

## **39809 - Computer architecture and organisation I**

### **Syllabus Information**

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**Academic Year:** 2022/23

**Subject:** 39809 - Computer architecture and organisation I

**Faculty / School:** 326 - Escuela Universitaria Politécnica de Teruel

**Degree:** 634 - Joint Programme in Computer Engineering - Business Administration

**ECTS:** 6.0

**Year:** 1

**Semester:** Second semester

**Subject Type:** Basic Education

**Module:**

## **1. General information**

### **1.1. Aims of the course**

The aims of this course are: basic knowledge about key concepts in modern ISAs and, designing assembly programs for dealing with I/O synchronization.

This subject does not explicitly work on or evaluate any of the Sustainable Development Goals, SDGs, included in the 2030 Agenda (<https://www.un.org/sustainabledevelopment/en/>).

### **1.2. Context and importance of this course in the degree**

This course is classified as a core subject of the computer science degree program. The contents of this course will support, in part, the concepts of the rest of the subjects.

### **1.3. Recommendations to take this course**

As requisite for the present course, the student should have taken the course "Introducción a los Computadores.

## **2. Learning goals**

### **2.1. Competences**

**Upon passing the course, the student will be more competent to...**

- Solve problems and take decisions with initiative, creativity and reasoning.
- Apply information and communication technologies in engineering.
- Use basic knowledge about the use and programming of computers, databases and computer programs with application in engineering.
- Apply knowledge of the structure, organization, operation and interconnection of computer systems, the fundamentals of their programming, and their application to the resolution of engineering problems.
- These last two competences are developed in a specific way to reinforce the first two, pursuing the learning results of the subject (see learning results of this guide).

### **2.2. Learning goals**

The student, in order to pass this course, must demonstrate the following learning goals ...

- Knows at a basic level the parameters that define the machine language architecture (ISA, instruction format and coding, stores, data types, addressing modes, sequencing control and control transfers, exception handling).
- Knows and can handle the machine language architecture of a reference processor.
- Distinguishes the concepts of machine and assembly language.
- Knows the methods of representation and coding of information and its basic operations. Is able to translate data and

control structures from high-level languages to assembler. Uses procedure calls.

- Understands the generic register model of a peripheral device driver and basic synchronization and transfer methods. Can program any I/O device and knows how to handle exceptions.
- Knows how to integrate assembly code and library routines into programs written in high-level languages.

### 2.3. Importance of learning goals

This course lays the foundations of the design, programming and efficient use of computers, whether general purpose or specific (embedded systems, supercomputing, GPU, etc.).

## 3. Assessment (1st and 2nd call)

### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that he/she has achieved the expected learning goals through the following assessment activities.

Written exam divided in two parts, one part of theory and questions and the other of programming in assembler.

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented such as:

- Lectures.
- Problem-based learning in small group sessions.
- Practical sessions in the laboratory.
- Tutored work at the end of the semester (evaluated independently).
- Voluntary seminars and nonacademic tutorials to complement training activities.
- Effective study of the concepts.

### 4.2. Learning tasks

The course includes the following learning tasks:

- Development of the subject program in the lectures.
- In the lessons of problems, the concepts discussed in the lectures will be worked in detail.
- In the computer lab sessions, small groups of students will work supervised by a teacher.
- Students can also attend personalized tutorial classes.

### 4.3. Syllabus

The course will address the following topics:

- **Processor Architecture:** Interpretation and translation, machine and assembly language, development environment, representation and coding of information, basic operations, registers and memory, addressing modes, instruction set, translation of data structures and control of high-level languages.
- **Subroutines:** Procedure calls, activation record. Case study: Integration of high-level language code with assembly code and library routines.
- **I/O subsystem:** Generic model device driver records. Basic methods of synchronization and transfer. Exceptions. Integration of peripherals in microcontrollers.

### 4.4. Course planning and calendar

## Schedule sessions and presentation of works

The educational organization of the course is as follows.

- Lectures (2 hours per week)
- Problem classes (1 hour weekly)
- Computer lab sessions ( 1 hour a weekly).

- Tutorial and evaluation activities

The timetable of classes and practice sessions will be defined when the academic calendar of the University of Zaragoza is approved.

### **Student Work**

To achieve the targets of this subject, students have to spend about 150 hours distributed as follows:

- 56 hours approximately, during the learning activities (lectures, problems and practical lab sessions).
- 51 hours of personal study (the study of notes and texts, problems solving problems, preparation for classes and practices, and learning of the software development process).
- 40 hours of software development work.
- 3 hours for the written final exam.

### **4.5. Bibliography and recommended resources**

<http://psfunizar7.unizar.es/br13/egAsignaturas.php?codigo=30205&Identificador=12491>