

## DEA-GITT-324 Digital Signal Processing

**SEMESTER:** Spring

**CREDITS:** 6 ECTS (4 hrs. per week. 2h Theory + 2h Lab)

**LANGUAGE:** Spanish

**DEGREES:** GITT

### Course overview

The main goal of this course is to provide the student with the first concepts regarding digital signal processing systems. During the semester, the course will cover both an analytical assessment of techniques to implement such systems and how these processes are used in real-life applications.

### Prerequisites

Basic knowledge of complex variable and differential calculus. Knowledge of Matlab framework (required for all lab sessions).

### Course contents

#### Theory:

1. Introduction: Signals and Spectra.
2. Sampling and Pulse Modulation.
3. FIR Systems.
4. Z-Transform and IIR Systems.
5. Spectral Analysis.
6. Adaptive Filtering
7. Applications.

#### Laboratory:

There will be eight 2-hour sessions throughout all the course.

- P1.** Sampling.
- P2.** Non-uniform quantization.
- P3.** Digital modification of the sampling frequency.
- P4.** FIR filtering.
- P5.** IIR filtering.
- P6.** Hardware considerations in IIR filters.
- P7.** Filtering using DFTs.

## P8. Adaptive filtering.

### Textbook

- Slides on Moodle.
- DSP First. McClellan, Schafer, Yoder. Prentice-Hall 1998.
- A Digital Signal Processing Primer. K. Steiglitz. Addison-Wesley 1996.
- Concepts in Systems and Signals, J. D. Sherrick. Prentice-Hall 2001
- Discrete-Time Signal Processing (2nd Edition). Oppenheim, Schafer, Buck. Prentice-Hall.
- Digital Signal Processing Handbook. Vijay K. Madisetti, Douglas B. Williams. Chapman & Hall.
- Advanced Signal Processing Handbook. Editor Stergios Stergiopoulos. CRC Press.

### Grading

The following conditions must be accomplished to pass the course:

- A minimum overall grade of at least 5 over 10.
- A minimum grade in the final exam of 5 over 10.
- A minimum overall laboratory grade at least 6 over 10.

The overall grade is obtained as follows:

- Final exam accounts for 45% of the final grade (A minimum grade of 5 out of 10 points is required to pass this subject).
- Several small exams during the course account for 20% in total.
- Lab reports account for 35% of the grade (A minimum grade of 6 out of 10 points is required to pass this course).