1. *Course number and name*
   ENGR 356 Digital Design
2. *Credits and contact hours*
   3 credit hour; Three 50-minute lecture 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. *References*
   1. Carter, J. W., Digital Designing with Programmable Logic Devices.
   2. Clements, A., Principle of Computer Hardware.
   3. Daniels, J., Digital Design from Zero to One.
   4. Dietmeyer, D. L., Logic Design of Digital Systems, 3rd Ed.
   5. Dewey, A., Analysis and Design of Digital Systems with VHDL.
   6. Katz, R. H., Contemporary Logic Design.
   7. Kline, R. M., Structured Digital Design.
   8. Lewin, M. H., Logic Design and Computer Organization.
   9. Marino, L. R., Principles of Computer Design.
   10. McCalla, T. R., Digital Logic and Computer Design.
   11. Pappas, N. L., Digital Design.
   12. Pucknell, D. A., Fundamentals of Digital Logic Design.
   13. Roth, D. A., Fundamentals of Logic Design, 4th Ed.
   14. Sandige, R. S., Digital Concepts Using Standard Integrate Circuits.
   15. Tinder, R. F., Digital Engineering Design - A Modern Approach.
   16. Wakerly, J. F., Digital Design Principles and Practices.
   17. Wong, D. G., Digital Systems Design.

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Number systems. Design of combinational and sequential logic circuits. Digital functional units such as adders, decoders, multiplexers, registers and counters. Micro-operations and register transfer language. Instruction format and execution. Memory organization. Datapath, control Units, Computer I/O and peripheral devices, time permitting.
   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 combinational and sequential circuits.

- The student will demonstrate the skill of using software tools.

- The student will demonstrate an ability to implement Digital Design circuit as a course project.

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, e, i, j, k.

7. *Brief list of topics to be covered*
- Digital Systems and Binary information

- Boolean Algebra and Logic Gates

- Gate Level minimization

- Combinational logic

- Synchronous Sequential Logic

- Registers and Counters

- Memory and Programmable Logic

- Design at Register Transfer Logic

- Additional Topics, time permitting