<table>
<thead>
<tr>
<th>Hours</th>
<th>Theory classes: 2h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 0h</th>
<th>Guided activities: 0h</th>
<th>Self study: 0h 48m</th>
</tr>
</thead>
</table>

### Fifth session of public presentations

<table>
<thead>
<tr>
<th>Hours</th>
<th>Theory classes: 2h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 0h</th>
<th>Guided activities: 0h</th>
<th>Self study: 0h 48m</th>
</tr>
</thead>
</table>
## Description:
The student makes a public presentation about the technical report developed

**Specific objectives:**
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

### Debriefing course

**Description:**
Attendance and class participation

**Specific objectives:**
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

### take-home exam

**Description:**
The student solves at home a 16-question exam. Each question has a limited space for your answer. The answer should be concise, complete and correct

**Specific objectives:**
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

### Practice 1 in Reuse workshop

**Description:**
The student sets up a computer

**Specific objectives:**
1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13

### 2nd practice in Reuse workshop

**Description:**
The student repairs the assigned computers

**Hours:** 2h 48m
- Guided activities: 2h
- Self study: 0h 48m
Specific objectives:
1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13

Qualification system

- 40% take-home exam
- 20% report on the subject
- 20% public presentation
- 20% practice in Reutilitzar workshop
- Until 1 extra point for wikipedia entry

Failure to attend class or lack of punctuality implies a reduction in the final grade. If you miss 2-3 classes you lose 20% of the note. If you miss 4-5 classes you lose 40% of the note. If you miss 6 classes or more, you suspend the subject.

The note from the skill "oral and written communication" is calculated from the technical report. The note of skill "Sustainability and social commitment" is calculated from technical report, the practice in the Reutilitzar workshop and a special session about sustainability.

Bibliography

Basic:

Complementary: