Subject: Hardware workshop
Code: 17818
Institution: Escuela Politecnica Superior
Degree: Computer Science and Engineering
Level: Graduate
Type: Compulsory
Credit allotment: 3 ECTS credits

HARDWARE WORKSHOP SYLLABUS

This document includes the set of rules that regulates the Hardware Workshop subject, which is part of the Computer Science and Engineering Seminars-Workshops degree. The academic board of the Escuela Politecnica Superior has approved this set of rules. The document is valid for the academic course 2013-2014 and is available to all students in the web page of the Escuela Politecnica Superior. This document can be considered as a contract for registered students.

COURSE TITLE

HARDWARE WORKSHOP

1.1. Course number

Computer Science and Engineering 17818

1.2. Content area

Computer Science and Engineering Seminars-Workshops

1.3. Course type

Compulsory

1.4. Course level

Graduate

1.5. Year

1st

1.6. Semester

1st

1.7. Credit allotment

3 ECTS credits

1.8. Prerequisites

No prerequisites are needed to attend this course.

1.9. Minimum attendance requirement

In this subject students can choose between two different assessment methods (see section 4). Based on the selected assessment method, the minimum required attendance is:

CONTINUOUS ASSESSMENT
Attendance is mandatory. Student must attend a minimum of 85% of the course hours.

FINAL EXAM
Attendance is highly advisable but not mandatory.

1.10. Faculty data

Note: Add @uam.es to all emails.

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1.11. Course objectives

Skills and knowledge provided by this subject are the following:

- Ability to configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems.
- Ability to design and build centralized and distributed computer systems/architectures based on hardware, software and network components.

In addition to previous skills, this subject provides partially the C9 and IC1 skills:

- C9. Ability to understand and evaluate computer structures and architecture, as well as the basic components that make them up.
- IC1. Ability to design and construct digital systems, including computers, microprocessor-based systems and communications systems.

The results of learning are:

- Knowledge of structure of a computer and its technological development.
- Ability to identify, assemble and update the components of a computer.
- Ability to manage analytical and measuring tools used to detect and correct typical hardware problems.

General objectives of this subject are:

- Ability to identify the architecture of a computer and its different components, including their technology evolution.

- Ability to identify, assemble, and update the components of a computer.
- Knowledge of actions to manage electrical and digital components.
- Knowledge of voltage levels in a computer.
- Knowledge of tools to assemble/dismantle a computer.
- Knowledge of tools to analyze and detect incidents in hardware components.

1.12. Course contents

1. Architecture of a computer and the Technological Evolution
   1.1. Computer architecture.
   1.2. Computer components.
   1.3. Microprocessors.
   1.4. Memories.
   1.5. Storage.
   1.6. Buses.
   1.7. Ethernet and Wireless communications.
   1.8. Input/Output.
   1.9. Power supply.
2. Computer components.
   2.1. Actions to manage electrical and digital components.
   2.2. Tools to assembly a computer.
   2.3. Voltage levels in a computer.
      2.3.1. Digital and computer systems voltage standards.
      2.3.2. Testing voltage levels.
   2.4. Assembly a computer.
   2.5. Tools to analyze and detect incidents.
3. Analysis and measurement tools.
   3.1. Power supply.
   3.2. Multimeter.
   3.3. Oscilloscope.
   3.4. Signal/Function generator.
   3.5. Others.
4. Digital systems.
   4.1. Microprocessor-based systems.
   4.2. Digital systems.

1.13. Course bibliography

There is not course bibliography because the subject is mainly practical. The course material is enough and will be provided to students through the web page of the subject.

2. Teaching methodology

The subject in mainly practical so all lectures will include an initial introduction to the theoretical content before the practical exercises. In addition, there are some tutorships sessions for all students to solve questions regarding the practical exercises (if necessary). Finally, there is a final lecture, called seminar, where student will do a presentation of a topic (related to the subject) chosen by them.

3. Student workload

		Nº hours	Percentage
Presence	Lectures	26 h (35%)	47% = 35 hours
	Practical exercises		
	Tutorships	3 h (4%)	
	Seminar	2 h (3%)	
	Final exam (ordinary and extraordinary)	4 h (5%)	
No presence	Practical exercises	11 h (30%)	53% = 40 hours
	Weekly study **(1 h x 14 weeks)**	14 h (19%)	
	Prepare the exam (ordinary and extraordinary)	15 h (7%)	
Total hours: 25 hours x 3 ECTS credits		**75 h**	

4. Evaluation procedures and weight of components in the final grade

- Grading for the continuous assessment method, apart from the required 85% of attendance, is the defined by the following equation:

Grade = 0,6*Practical_Exercises + 0,2*Seminar + 0,2*Tests

  - Tests are two modular exams that student will do during the semester.
  - Seminar is a presentation about a topic of free election related to the subject.
  - Students must do two practical exercises to obtain a grade. Less than two exercises will grade as “No grade”.

