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