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

2. **Credits and contact hours**  
   3 credit hours; two 50-minute lecture sessions/week and one 2-hour-45-minute lab session/week

3. **Instructor’s or course coordinator’s name**  
   Instructor: Hamid Mahmoo, Assistant Professor of Computer Engineering  
   Course coordinator: Hamid Mahmoodi, Assistant Professor of 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 knowledge of the DC characteristics of TTL and CMOS digital devices.
      - The student will demonstrate knowledge of the AC characteristics of TTL and CMOS digital devices.
      - The student will demonstrate an ability to interface digital devices with different characteristics.
      - 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
• Introduction to HDL
• Introduction to Programmable Logic Devices
• Combinational circuit analysis and design
• Sequential circuit analysis and design
• Design with Field Programmable gate Arrays
• Real-world design examples: traffic light controller, array multiplier, keypad scanner
• Lab: Computer-aided design and simulation tools; digital design and verification, synthesis and implementation to FPGA