Digital Circuit 1

Basic Course Information

Course Number	02005072	**Subject Category**	Compulsory (C)
Class Format	Lecture	**Credit Type and Number of Credits**	1
Department	Computer	**Student Category**	Year 1
Period of Study	Semester 2	**Classes per Week**	2
Required Materials			
Instructor	Dr.Thanyawarat Pawasopon		

Course Objective

The course provides students with introduction and basic knowledge of number base systems, fundamental logical operations, logical functions, the concept of the simplification of logical expressions and the combinational logic circuits.

Evaluation(Rubric)	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
1. Being able to perform number base systems	Demonstrates very good skills to execute essential of convert and calculate number base	Demonstrates good skills to execute basic of convert and calculate number base	Lacks of skills to execute basic of convert and calculate number base
2. Being able to perform fundamental logical operations	Demonstrates very good skills to perform fundamental logical operations, and also having very good ability to apply the skills to execute essential operations	Demonstrates good skills to perform fundamental logical operations, and also having good ability to apply the skills to execute basic operations	Lacks of skills to perform fundamental logical operations, and also lack of ability to apply the skills to execute basic operations
3. Being able to show logical functions as logical expressions by the combination of fundamental logical operations	Demonstrates very good ability to understand mathematical meaning of logical functions, and also demonstrates very good skills to express the simple logical functions	Demonstrates good ability to understand mathematical meaning of logical functions, and also demonstrates good skills to express the simple logical functions	Lacks of ability to understand mathematical meaning of logical functions, and also lacks of skills to express the simple logical functions
4. Being able to explain the concept of the simplification of logical expressions	Demonstrates very good ability to understand the mathematical concept about the simplification of logical expressions, and also having essential skills to perform the simplification using Karnaugh maps	Demonstrates good ability to understand the mathematical concept about the simplification of logical expressions, and also having basic skills to perform the simplification using Karnaugh maps	Lack of ability to understand the mathematical concept about the simplification of logical expressions
5. Being able to show the combinational logic circuits with logic gates from logical expressions	Demonstrates very good ability to explain the comcept about the combinational logic circuits, and also having very good skills to obtain the combinational logic circuits with logic gates from essential logical expressions	Demonstrates good ability to explain the comcept about the combinational logic circuits, and also having good skills to obtain the combinational logic circuits with logic gates from basic logical expressions	Lack of ability to explain the comcept about the combinational logic circuits
6. Being able to explain the functions of given simple combinational logic circuits	Demonstrates very good ability to understand the functions of simple combinational logic circuits, and also having very good skill to explain the functions of the circuits	Demonstrates good ability to understand the functions of simple combinational logic circuits, and also having good skill to explain the basic	Lack of ability to understand the functions of simple combinational logic circuits

7. Being able to design any combinational logic circuits	Demonstrates both the essential ability to design combinational logic circuits, and the very good skill about the simplification, and also having very good abilty to apply the understandings and skills to design essential combinational logic circuits	Demonstrates both the essential ability to design combinational logic circuits, and the good skill about the simplification, and also having good abilty to apply the understandings and skills todesign basic combinational logic circuits	Lack neither the essential ability to design combinational logic circuits, nor the skill about the simplification

Relationship with Learning Outcomes
C(1) Ability to operate and administer the computer software and hardware
Please change
Please change

Teaching Method	
Outline:	Repeat of Drill-Explanation-Drill
Class Format:	Lecture and Drill
Please Note ：	Students are required to ask any questions after sufficient self-learning

