COURSE SYLLABI 010153101 DIGITAL CIRCUIT AND MICROPROCESSOR FUNDAMENTAL

1. Course number and name: 010153101 Digital Circuit and Microprocessor Fundamental

2. Credits, contact hours: 3(2-3-5), Core engineering course

3. Instructor's or course coordinator's names: Phisit Ittiyavut and Ruslee Sutthaweekul
4. Textbooks, title, author, and year
    a. Fundamentals of Digital and Computer Design with VHDL, Richard S. Sanddige, Michael L. Sandige, McGraw Hill International Edition, 2012.
    b. Stephen Brown, Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design 3rd Edition, 2009, McGraw-Hill.
    c. 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)
    Introduction to digital signals; number systems and codes; digital circuits; logic gates and Boolean algebra; integrated circuit; logic families; TTL; CMOS; timing diagram; combinational circuits; sequential circuits; state diagram and implementation; microprocessor and microcontroller architecture; register and memory; timer/counter; basic input/output; interrupt; arithmetic and logic unit; basic input/output application, analog to digital conversion; serial Interface; hardware description language; VHDL; digital circuit laboratory.
    b. prerequisites or co-requisites: -
    c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program: required

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.)
        1. explains positive and negative logic states, TTL, MOS and CMOS integrated circuits properties
        2. explains number systems and convert number systems.
        3. explains logical AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR functions.
        4. explains the simplification of logical statements with using Boolean rules and de-Morgan theorems.
        5. writes Boolean equation by using truth table and shows its logic circuit and HDL.
        6. writes Boolean equation by logic circuits and shows its truth table.
        7. explains the simplification of logical statements with Karnaugh maps.
        8. explains the working principles of adder, decoder, encoder, multiplexer, de-multiplexer
        9. recognize 7-segmented displayers and show the application of combinational circuits.

10. recognize timing diagram, logic symbol and truth table of RS, JK, D and T type flip-flops.
11. recognizes asynchronous and synchronous counters
12. designs and analyses synchronous sequential circuits including Moore and Mealy models.
13. recognizes finite state machine diagram.
14. explains fundamental of dedicated microprocessor design.
15. designs and analyses dedicated microprocessor and its application.

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

		Student Outcomes						
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Course learning outcomes (CLO)	1	X						
	2	X						
	3	X						
	4	X						
	5	X						
	6	X						
	7	X						
	8	X						
	9	X	X					
	10	X						
	11	X						
	12	X	X					
	13	X						
	14	X		X				
	15	X	X	X	X	X	X	X

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

7. Brief list of topics to be covered
    a. Boolean Algebra, Boolean Functions, VHDL, and Gates Analysis of circuits.
    b. Number Conversions, Codes, and Function Minimization.
    c. Introduction to Logic Circuit Analysis and Design.
    d. Combinational Logic Circuit Design with VHDL.
    e. Bistable Memory Device Design with VHDL.
    f. Simple Finite State Machine Design with VHDL.
    g. Register transfer level (RTL) design.
    h. Control Unit and Datapath.
    i. Dedicated Microprocessor applications.