

Tsuyama College		Year	2021		Course Title	Design of Electronic and Information Circuits
Course Information						
Course Code	0119		Course Category	Specialized / Elective		
Class Format	Lecture		Credits	Academic Credit: 2		
Department	Department of Integrated Science and Technology Communication and Informations System Program		Student Grade	5th		
Term	First Semester		Classes per Week	2		
Textbook and/or Teaching Materials	Textbooks : "VHDL niyoru Dejitaru Denshikairo Sekkei" (Morikita Syuppan)					
Instructor	MAEHARA Kenji					
Course Objectives						
Learning purposes : Learn about digital circuit systems through digital circuit design, and learn high-speed, large-scale digital circuit system technology to meet social demands, including microcomputers used in many electronic devices around us.						
Course Objectives : 1. To understand and explain the principles of processing digital data. 2. To explain and design a simple combination logic circuit and sequential circuit. 3. To design the digital circuit systems using the hardware description language, and can simulate it.						
Rubric						
	Excellent	Good	Acceptable	Not acceptable		
Achievement 1	The student can understand a principle to process digital data and can explain various processing techniques.	The student understands a principle to process digital data and can explain the processing technique quite well.	The student understands a principle to process digital data and can explain the processing technique of a simple logic circuit.	The student doesn't understand a principle to process digital data and can't explain the processing technique.		
Achievement 2	The student can competently explain and design a simple combination logic circuit and sequential circuit.	The student can explain and design a simple combination logic circuit and sequential circuit quite well.	The student can explain and design a simple combination logic circuit and sequential circuit using the textbook.	The student cannot explain and design the simple combination logic circuit and sequential circuit.		
Achievement 3	The student can design the digital circuit systems using the hardware description language and simulate it.	The student can design the digital circuit systems using the hardware description language and simulate it quite well.	The student can design the digital circuit systems using the hardware description language and simulate it, looking at explanatory material.	The student cannot design the digital circuit systems using the hardware description language and simulate it.		
Assigned Department Objectives						
Teaching Method						
Outline	General or Specialized : Specialized Field of learning : Information and Control Foundational academic disciplines : Information science, Information engineering/Computer systems Relationship with Educational Objectives : This class is equivalent to "(3) Acquire deep foundation knowledge of the major subject area". Relationship with JABEE programs : The main goal of learning / education in this class is "(A), A-2". Course outline : At first, the student will learn the basics of digital and how to design digital circuits. Next, there will be a focus on various digital control circuits through designing using the latest mainstream design method, the hardware description language. This is more than just laerning of the knowledge, it involves practices of designing digital processing using the integrated circuit design tool.					
Style	Course method : This course is opened in the first semester for 2 credit hours(90 minutes) in one week. The student learns digital processing circuits while experiencing design and simulation practice using the integrated circuit design tool as well as the study of the digital circuit and design method with the textbook. For extra learning, the student will work on design practice, chapter-end problems and practice problem-solving. Grade evaluation method : Regular exams (50%) + Practice and problem (50%). Examinations will be conducted a total of 2 times, and the evaluation ratios will be the same. Students with poor results may be retested. The limit of the score after retest is 60 points.					

Notice	<p>Precautions on the enrollment : Students must take this class (no more than one-third of the required number of class hours may be missed) in order to complete the 5th year course. This is a class that requires study outside of class hours. A total of 45 hours of study is required per credit, including both class time and study outside class time. Follow the instructions of the instructor regarding study outside of class hours.</p> <p>Course advice : This subject contains high level digital circuit designs, but the principal objective is that has the student take in the state-of-the-art design and digital processing methods through hands-on training experience. Review contents regularly after class, and solve the weekly set problem and submit it at the beginning of the next class. This class is recommended for the person interested in information systems.</p> <p>Foundational subjects : Information Literacy (1st year), Digital Engineering (3rd) , Applied Digital Circuits (3rd) Related subjects :</p> <p>Attendance advice : If you are late for the start time, you will be treated as absent after 10 minutes. Prepare for next lesson by reading a textbook beforehand, and work on a class, practical training and class overtime learning positively.</p>
--------	---

