Akashi College	Year	2022	Course Title	Experiments of Electrical Engineering I

Course Information

Course Code	4426	Course Category	Specialized / Compulsory
Class Format	Experiment	Credits	School Credit: 4
Department	Electrical and Computer Engineering Electrical Engineering Course	Student Grade	4th
Term	Year-round	Classes per Week	4
Textbook and/or Teaching Materials			
Instructor	KAMI Yasushi,HIROTA Atsushi,TERASAWA Shinichi,HIRANO Masatsugu,NOMURA Hayato		

Course Objectives

1. Can actively participate in experiments by group and carry out experiments in cooperation with the group members.
2. Can conduct experiments in a planned manner based on the basic ability, and analyze the results of an experiment.
3. Can summarize the results of a experiments in a report with correct writing expressions.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can actively participate in experiments by group and carry out experiments in cooperation with the group members.	Can carry out experiments in cooperation with the group members.	Cannot carry out experiments.
Achievement 2	Can conduct experiments in a planned manner and analyze the results of an experiment.	Can analyze the results of the experiments.	Cannot analyze the results of an experiment.
Achievement 3	Can summarize the results of an experiment in a report with correct writing expressions and submit in time.	Can summarize the results of an experiment in a report with correct writing expressions.	Cannot summarize the results of an experiment in a report.

Assigned Department Objectives

Teaching Method

Outline	The goal of this course is to acquire the ability to solve new problems practically while understanding and confirming the knowledge and techniques of electrical information acquired so far through experimental themes. Furthermore, the course requires students to submit reports on each theme, in order to help them learn necessary writing expressions for scientific reports. The experiments will be conducted by groups, to help students develop autonomy, coordination, planning, and leadership. Hirano will supervise the measurement circuits; Kami, controls; Nomura and Terazawa, circuits and microcomputers; and Hirota, power circuits. The experiments in weeks 2 to 5 of the first semester and week 4 of the second semester will be supervised by persons engaged in the development of electronic devices and other activities in a company.
Style	Students will conduct experiments on themes closely related to the electrical and electronic fields, such as measurement, circuits, control, and microcomputers, in groups of four to five, and submit a report on them. They will actively conduct experiments give, based on their own necessary preparation and pre-study, and guidance provided on the spot by the instructor of the experiment.
Notice	If all reports have not been received by the due date, students will not receive a passing grade. Students must clean the lab and put away the equipment. Precautions regarding the experiments will be given during the first week of the first and second semesters. Students have to participate in all experiments. Students will not be graded unless they have participated in all experiments.

Characteristics of Class / Division in Learning

☐ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☑ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Experiment guidance	Understand the various precautions related to engineering experiments and the outline of the theme of each experiment.
		2nd	FPGA1 (Circuit design)	Understand logic circuit inputs using IDE (Integrated Development Environment).
		3rd	FPGA2 (emulator debug)	Understand the simulation and debugging of logical circuits using the IDE (Integrated Development Environment).
		4th	FPGA3 (implementation and operation)	Understand circuit implementation in FPGA(Field Programmable Logic Array).
		5th	FPGA4 (evaluation)	Understand the operation, debugging, and evaluation of implementation circuitry with FPGAs.
		6th	Report organization	Can examine and compile the results of the experiment into a report.
		7th	Computer measurement I.	Can perform waveform measurement and processing using a computer and measurement interface.
		8th	Computer Measurement II.	Can fabricate a stethoscope using a computer and an interface microphone for measurement.
	2nd Quarter	9th	Report organization	Can examine and compile the results of the experiment into a report.
		10th	Electric motor speed control	Understand how to control the speed of an electric motor.

		11th	Direct current voltage stabilization circuit	Can investigate the characteristics of a voltage stable circuit in a rectification circuit.
		12th	Report organization	Can examine and compile the results of the experiment into a report.
		13th	Oscillation circuits	Can investigate various characteristics for various types of typical oscillation circuits.
		14th	Low frequency amplifier characteristics	Can examine the circuit operation and characteristics of the push-pull amplifier.
		15th	Report organization	Can examine and compile the results of the experiment into a report.
		16th	No final exam	
2nd Semester	3rd Quarter	1st	Experiment guidance	Understand the various precautions related to engineering experiments and the outline of the theme of each experiment.
		2nd	Microcomputer control I	Can build control systems using embedded microcomputers.
		3rd	Microcomputer control II	Can build control systems using embedded microcomputers.
		4th	Microcomputer control III	Can build control systems using embedded microcomputers.
		5th	Report organization	Can examine and compile the results of the experiment into a report.
		6th	Transistor amplifier	Can design a transistor amplifier
		7th	Report organization	Can examine and compile the results of the experiment into a report.
		8th	Equivalent circuit of the transformer	Can determine the equivalent circuit and constant of the transformer.
	4th Quarter	9th	Report organization	Can examine and compile the results of the experiment into a report.
		10th	Sequence control I	Understand the basics of relay sequence control.
		11th	Report organization	Can examine and compile the results of the experiment into a report.
		12th	Sequence control II	Can construct a relay sequence control method of a control circuit that meets the specified specification.
		13th	Report organization	Can examine and compile the results of the experiment into a report.
		14th	Variable speed control of the inductive electric motor by means of a PWM inverter	Understand the principles of PWM inverters and speed control of inductive electric motors.
		15th	Summarizing and organizing	Can summarize and organize the experiment.
		16th	No final exam	

Evaluation Method and Weight (%)

	Report	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	80	0	0	20	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	80	0	0	20	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0