

**Academic Year/course: 2022/23**

## **25802 - Computer Science**

### **Syllabus Information**

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**Academic Year:** 2022/23

**Subject:** 25802 - Computer Science

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 558 - Bachelor's Degree in Industrial Design and Product Development Engineering

**ECTS:** 6.0

**Year:** 1

**Semester:** 107-First semester

558-First semester o Second semester

271-First semester

**Subject Type:** Basic Education

**Module:**

## **1. General information**

## **2. Learning goals**

### **2.1. Competences**

#### **BASIC COMPETENCES**

CB01. Students have demonstrated knowledge and understanding in a field of study that is part of the general secondary education curricular, and is typically at a level which, although it is supported by advanced textbooks, includes some aspects that involve knowledge of the forefront of their field of study.

CB02. Students can apply their knowledge to their work or vocation in a professional manner and have competences typically demonstrated through devising and defending arguments and solving problems within their field of study.

CB03. Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include an important reflection on social, scientific or ethical issues.

CB04. Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

CB05. Students have developed those skills needed to undertake further studies with a high degree of autonomy.

#### **GENERAL COMPETENCES**

GC04. Ability to organize time effectively and coordinate activities to acquire new knowledge quickly and perform under pressure.

GC06. Ability to generate the necessary documentation for the proper transmission of ideas through graphics, reports and technical documents, models and prototypes, oral presentations in Spanish and other languages.

GC07. Ability to use and master techniques, skills, tools and techniques and communication and others specific of design engineering needed for design practice.

GC08. Ability to learn continuously, to develop autonomous learning strategies and to work in multidisciplinary groups with motivation and determination to achieve goals.

#### **SPECIFIC COMPETENCES**

SC03. Basic knowledge of the use and programming of computers, operating systems, databases and software with applications in Engineering in Industrial Design and Product Development.

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

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

### 4.1. Methodological overview

The course is composed of two sections:

- **Section 1: Overview of Computer Science**  
It introduces the constituents of a computer and their functioning. The methodology applied is based on lectures
- **Section 2: Programming**  
The goal is the student's development of skills for solving problems by writing computer programs. The methodology applied is based on problem-based learning

### 4.2. Learning tasks

The course includes the following learning tasks:

1. **Theory Sessions.** 30 hours  
Theory sessions of section 1 are lectures whereby the teacher presents the structure of a computer and its functioning  
Theory sessions of section 2 are based on illustrative applied problems solved on the board by the teacher and students working together, because «programming is learned by writing programs». Thus, the students can progressively acquire the necessary experience and knowledge in this area
3. **Problem-solving Sessions.** 10 hours  
The teacher proposes a collection of problems with sufficient time to be analysed in advance of the session. Problem-solving sessions are dedicated to present and discuss the solutions reached, even the incomplete ones
5. **Computer lab Sessions.** 20 hours  
The students carry out the proposed activities working with a computer  
Computer lab sessions of section 1 are dedicated to learning how to work with several operating systems and software tools related to industrial design  
Computer lab sessions of section 2 are dedicated to learning programming; in order for this aim to be achieved, it is necessary to learn to use an integrated development environment related to the programming language employed
7. **Individual Works.** 12 hours  
In each section of the course, one work will be published in the virtual platform ADD (2 works in total) that are to be carried out individually by the students. They shall be submitted before the corresponding deadlines  
Work of section 1 consists of making a technical slideshow  
Work of section 2 consists of solving a programming problem
9. **Group Work.** Optional. 1 tutorial hour and 11 hours student's personal work  
This activity, proposed for groups of 2 or 3 students, has scheduled support of face-to-face tutorials for advice and guidance  
It consists of a medium-complexity problem which has to be solved writing a computer program  
The students can choose to not do this activity, although it is highly recommended to reach a medium-high level of programming skills

It is possible to take the Management Information course for first-year students (offered by Hypatia Library)

### 4.3. Syllabus

The course will address the following topics:

#### Theory Syllabus

- **Section 1: Overview of Computer Science**
  1. Computer Organization and Architecture
  2. Software
  3. Operating Systems
  4. Hardware
  5. Computer Networks

- 6. Information Representation
- 7. Databases
- **Section 2: Programming**
  - 1. Basic Elements of Programming
  - 2. Algorithms and Programs Design

### Practice Syllabus

- **Section 1: Overview of Computer Science**
  - 1. Operating Systems: Windows and Linux
  - 2. Software Tools
- **Section 2: Programming**
  - 1. First Steps in Programming
  - 2. Control Flow Statements
  - 3. Collections
  - 4. More Items

## 4.4. Course planning and calendar

The course is estimated to take 150 hours of student effort

- 30 theory sessions
- 10 problem-solving sessions
- 20 computer lab hours: 3 hour sessions, about every 2 weeks
- 1 tutorial hour: Tutorial support of group work
- 12 hours making the individual works
- 11 hours making the group work
- 60 study hours
- 6 hours of exams

The planned schedule of activities is as follows:

- **Section 1 (Overview of Computer Science)**
  - It takes place in the first four weeks
  - It is composed of 9 theory sessions, 2 problem-solving sessions, 2 computer lab session, and 1 individual work
  - The written exam of this section takes place after its completion, in sixth or seventh week
- **Section 2 (Programming)**
  - It takes place from the fifth week
  - It is composed of about 20 theory sessions, 8 problem-solving sessions, 4 computer lab sessions, 1 individual work, and 1 non-compulsory group work

Detailed information will be provided on the first day of class.

Each subject/course timetables, starting and ending dates, teaching schedules and teachers' office hours are published and can be found at EINA website:

<https://eina.unizar.es/>

## 4.5. Bibliography and recommended resources

<https://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=25802>