- Grading for the final exam method will be only the grade of the final exam.
- Grading for the extraordinary exam session will be the grade of the exam.
  - Students with no practical exercises grading will have to do all the practical exercise s before taking the exam.
  - Students with practical exercises grading will not have to do any additional practical exercise before taking the exam.

WARNING: Practical exercises grading will be only valid for the extraordinary exam session of the same academic year and the next one.

WARNING: Any copy of practical exercises will be taking in consideration with severity. The penalty for this behavior will be punished following the EPS internal set of regulations, and will involve to fail the current exam session and the reduction of one point of the grade for the extraordinary exam session.

NOTICE: Hardware Workshops are part of the Computer Science and Engineering Seminars-Workshops subject and it is necessary a grade of 5 to pass the subject. The final grade of Computer Science and Engineering Seminars-Workshops will be the average of Hardware Workshop and Software Workshop. A grade of 5 will be necessary in both subjects to calculate the average. In other case, the final grade will be: (50% x Minimum (5, Software Workshop grade) + 50% x Minimum (5, Hardware Workshop)).

5. Course calendar*

Week	Content	Contact hours	Independent study time
1	Presentation of the subject using this document. Description of the web tool moodle.	2 - Define partners	1 - Read this document - Log in moodle and register for this subject
2	Topic 1: Architecture of a computer and the Technological Evolution - 1.1. Computer architecture. - 1.2. Computer components. - 1.3. Microprocessors. - 1.4. Memories. - 1.5. Storage. - 1.6. Buses.	2 - Exercise 1 Task 1: Investigate a computer component	1 - Document P1T1 - Submit P1T1
3	Topic 2: Architecture of a computer and the Technological Evolution - 1.7. Ethernet and Wireless communication. - 1.8. Input/Output - 1.9. Power supply	2 - Exercise 1 Task 2: Buy a computer by components	1 - Document P1T2 - Submit P1T2
4	Topic 2: Computer components - 2.1. Actions to manage electrical and digital components. - 2.2. Tools to assembly a computer. - 2.3. Voltage levels in a computer. - 2.4. Assembly a computer. - 2.5. Tools to analyze and detect incidents.	2 - Exercise 2 Task 1: Assemble/dismantle a computer	1 - Document P2T1 - Submit P2T1
5	Topic 2: Computer components. Communications: Serial and RJ45 cables Tutorship	2+1 - Exercise 2 Task 2: Assemble serial and RJ45 cables	1 - Document P2T2 - Submit P2T2

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Week	Content	Contact hours	Independent study time
		- Solve questions	
6	Test 1	2	1
7	Topic 3: Analysis and measurement tools. - 3.1. Power supply - 3.2. Multimeter. Electronics theory	2 - Exercise 3 Task 1: Power supply and multimeter exercises	1 - Document P3T1 - Submit P3T1
8	Topic 3: Analysis and measurement tools. - 3.3. Oscilloscope. - 3.4. Signal/Function generator. - 3.5. Others. Tutorship	2+1 - Exercise 3 Task 2: Oscilloscope and signal/function generator exercises - Solve questions	1 - Document P3T2 - Submit P3T2
9	Test 2	2	1
10	Topic 4: Digital systems. - 4.1. Microprocessor-based systems. - 4.2. Digital systems Skybot platform for development of an autonomous robot	2 - Presentation of the Skybot platform	1 - Study the documentation of the Skybot platform
11	Topic 4 Programming motors in the Skybot platform	2 - Test the motors of the Skybot platform	1 - Document P4 (Skybot y motors)
12	Topics 4 Programming the sensors in the Skybot platform Tutorship	2+1 - Test the sensors of the Skybot platform - Solve questions	1 - Document P4 (sensors) - Develop a program to follow the “black line”
13	Topic 4 Line-Following robot	2 - Test robots	1 - Document P4 - Submit P4
14	Seminar	2 - Presentations of the selected topics	1 - Submit the presentation

- The calendar is for guidance only. Future modifications can be made based on the academic calendar and the development of the subject.