Characteristics of Class / Division in Learning

<input type="checkbox"/> Active Learning	<input type="checkbox"/> Aided by ICT	<input type="checkbox"/> Applicable to Remote Class	<input checked="" type="checkbox"/> Instructor Professionally Experienced
--	---------------------------------------	---	---

Elective must complete subjects

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Gives an outline. Analog and digital. [learning out of the school hour] Analog and digital.	Savvy class contents and the overall flow. Understand the digital basics. [learning out of the school hour] Understand the digital basics.
		2nd	Numeric expression. [learning out of the school hour] Operation by the complement number.	Understand the numeric expression. [learning out of the school hour] Can do basic digital operation using a logic operation and binary conversion by solving chapter end problem.
		3rd	Generation of the digital circuit, PLD, automatic design, design tool. [learning out of the school hour] Difference and characteristic, of the design process of the automatic design and custom design, FPGA.	Understand the generation of the digital circuit, constitution and characteristic of FPGA and the flow and characteristic of automatic design and custom design. [learning out of the school hour] Work on assignments and understand it.
		4th	Generation of the digital circuit, PLD, automatic design, design tool. [learning out of the school hour] Difference and characteristic, of the design process of the automatic design and custom design, FPGA.	Understand the generation of the digital circuit, constitution and characteristic of FPGA and the flow and characteristic of automatic design and custom design. [learning out of the school hour] Work on assignments and understand it.
		5th	Constitution the computer, Instruction cycle. [learning out of the school hour] Basic constitution and operation of the CPU.	Can utilize basic knowledge about the hardware of the computer. [learning out of the school hour] Understand basic constitution and operation of the CPU.
		6th	Constitution and Instruction of the simple CPU. [learning out of the school hour] Constitution and Instruction of the simple CPU.	Can utilize basic knowledge about the hardware of the computer. [learning out of the school hour] Understand basic constitution and operation of the CPU.
		7th	VHDL description, Usage of ISE. [learning out of the school hour] VHDL description, Usage of ISE.	Learn the circuit design and procedure of simulation using ISE. [learning out of the school hour] Work on the design of the half adder and become familiar with circuit design and ISE.
		8th	1st semester mid-term exam.	1st semester mid-term exam.
	2nd Quarter	9th	Return and commentary of exam answers, Hierarchy description, Full adder, Multi-bit signal. [learning out of the school hour] Design and simulation of full adder by a hierarchy design.	Return and commentary of exam answers, Hierarchy description, Full adder, Multi-bit signal. [learning out of the school hour] Design and simulation of full adder by a hierarchy design.
		10th	Review of the operation by the complement number and design of the addition and subtraction circuit. [learning out of the school hour] Design of the addition and subtraction circuit.	Review of the operation by the complement number and design of the addition and subtraction circuit. [learning out of the school hour] Design of the addition and subtraction circuit.
		11th	Design of the addition and subtraction circuit. [learning out of the school hour] Design of the addition and subtraction circuit.	Review of the operation by the complement number and design of the addition and subtraction circuit. [learning out of the school hour] Design of the addition and subtraction circuit.
		12th	Design of the decoder using process sentence, if sentence and case sentence. [learning out of the school hour] Design of the decoder.	Understand process sentence, if sentence and case sentence, and can design the conditional processing. [learning out of the school hour] Can design based on a truth table.
		13th	State transition, description of the sequential circuit, BCD counter. [learning out of the school hour] Design of the BCD counter.	Understand design based on state transition of the sequential circuit. [learning out of the school hour] Can design based on state transition.

		14th	BCD counter. [learning out of the school hour] Design of the sequencer.	Understand design based on state transition of the sequential circuit. [learning out of the school hour] Can design based on state transition.
		15th	(1nd semester final exam)	
		16th	Return and commentary of exam answers.	

Evaluation Method and Weight (%)

	Examination	Practice and problem	Total
Subtotal	50	50	100
Basic Proficiency	0	0	0
Specialized Proficiency	50	50	100
Cross Area Proficiency	0	0	0