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)**
      

   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, c, e, b, k.

7. Brief list of topics to be covered
• 1. Introduction to Verilog HDL
• 2. Basic methods for circuit specification
• 3. Programmable logic devices and FPGA’s
• 4. Design and specification of simple circuits
• 5. Arithmetic unit design
• 6. State Machine design
• 7. SM Charts
• 8. Design with FPGAs
• 9. Lab: Computer-aided design and simulation tools; digital circuit verification and troubleshooting, synthesis and implementation to FPGA