Anan College	Year	2024		Course Title	Control Engineering 1

Course Information

Course Code	1314G01		Course Category	Specialized / Compulsory
Class Format	Lecture		Credits	Academic Credit: 2
Department	Course of Electrical Engineering		Student Grade	4th
Term	Second Semester		Classes per Week	2
Textbook and/or Teaching Materials	Lectures and exercises on automatic control (Nisshin Publishing) /Understanding automatic control exercises (Nisshin Publishing)			
Instructor	Nakamura Yuichi			

Course Objectives

1. The input / output relationship of the system can be expressed using a transfer function.
2. The input / output relationship of the system can be expressed using a block diagram.
3. Excessive response of the system can be explained using step response.
4. The frequency characteristics of the system can be explained using a Bode diagram.

Rubric

	Ideal Level	Standard Level	Minimum achievement level (possible)
Achievement 1	Able to obtain the transfer function by expressing it as a differential equation of the input/ output characteristics of various systems.	Able to express by an equation as well as by a transfer function the input / output the characteristics of a basic system such as an electric circuit.	Able to express by an expression or transfer function a simple system input / output relationship.
Achievement 2	Able to express various systems using block diagrams and explain their meanings.	Able to explain the basic system using a block diagram.	Able to represent a simple system by a block diagram.
Achievement 3	Able to explain the meaning of step responses by deriving the transient characteristics of various systems.	Able to explain the transient characteristics of the basic system using step responses.	Able to explain the transient characteristics of a simple system.
Achievement 4	Able to explain the frequency characteristics of various systems by drawing a Bode diagram.	Able to explain the frequency characteristics of a basic systemusing a Bode diagram.	Able to explain the frequency characteristics of a simple system using a Bode diagram.

Assigned Department Objectives

学習・教育到達度目標 D-1

Teaching Method

Outline	The purpose of Control Engineering 1 is to understand the basic classical control theory centered on a input 1 and output 1 system. We will learn how to express the system behavior using the transfer function expression and a block diagram using mathematical methods, and learn how to derive the transient response characteristics of the system. You will also learn how to express the frequency characteristics of a system using Bode plots and vector loci.
Style	The lessons will be centered around lectures in the classroom. Assuming that you have basic knowledge of mathematics, such as differential equations, you will explain the expression of control systems and their analysis methods during exercises. I want you to not only memorize the solution to the problem, but also to understand and apply the important points that are the basis of control engineering, such as the concept and expression method of the control system.
Notice	A quiz may be given at the end of the lecture to aid understanding. In addition, it will be necessary to submit a task report such as end-of-chapter problems to confirm understanding.

Characteristics of Class / Division in Learning

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

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Basic concept of automatic control	Explain the concept of automatic feedback control.
		2nd	Laplace transform and differential equations	Laplace transform and inverse transform are possible. The differential equation can be solved using the Laplace transform.
		3rd	Laplace transform and differential equations	Laplace transform and inverse transform are possible. The differential equation can be solved using the Laplace transform.
		4th	Laplace transform and differential equations	Laplace transform and inverse transform are possible. The differential equation can be solved using the Laplace transform.
		5th	Laplace transform and differential equations	Laplace transform and inverse transform are possible. The differential equation can be solved using the Laplace transform.
		6th	Transfer function	Understand the definition of transfer function. The transfer functions of various systems can be obtained.

		7th	Transfer function	Understand the definition of transfer function. The transfer functions of various systems can be obtained.
		8th	Mid-term exam	
	4th Quarter	9th	Block diagram	Understand the basic structure of the block diagram. Explain various systems using block diagrams.
		10th	Equivalent transformation of block diagram	Understand the equivalent transformation of block diagrams.
		11th	Frequency response	Understand the frequency response of the system.
		12th	Bode plot	Understand the gain and phase change of the basic system.
		13th	Bode plot of primary lag elements	Understand the gain and phase change of the first-order lag element, and be able to draw a Bode diagram.
		14th	Characteristics of Bode plot of series coupling system	Understand series coupling, gain, and phase change, and draw a Bode diagram.
		15th	Secondary standard Bode plot	Draw a secondary standard Bode plot.
		16th	Return of final exam	

Evaluation Method and Weight (%)

	Examination	Issues	Total
Subtotal	80	20	100
Basic Proficiency	10	0	10
Specialized Proficiency	70	20	90
Cross Area Proficiency	0	0	0