1. Course number and name
   **ENGR 378: Digital System Design**

2. Credits and contact hours
   3 credit hours; one 100-minute lecture session/week and one 2-hour-45-minute lab session/week

3. Instructor’s or course coordinator’s name
   Instructor: Hamid Mahmoodi, Professor of Electrical and Computer Engineering
   Course coordinator: Hamid Mahmoodi, Professor of Electrical and Computer Engineering

4. Text book, title, author, and year
   
a. other supplemental materials
   (none)

5. Specific course information
   a. brief description of the content of the course (catalog description)
      CMOS digital circuits and their electrical properties. Logic circuit design with functional units.
      Algorithmic sequential machine design. Design with programmable logic devices. Hardware description
      and simulation language.
   
b. prerequisites or co-requisites
      grade of C- or better in ENGR 356
   
c. indicate whether a required, elective, or selected elective course in the program
      Required for Computer Engineering; elective for Electrical 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 combinational and sequential circuits.
      - The student will demonstrate knowledge of structural, dataflow, and behavioral modeling of digital
        system.
      - The student will demonstrate knowledge of Hardware Description Language (HDL) for digital system
        design and simulation.
      - The student will demonstrate a skill in using software tools.
      - The student will demonstrate a working knowledge of programmable logic devices
      - The student will demonstrate a skill in using tools for digital design with programmable logic devices.
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
   • Introduction to Verilog HDL
   • Basic methods for circuit specification
   • Programmable logic devices and FPGA’s
   • Design and specification of simple circuits
   • Arithmetic unit design
   • State Machine design
   • SM Charts
   • Design with FPGAs
   • Lab: Computer-aided design and simulation tools; digital circuit verification and troubleshooting, synthesis and implementation to FPGA