

1. Course number and name: 010113025 Digital Circuit and Logic Design
2. Credits and contact hours: 3(3-0-6)
3. Instructor's or course coordinator's name:  
Section 1: Asst. Prof. Dr. Noppadol Charbkaew  
Section 2: Asst. Prof. Dr. Ruslee Sutthaweekul  
Section 3: Assoc. Prof. Chatchai Sermpongpan
4. Text book, title, author, and year
  - a. Stephen Brown, Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design 3rd Edition, 2009, McGraw-Hill
  - b. Enoch O. Hwang, Digital Logic and Microprocessor Design with VHDL, 2005, CL Engineering
5. Specific course information
  - a. brief description of the content of the course (catalog description)  
**Units.**
  - b. prerequisites or co-requisites  
**Prerequisite: None**
  - c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program  
**A required course in the program as non ECE Technical: Digital logic designation both Combination circuit and Sequential Circuit.**
6. Specific goals for the course
  - a. specific outcomes of instruction (e.g. The student will be able to explain the significance of current research about a particular topic.)
    - i. Basic concept
      1. Understand the number systems and convert number systems.
      2. Understand logical AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR functions.
      3. Identify a Boolean equation by using the truth table and shows its logic circuit and HDL.
    - ii. Digital Circuits Analysis
      1. Discuss the working principles of adder, decoder, encoder, multiplexer, demultiplexer.
      2. Recognize the timing diagram, logic symbol and truth table of R-S, JK, D and T type flip-flops.
      3. Designs and analyses the synchronous sequential circuits including Moore and Mealy models.
      4. Recognizes the finite state machine diagrams.
      5. Designs and analyses the dedicated microprocessors and applications.

iii. Overall objectives

Apply the knowledge to design digital circuits and to discuss digital problems relating electrical engineering field.

- b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

| ABET<br>Student Outcome (SO)<br>Listed in Criterion 3   | 010113025<br>Digital Circuit and Logic Design<br>Course Learning Outcomes (CLO)  |
|---|--|
| SO1 an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics | CLO an ability to identify, formulate, and solve complex engineering problems incorporated with digital circuits and logic design by applying principle of digital circuit theorem (Boolean, combination, sequential function and dedicated microprocessors) |

c. Course Assessment

| Course Assessment | The weightage (%) | Assessment Tools | Date                      |
|-------------------|-------------------|------------------|---------------------------|
| Formative 1       | 30                | Midterm Exam     | Sat. Jan. 2026            |
| Formative 2       | 40                | Mini Project     | Dec 2025 – Mar 2026       |
| Summative         | 30                | Final Exam       | 24 <sup>th</sup> Mar 2026 |

| Score    | Grade          |
|----------|----------------|
| 80 - 100 | A              |
| 75 - 79  | B <sup>+</sup> |
| 70 - 74  | B              |
| 65 - 69  | C <sup>+</sup> |
| 60 - 64  | C              |
| 55 - 59  | D <sup>+</sup> |
| 50 - 54  | D              |
| 0 - 49   | F              |

7. Brief list of topics to be covered

- a. Design Concepts
- b. Introduction to Logic Circuits
- c. Number Representation and Arithmetic Circuits
- d. Combinational-Circuit Building Blocks
- e. Flip-Flops, Registers, Counters, and a Simple Processor
- f. Synchronous Sequential Circuits
- g. Dedicated Microprocessor