

Academic Year/course: 2022/23

## 29814 - Signals and systems

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 29814 - Signals and systems

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

**Degree:** 440 - Bachelor's Degree in Electronic and Automatic Engineering  
444 - Bachelor's Degree in Electronic and Automatic 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

##### At the EINA (ZARAGOZA)

The methodology followed in this course is oriented towards the achievement of the learning objectives. The course will be based on combining theoretical explanations with practical exercises, written assignments and laboratory work.

1. Lectures will provide a theoretical background on Signal and Systems fundamentals
2. Case studies and problem-solving will be worked out at the classroom
3. The students will do laboratory work in small groups
4. Written assignments will be proposed

Student participation is considered very important in order to acquire the learning outcomes and skills needed.

##### At the EUPT (TERUEL)

**The learning process is based on:**

1. Lectures and theory sessions are taught to the whole group of students enrolled in the course. Lectures will explain the basic principles of the subject. A selection of problems will be solved at the end of each chapter.
2. Laboratory sessions every 2 weeks. Can be carried out through a remote access to lab equipment.
3. Supervised assignments (approximately every 2 weeks).
4. Individual work.

#### 4.2. Learning tasks

**The course includes the following learning tasks:**

## At the EINA (ZARAGOZA)

### Classroom activities 6 ECTS (60 hours)

- 1) **Lectures (T1)** (30 hours): Fundamentals of systems modeling and analysis, mixing theoretical concepts and practical applications.
- 2) **Case studies (T2)** (15 hours): Examples and practical case studies with the active participation of students.
- 3) **Lab sessions (T3)** (15 hours): Five laboratory sessions related to system identification and simulation and signal analysis. Students have to prepare sessions in advance. This previous work will be evaluated in the laboratory.

### Personal work: 3.6 ECTS (90 hours)

- 4) **Assignments (T6)** (10 hours): Assignments for groups of two students related to modeling and simulation of a continuous system will be proposed
- 5) **Personal study (T7)** (76 hours): Continuous study will be promoted among students. They can also attend tutorials to solve the specific problems they can face in the course
- 6) **Evaluation activities (T8)** (4 hours): Assessment will be based on coursework (laboratory work and assignments) and final examination

## At the EUPT (TERUEL)

1. **Lectures and theory sessions (30 hours)**
2. **Solving selected exercises and problems (15 hours)**
3. **Lab sessions (14 hours)**
4. **Individual work (58 off-site hours)**
5. **Lecturer-student sessions**
6. **Evaluation/assessment (5 hours)**
7. **Supervised assignments (28 hours)**

### 4.3. Syllabus

The course will address the following topics:

1. Continuous-time systems modeling.
  - 1.1 Representation of continuous-time signals.
  - 1.2 Modeling tools.
  - 1.3 Physical systems modeling.
2. Time-domain analysis of continuous-time systems.
  - 2.1. The time-domain response of linear systems.
  - 2.2. Stability
  - 2.3. Transient response analysis.
3. Frequency-domain analysis of continuous-time signals and systems.
  - 3.1. Fourier Transform.
  - 3.2. Frequency-domain transfer function.
  - 3.3. Bode and polar plots.
4. Discrete-event systems modeling and simulation.
  - 4.1. Discrete-event systems. State diagrams.
  - 4.2. Petri networks.
  - 4.3. Qualitative and quantitative properties. Analysis based on examples.
  - 4.4. Discrete-event and hybrid systems simulation.

### 4.4. Course planning and calendar

Educational activities take place according to the general schedule set by the faculty board. Timetables will be published prior to the beginning of the course on the web of the EINA <https://eina.unizar.es/> and EUPT <https://eupt.unizar.es/>

Each teacher will publish his office hours. All the other activities will be planned and announced well in advance. It will be available at <https://moodle2.unizar.es/add/>

#### PART TIME ENROLLMENT STATUS, ONLY AT E.U.P. TERUEL (MODALIDAD SEMIPRESENCIAL)

Students choosing part time enrollment status (modalidad semipresencial) will have at their disposal the material of work and the bibliographic references from the beginning of the course (moodle).

For students choosing part time enrollment status (modalidad semipresencial), the lecturer will carry out adaptations in the weekly program so as to allow them to follow the programmed activities.