

## DEA-GITT-214 Digital Systems I

**SEMESTER:** Fall  
**CREDITS:** 6 ECTS (4 hrs. per week: 2 Theory + 2 Lab.)  
**LANGUAGE:** Spanish  
**DEGREES:** GITT

### Course overview

This course is an introduction to digital electronics. The application of digital representation and the electronic aspects of digital circuits are introduced. The course focuses on Boole algebra, number systems, digital codes, hardware description languages, fundamentals of digital design and the introduction to complex systems. Besides, typical applications will be analyzed and experimented in the lab to illustrate typical digital solutions to real problems.

### Prerequisites

Basic electronics.

### Course contents

#### Theory:

1. Introduction to Digital Techniques.
2. Logic Functions and Boolean Algebra.
3. Number Systems and Codes.
4. Introduction to Hardware Description Languages. VHDL.
5. Arithmetic Circuits.
6. Combinational Logic Design.
7. Sequential Logic Design.
8. State-machines Principles.
9. Designing with Registers.
10. Designing with Counters.
11. Complex Digital System Design.

#### Laboratory:

Each unit described previously has at least one associated lab practice (2 hours/week)

- P1. Introduction to digital gates and digital oscilloscope.

- P2. Introduction to Quartus II. Designing with schematics and compilation.
- P3. Introduction to Quartus II. Simulation and physical design.
- P4. Combinational digital circuits with VHDL.
- P5. Arithmetic circuits. 5 bits adder.
- P6. Arithmetic circuits. 5 bits multiplier.
- P7. Arithmetic circuits. 5 bits ALU.
- P8. Introduction to latches and flip-flops.
- P9. Digital design. The electronic lock.
- P10. Digital design. The parking control.
- P11. Digital design. Microwave timer.

## Textbook

- José Daniel Muñoz Frías. Introducción a los sistemas digitales. Un enfoque usando lenguajes de descripción de hardware.

## Grading

The grading is split in two parts: theory and laboratory. The theory part is graded with the following rule:

- Final exam accounts for 70% of the final.
- Mid-term exam accounts for 20%.
- Several small exams during the course account for 10% in total.
- Lab reports must be handed in every week and they are graded and returned the following week. They account for 5% of the grade.

The laboratory part is graded taking into account:

- A final exam, which accounts the 50 % of the lab grade.
- Some tests made at the beginning of the lab practice to evaluate the prior work done by the student. This accounts for the 30 % of the lab grade.
- The documentation of the lab practice accounts for the 20 %.

If the student passes theory and practice, then the final grade is a 60 % of the theory grade and 40 % of the lab grade. If not, the final grade will be the least of the two grades.