

Faculty: Science and Technology

Course: **Signal Processing**

Program: Study Abroad in Engineering

Semester: 2 - Spring

ECTS credits: 3

Duration: 22,5 hours

Language of instruction: English

Instructor: Albert Dorca

Course Description

This course covers the main mathematical tools for processing a physical signal, it addresses the theoretical aspects with applications in numerical simulation.

Prerequisites

Sequence and series.

Attendance policy

Attendance is mandatory for all classes, including study visits. Any exams, tests, presentations, or other work missed due to student absences can only be rescheduled in cases of certified medical or family emergencies.

Learning outcomes

By the end of the course, students should be able to analyzing and modeling simple signals using Matlab.

Method of presentation

- Lectures and discussions: Lectures with appropriate visual support provide the theoretical content of the sessions. Class discussions facilitate the students' ability to connect reading and lectures, analyzing or applying concepts.
- Class participation: Students are expected to participate in group activities and in the discussions based on the course readings and cases proposed.
- Home exercises: Students are expected to solve several exercises during the semester.

Required work and assessment methods

- Cases, reading and exercises (60%). Preparation, development and discussions related to exercises will be highly valuable for the success of the course both at individual and group level.
- Validation exam (40%). Individual test.

Contents

Unit One: Introduction to signals

Week 1. Course presentation. Introduction to signals.

Week 2. Signal characteristics.

Week 2. Signal representation in matlab.

Unit Two: Frequency analysis

Week 3. Fourier series decomposition (DSF).

Week 4. Fourier Transform (FT). (E1)

Unit Three: Digitalization of a signal

Week 5. Shannon Theorem.

Week 6. Converters ADC and DAC. (E2)

Unit Four: Discretized Fourier Transform

Week 7. Discrete Time Fourier Transform.

Week 8. Fast Fourier Transform (FFT). (E3)

Unit Five: Analysis of digital filters

Week 9. Difference equation.

Week 10. Z-transfer function.

Week 11. FIR filters (Finite Impulse Response)

Week 12. IIR filters (Infinite Impulse Response) (E4)

Unit Six: Transmission of signals

Week 13. Digital modulation.

Week 14. Quality of transmission. (E5)

Week 15. Test. (T)

Activities weight

	E1	E2	E3	E4	E5	T
%	10	10	10	20	10	40

Retake exams and activities

The student must present the activities pending to delivery (E1 from E5).

If the student passed the test (T), it is not necessary to take the retake test. It is only mandatory to take the retake test if some tests were not passed.

The activities weight in the retake evaluation is the same than activities weight in the ordinary evaluation (see the percentages table).