

Academic Year/course: 2022/23

## 30312 - Digital Signal Processing

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 30312 - Digital Signal Processing

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

**Degree:** 330 - Complementos de formación Máster/Doctorado

438 - Bachelor's Degree in Telecommunications Technology and Services Engineering

581 - Bachelor's Degree in Telecommunications Technology and Services Engineering

**ECTS:** 6.0

**Year:** 581 - Bachelor's Degree in Telecommunications Technology and Services Engineering: 2

438 - Bachelor's Degree in Telecommunications Technology and Services Engineering: 2

330 - Complementos de formación Máster/Doctorado: XX

**Semester:** Second semester

**Subject Type:** 581 - Compulsory

438 - Compulsory

330 - ENG/Complementos de Formación

**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 are implemented, such as lectures, practice sessions, assignments, computer lab sessions, autonomous work, and tutorials. Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. Further information regarding the course will be provided on the first day of class.

### 4.2. Learning tasks

The course is organized as follows:

- Lectures (40 hours) & practice sessions (10 hours). The teacher explains the course contents and solves representative applied problems. More examples and problems are proposed and solved during the practice sessions. Regular attendance is highly recommended.
- Computer lab sessions. Sessions will take place every 2 weeks (5 sessions in total) and they last 2 hours each. Students will work together in pairs. Before each lab session, students will complete and submit a pre-lab problem set. At the end of each lab session, they will take an assessment test.
- Assignments (autonomous group work). Every other week, students will complete an assignment with problems and exercises related to concepts seen in laboratory sessions and lectures. Student will work together in groups of

three. Assignments will be submitted via Moodle.

### 4.3. Syllabus

The course will address the following topics:

1. Frequency-domain representation of discrete-time signals
  - 1.1. Discrete-time Fourier transform
  - 1.2. Discrete Fourier Transform
  - 1.3. Implementation and applications
2. Sampling and reconstruction of signals
  - 2.1. Sampling and reconstruction of analog signals
  - 2.2. Changing the sampling rate
  - 2.3. Multirate systems: applications
3. Transform analysis of LTI systems
  - 3.1. z-Transform
  - 3.2. Transfer function
  - 3.3. Frequency response
  - 3.4. Special systems
4. Digital filter design
  - 4.1. Ideal and real filters
  - 4.2. Design of linear phase FIR filters
  - 4.3. Design of IIR filters

### 4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class and on the course webpage in the Moodle platform (<https://moodle.unizar.es>). Also, refer to the EINA website (<http://eina.unizar.es>).

### 4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=30312>