IEE2783 DIGITAL SYSTEMS LABORATORY

Credits and contact hours: 5 UC credits / 5 hours a week labs

Instructor’s name: Enrique Álvarez

Course coordinator’s name: To be defined


Course Catalog Description: This course allows the student to review the contents studied during the undergraduate course of digital systems through the implementation in FPGA of complex digital systems.

Prerequisite Courses: IEE2713 Digital Systems, IEE2183 Electrical Measurements Laboratory

Co-requisite Courses: To be defined

Status in the Curriculum: Elective

Course Learning Outcomes:
1. Design and implementation of complex digital systems using discrete components (TTL and HC) and mainly FPGAs.
2. Learn hardware-oriented programming languages such as Verilog.
3. Solve engineering problems with given specifications by developing digital systems.

Relation of Course to ABET Criteria:

a. Knowledge of mathematics, science and engineering
b. Design and conduct experiments: analyze and interpret data
c. Design a system, component, or process
d. Multidisciplinary teams
e. Identify, formulate, and solve engineering problems
i. Recognition of the need for, and an ability to engage in life-long learning
k. Techniques, skills, and modern tools for engineering practice.
Topics covered:

1. Experience 1 – TTL, HC and FSM design
   a. Characterization of TTL and HC technologies
   b. Design and discrete implementation of an FSM for and specific engineering problem
2. Experience 2 - EEPROM
   a. Design and implementation of an asynchronous serial communication protocol using an EEPROM for combinational logic
3. Experience 3 – Introduction to the FPGA
   a. Design and implementation of a function generator using an FPGA
4. Experience 4 – Pong
   a. Use of peripherals such as the VGA
   b. Design and implementation in FPGA of the game Pong
5. Experience 5 – Digital Piano
   a. Use of peripherals such as a computer keyboard (PS2 protocol)
   b. Design and implementation in FPGA of a two-octaves piano.
6. Project
   a. Design and implementation in FPGA of a complex digital system