

Tsuyama College		Year	2020		Course Title	Mathematical Information
Course Information						
Course Code		0085		Course Category		Specialized / Compulsory
Class Format		Lecture		Credits		Academic Credit: 2
Department		Department of Integrated Science and Technology Communication and Informations System Program		Student Grade		4th
Term		Second Semester		Classes per Week		2
Textbook and/or Teaching Materials		Textbook : Shuichi SAKAI, "Ronri Kairo Nuumon (Intruduction to Logic Circuits)" (Baihukan), Reference book : Takehiko TOMIKAWA, "Reidai de Manabu Ronri Kairo Sekkei (Logic Circuits Design by Examples)" (Morikita Shuppan)				
Instructor		KAWANAMI Hiromichi				
Course Objectives						
Learning purposes : Understand principles of digital data proccessing, and design fundamental circuits for data processing.						
Course objectices : 1. To design combinational circuits. 2. To explain operations and characteristics of fundamental elements of a sequential circuits. 3. To explain operations of fundamental sequential circuits.						
Rubric						
	Excellent		Good		Acceptable	Not acceptable
Achievement 1	The student can design desired combinational circuits.		The student can design fundamental combinational circuits such as an adder.		The student can design simple combinational circuits.	The student does not reach the the acceptable level.
Achievement 2	The student can exchange every flip-flop to equivalent flip-flops.		The stundent can cleary explain operations and characteristics of fundamental elements of a sequential circuits.		The stundent can explain operations and characteristics of fundamental elements of a sequential circuits.	The student does not reach the the acceptable level.
Achievement 3	The student can analyze and explain on arbitrary sequential circuits.		The student can analyze and clearly explain on fundamental sequential circuits.		The student can analyze and explain fundamental sequential circuits.	The student does not reach the the acceptable level.
Assigned Department Objectives						
Teaching Method						
Outline	General or Specialized : Specialized Field of learning : Information system, Programming, Networks Required, Elective, etc. : Must complete subjects Foundational academic disciplines : Informatics/Computing Technology/Computer System Relationship with Educational Objectives: This class is equicalent to "(3) Acquire deep foundation knowledge of the major subject area". Relationship with JABEE programs : The main goal of learning / education in this class are "A", "A-1", also "A-2" is involved. Course outline : In this class, the students study loigic theory further, using examples of optimization design of combinational circuits and sequential circuits of logic circuits.					
Style	Course method : This class is conducted mainly using the blackboard. To deepen understanding of contents the students work on exercises. Grade evaluation method : Exams (75%) + Exercises (25%). Two regular examinations will be conducted 2 times, equally weighted. If necessary, a supplementary examination will be conducted. However, the updated evaluation will not exceed 60 points.					
Notice	Precautions on the enrollment : Students must take this class (no more than one-thirds of the required number of class hours missed) in order to complete the 4th-grade course. Course advice : Precisely understand meaning and definition of technical terms appeared in the textbook. It is also important to try example questions and exercises in every chapter and deeply understand them. Fundamental subjects : Information Literacy (1st year), Digital Circuits (2nd), Basic Programming (2nd), Digital Engineering (3rd), Applied Digital Circuits (3rd) Related subjects : Information Theory (5th year, Network), System Programming (5th), e-Business (5th), Information System Analysis (5th) Attendance advice : Listening to the lecture carefully is very important and the most effective way to understand. If you are late for the start time, your absence will be counted on every half class hour.					
Course Plan						
			Theme		Goals	
2nd Semester	3rd Quarter	1st	Guidance. Binary code.		Can operate fundamental arithmetic operation by binary code.	

		2nd	Logic operation (1) (login function)	Can explain conception of combinational circuits and logic function.
		3rd	Logic operation (2) (canonical forms)	Can form a disjunctive canonical form and a conjunctive canonical form).
		4th	Design of combinational circuits (1). (simplification using Karnaugh map)	Can simplify combinational circuits using Boolean algebra and Karnaugh map.
		5th	Design of combinational circuits (2). (simplification using QM algorithm)	Can simplify combinational circuits using Quine–McCluskey algorithm.
		6th	Design of combinational circuits (3). (Simplification for multi-output circuits)	Can simplify multiple-output combinational circuits using Quine–McCluskey algorithm.
		7th	Major combinational circuits. (adder, decoder, multiplexer, etc.)	Can explain fundamental combinational circuits.
		8th	Semester mid-term exam.	
	4th Quarter	9th	Return and commentary of exam answers.	
		10th	Flip-flop (1). (characteristics table, excitation table)	Can explain principles of fundamental operations of flip-flops.
		11th	Flip-flop (2). (master-slave FF, edge-triggered FF)	Can explain principles of operations of advanced flip-flops.
		12th	Fundamental sequential circuits. (non-synchronous / synchronous counter)	Can design fundamental sequential circuits.
		13th	Practical sequential circuits (1). (pattern matching, etc.)	Can design applied sequential circuits.
		14th	Practical sequential circuits (2). (traffic signal, vending machine)	Can design practical sequential circuits.
		15th	Semester final exam.	
		16th	Return and commentary of exam answers.	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Exercise	Other	Total
Subtotal	75	0	0	0	25	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	75	0	0	0	25	0	100
Cross Area Proficiency	0	0	0	0	0	0	0