

DEA-GITI-341 Digital Electronics

SEMESTER: Spring

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

LANGUAGE: Spanish

DEGREES: GITI

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. Design with Registers.
10. Design with Counters.
11. Complex Digital 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

- Introducción a los sistemas digitales. Un enfoque usando lenguajes de descripción de hardware. José Daniel Muñoz Frías. 2011.
- John F. Wakerly Digital Design: Principles and practices. 4ª Edition. Prentice Hall. 2000.
- Thomas L. Floyd Fundamentos de sistemas digitales. 9ª Edición. Pearson/ Prentice Hall. 2006.

Grading

The following conditions must be accomplished to pass the course:

- A minimum overall grade, in the final and the lab, of at least 5 over 10

The overall grade is obtained as follows:

- Final exam accounts for 40% of the final grade
- Several small exams during the course account for 20% in total.
- Lab must be handed in every week and they are graded and returned the report following week. They account for 40% of the grade.