

Academic Year/course: 2022/23

## 30212 - Concurrent and Distributed Systems Programming

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 30212 - Concurrent and Distributed Systems Programming

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura  
326 - Escuela Universitaria Politécnica de Teruel

**Degree:** 439 - Bachelor's Degree in Informatics Engineering  
443 - Bachelor's Degree in Informatics Engineering

**ECTS:** 6.0

**Year:** 2

**Semester:** First semester

**Subject Type:** Compulsory

**Module:**

### 1. General information

### 2. Learning goals

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

### 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 will be carried out, according to the following items:

- autonomous work since the beginning of the semester.
- lectures for the presentation of the main concepts and methodologies related to the development of a compiler from a high level programming language. The teacher will make the lectures as interactive as possible so that students should also participate.
- the use of the presented methodologies in practical problem sessions, where students should also have a participative attitude.
- the laboratory sessions, where students will learn (and work with) the necessary techniques for the development of compilers.

#### 4.2. Learning tasks

The 6 ECTS course is organized as follows:

At the *Escuela de Ingeniería y Arquitectura* (Zaragoza):

- Lectures (45 hours). The teacher explains the course contents and solves representative applied problems. A third part will be devoted to problem sessions where student will work on the solution of some previously stated exercises. Regular attendance is highly recommended.
- Laboratory sessions (15 hours). Students will work in pairs implementing solutions to some proposed practical cases.
- Autonomous work (85 hours). Students are expected to spend about 85 hours to study theory, solve problems and

prepare laboratory sessions.

- Evaluation (5 hours). Students will have to pass some examinations related to both theoretical and practical aspects of the subject.

At the *Escuela Universitaria Politécnica* (Teruel):

- Lectures (45 hours). Lectures run for 3 weekly hours. The teacher explains the course contents and solves representative applied problems. A third part will be devoted to problem sessions where student will work on the solution of some previously stated exercises. Regular attendance is highly recommended.
- Laboratory sessions (15 hours). Students will work in pairs implementing solutions to some proposed practical cases.
- Group work (24 hours). A work to be carried out in groups is included in the program of the subject.
- Autonomous work (60 hours). Students are expected to spend about 85 hours to study theory, solve problems and prepare laboratory sessions.
- Evaluation (6 hours). Students will have to pass some examinations related to both theoretical and practical aspects of the subject.

### 4.3. Syllabus

The course will address the following topics:

- Introduction to concurrency (4h approx.)
- Modelling and analysis of concurrent systems (6h approx.)
- The critical section problem (5h approx.)
- Semaphores (8h approx.)
- Monitors (6h approx.)
- Introduction to distributed systems (3h approx.)
- Coordination by means of tuple spaces (3h approx.)
- Distributed algorithms (7h approx.)
- Introduction to real-time systems (1.5h approx.)
- Introduction to event-based systems (1.5h approx.)

The laboratory sessions will cover the following topics:

- Concurrent programming. Threads and shared data. Problems generated by the sharing of data and resources (2h)
- Solutions to the critical section problem (2h)
- Synchronization by means of semaphores (3h)
- Synchronization by means of monitors (3h)
- Synchronization in distributed systems by message passing (4h)

### 4.4. Course planning and calendar

The concrete schedule of the proposed activities will be established according to the faculty organization.

### 4.5. Bibliography and recommended resources

**Teruel:**

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=30212&Identificador=12947>

**Zaragoza:**

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=30212&Identificador=13379>