

1. *Course number and name*

ENGR 357: Digital Design Laboratory

2. *Credits and contact hours*

1 credit hour; one 2 hours and 45-minute lab session/week

3. *Instructor's or course coordinator's name*

Instructor: Hamid Shahnasser, Professor of Electrical and Computer Engineering

Course coordinator: Hamid Shahnasser, Professor of Electrical and Computer Engineering

4. *Text book, title, author, and year*

M. Morris Mano & Michael D. Ciletti, Digital Design with an Introduction to the Verilog HDL, Fifth Ed

a. *other supplemental materials*

Hu, S. C., Computer Logic Experiments. Second Edition

One Engr 357 Kit for each lab team (no more than 2 students/team); take voucher to pay \$34 for kit at Bursar's Office (Adm 155); pick up kit at SCI-140 with receipt from Cashier.

5. *Specific course information*

a. *brief description of the content of the course (catalog description)*

CMOS digital circuits and their electrical properties, Sequential and Combinational circuits design and implementation, Hands on experiments on Adders, Decoders, Latches Flip-flops, Register and Counters. Introduction to EDA tool and VHDL programming.

b. *prerequisites or co-requisites*

ENGR 205 or CS210 with a grade of C- or better

c. *indicate whether a required, elective, or selected elective course in the program*

Required for Electrical Engineering; elective for Computer Engineering.

6. *Specific goals for the course*

a. *specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.*

- The student will demonstrate an ability to analyze combinational and sequential circuits.
- The student will demonstrate an ability to design and implement combinational and sequential circuits.
- The student will demonstrate knowledge of structural, dataflow, and behavioral modeling of digital system
- The student will demonstrate knowledge of VHDL (VHSIC Hardware Description Language) using Xilinx Software for circuit design.

- The student will demonstrate the skill of using software tools.
- b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.*

Course addresses ABET Student Outcome(s): a, b, c, e, k.

7. *Brief list of topics to be covered*

- Basic Logic Operations
- Introduction with EDA tool
- Introduction and implementation of Combinational Circuit Design
- Implementation of iterative circuits such as Adders and Subtractors
- Implementation of Decoders and Multiplexers.
- Introduction of Latches and Flip-flops
- Introduction and implementation of Sequential Circuit Design
- Implementation of Registers
- Implementation of Counters