Template for ABET course syllabi (new format)

1. **Course number and name**
   
   ENGR 356 Basic Computer Architecture

2. **Credits and contact hours**
   
   3 Credit Hours

3. **Instructor’s or course coordinator’s name**
   
   Instructor: Sung Hu, Ph.D
   
   Course coordinator: Sung Hu, Ph.D

4. **Text book, title, author, and year**
   
   

   a. **other supplemental materials**
      
      - Clements, A., Principle of Computer Hardware.
      - Daniels, J., Digital Design from Zero to One.
      - Dewey, A., Analysis and Design of Digital Systems with VHDL.
      - Katz, R. H., Contemporary Logic Design.
      - Kline, R. M., Structured Digital Design.
      - Marino, L. R., Principles of Computer Design.
      - Pappas, N. L., Digital Design.
      - Vahid, F., Digital Design
      - Wong, D. G., Digital Systems Design.
      - Yarbrough, J. M., Digital Logic – Applications and Design

   (Optional References).

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, and control units. Computer I/O and peripheral devices.

   b. **prerequisites or co-requisites**

      A grade of C or better in either ENGR 205 or CSC 210
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c. indicate whether a required, elective, or selected elective course in the program
   Required for Computer Engineering and 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 simple combinational and sequential
        circuits.
      - The student will demonstrate an ability to design simple combinational and sequential
        circuits.
      - The student will demonstrate knowledge of the common combinational functional units such
        as decoders, encoders, multiplexers, demultiplexers, etc.
      - The student will demonstrate knowledge of the common sequential functional units such as
        registers and counters.
      - The student will demonstrate knowledge of the main storage devices and organization.
      - The student will demonstrate knowledge in binary number systems and related arithmetic
        operations.
      - The student will demonstrate an understanding of the basic building blocks of a digital
        computer.
      - The student will demonstrate an understanding of a simple datapath unit structure.
      - The student will demonstrate an understanding of the concept of micro-operations and
        register transfer language (RTL).
      - The student will demonstrate an understanding of instruction set architecture.
      - The student will demonstrate an understanding of simple computer input/output operations.
      - The student will demonstrate basic knowledge of a PC motherboard.
      - The student will demonstrate basic knowledge of PC peripheral 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]

7. Brief list of topics to be covered
   - Binary number system and binary arithmetic operations.
   - Logic simplification: Boolean algebra and K-map.
   - Basic logic components: gates and flip-flops.
   - Combinational circuit analysis and design.
   - Digital functional units.
   - Synchronous sequential circuit analysis and design.
   - Memory organization.
   - Micro-operations and register transfer language.
   - Datapath, sequencing, and control.
   - Instruction set architecture.
   - Input/output operations.
   - PC organization and peripheral devices