Course Plan					
Semester 2	Contents and Method of Course	Goals	Related MCC		
1st week (Nov 7th -online)	Introduction of digital circuit, Point of Difference between Digital and Analog and Number base systems	Being able to discuss both about the point of difference between digital and analog, and also able to explain about fundamental of number base system	V-D	3	31
			V-D	3	32
			V-D	3	34
2nd week (Nov 14th - online)	Arithmetic Operations of Binary Numbers	Being able to understand about binary arithmetic operations, especially the usage of complements, and also having skills to perform arithmetic subtraction using 2's complement	V-D	3	32
			V-D	3	33
3rd week (Nov 21th)	Logical Operations: Configuration and Behavior of Logic Gates	Being able to explain about the functions both of logical operations and of logic gates using truth tables	V-D	3	35
			V-D	3	36
4th week (Nov 28th)	Theorems of Boolean Algebra(1)	Being able to explain about the theorems of boolean algebra using truth tables and/or Venn diagrams	V-D	3	35
			V-D	3	36
5th week (Dec 5th)	Hollydays				
6th week (Dec 12th)	Theorems of Boolean Algebra(2)	Analyzing and simplifying the logic circuits by using Boolean Algebra	V-D	3	37
			V-D	3	38
7th week (Dec 19th)	Simple SOP (Sum of Products) and Designing Logic Circuits of Simple SOP	Being able to explain both about the simple SOP (sum of products) and able to design logic circuits of simple SOP	V-D	3	37
			V-D	3	38
			V-D	3	39
			V-D	3	40
			V-D	3	41
8th week	Simple POS (Product of Sum) and Designing Logic	Being able to explain both about the simple POS (Product of Sum) and able	V-D	3	37
			V-D	3	38
			V-D	3	39

(Dec 26th)	Circuits of Simple POS	(Product of Sum) and able to design logic circuits of simple POS	V-D	3	40
			V-D	3	41
9th week (Jan 2nd)	Hollydays				
10th week (Jan 9th)	Mid-term Examination				
11th week (Jan 16th)	Karnaugh Map(1)	Understanding and able to simpifly expression using Karnaugh Map (Minterm and Maxterm of 2-3-4 variable Karnaugh Map)	V-D	3	37
			V-D	3	38
			V-D	3	39
			V-D	3	40
			V-D	3	41
12th week (Jan 23rd)	Karnaugh Map(2)	Understanding and able to simpifly expression using Karnaugh Map (Don't care term of 2-3-4 variable Karnaugh Map)	V-D	3	37
			V-D	3	38
			V-D	3	39
			V-D	3	40
			V-D	3	41
13th week (Jan 30th)	Designing Circuits of NAND-Logic or Circuits	Being able to design circuits using only NAND-logic	V-D	3	39
			V-D	3	40
			V-D	3	41
			VI-D	1	6
			VI-D	1	8
14th week (Feb 6th)	Arithmetic Addition Circuits	Being able to design Half-adder circuits using only NAND-logic	V-D	3	39
			V-D	3	40
			V-D	3	41
			VI-D	1	6
			VI-D	1	7
			VI-D	1	8
15th week (Feb 13th)	Arithmetic Addition Circuits	Being able to design Full-adder circuits using only NAND-logic	V-D	3	39
			V-D	3	40
			V-D	3	41
			VI-D	1	6
			VI-D	1	7
			VI-D	1	8
16th week (Feb 20th)	Arithmetic Subtraction Circuits	Being able to design Subtraction circuits using only NAND-logic	V-D	3	39
			V-D	3	40
			V-D	3	41
			VI-D	1	6
			VI-D	1	7
			VI-D	1	8
17th week (Feb 27th)	7-Segment circuit	Being able to design 7-segment circuits using only NAND-logic	V-D	3	39
			V-D	3	40
			V-D	3	41
			VI-D	1	6
			VI-D	1	7
			VI-D	1	8
18th week (March 5th)	Review before Final examination	Being able to explain the functions of given simple combinational logic circuits and able to design any combinational logic circuits			
19th week (March 12th)	Final examination				
20th week (March 19th)	Return final exam				

	Examination	Quiz	Mutual Evaluations between students	Report	Portfolio	Other
Basic Ability	30	10		5	10	
Technical Ability	30	10		5		
Interdisciplinary Ability						