

Akashi College		Year	2022		Course Title	Fundamentals of Communication Systems
Course Information						
Course Code	4525			Course Category	Specialized / Elective	
Class Format	Lecture			Credits	Academic Credit: 2	
Department	Electrical and Computer Engineering Computer Engineering Course			Student Grade	5th	
Term	First Semester			Classes per Week	2	
Textbook and/or Teaching Materials						
Instructor	TAKITA Makoto					
Course Objectives						
The goal is to achieve the following competencies: 1) Understand the mathematical preparation and basic signal processing theory necessary to understand communication systems and can analyze them. 2) Can design a simple signal processing system in a communication system. 3) Gain self-directed and continuous learning skills through the preparation of assignment reports.						
Rubric						
	Ideal Level		Standard Level		Unacceptable Level	
Achievement 1	Correctly understand the mathematical preparation and basic signal processing theory necessary to understand communication systems and can analyze them.		Understand the mathematical preparation and basic signal processing theory necessary to understand communication systems and can analyze them.		Do not understand the mathematical preparation and basic signal processing theory necessary to understand communication systems.	
Achievement 2	Can correctly design a simple signal processing system in a communication system.		Can design a simple signal processing system in a communication system.		Cannot design a simple signal processing system in a communication system.	
Achievement 3	Can correctly write up the required number of assignment reports.		Can write up the required number of assignment reports.		Cannot write up the required number of assignment reports.	
Assigned Department Objectives						
Teaching Method						
Outline	In this course, we will explain the basics necessary to understand communication systems, and simple analogue communication systems. This course is paired with Communication Systems, which will be held in the second semester. Therefore, taking both this course and Communication Systems is recommended.					
Style	This course will focus on the basics of communication systems and the analogue modulation and demodulation systems, and the material will be explained using a textbook. Self-study is important, so be sure to work through the pre-study review. Liaison: Masato Omukai					
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes will not be eligible for a passing grade.					
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	Introduction The basic structure of the communication system and the positioning of this class will be carried out. Discuss on essential mathematical fundamentals for learning communication systems such as Fourier transforms.	Can explain about communication systems. Can explain the role of modulation.		
		2nd	Digital and analogue signal processing Discuss on the characteristics of digital signal processing versus analogue signal processing.	Can explain about digital and analogue processing briefly.		
		3rd	Signal Wave Analysis Discuss on the representation of signal waves using Fourier series and Fourier transforms.	Can express periodic and non-periodic signals using Fourier series and Fourier transforms.		
		4th	Continuous and discrete time systems Discuss on the relationship between a continuous-time system such as an electrical circuit and a discrete-time system that deals with digital signals.	Can explain continuous and discrete time systems.		
		5th	Linear time invariant system Discuss on the basic properties of systems such as linearity and time invariants and convolution.	Can explain the linearity, time invariant and convolution operations of discrete time systems.		
		6th	Frequency response of the system Discuss on the frequency characteristics of the system and its effectiveness. Discuss on the method of frequency response using the transfer function.	Can explain and derive the frequency characteristics of discrete time systems.		
		7th	Midterm exercise Review the content learned so far through exercises to gain a better understanding.	Can accomplish the challenges assigned.		

		8th	Midterm exam	Score 60 or more marks.
	2nd Quarter	9th	Amplitude modulation systems (1) Explain the role and significance of modulation. Explain the amplitude modulation system.	Can explain the role of each modulation system. Can explain amplitude modulation system briefly.
		10th	Amplitude modulation systems (2) Explain amplitude modulation and its demodulation.	Can explain the modulation and demodulation methods of amplitude modulation system.
		11th	Angle-modulation systems (1) Explain phase modulation and frequency modulation briefly, and explain the bandwidth used for frequency modulation.	Can explain the nature of phase modulation and frequency modulation.
		12th	Angle-modulation systems (2) Explain frequency modulation and its demodulation.	Can explain the modulation and demodulation methods of frequency modulation system.
		13th	Pulse modulation and pulse-code modulation Explain the sampling theorem and the pulse-code modulation using the periodic pulse signal as the carrier wave.	Can explain the sampling theorem and pulse modulation.
		14th	Fast Fourier transforms Explain fast Fourier transforms that result in discrete frequency spectra in less computations.	Can explain the fast Fourier transform and their relationship with discrete Fourier transforms.
		15th	Final exercise Review the content learned so far through exercises to gain a better understanding.	Can complete the assignments given.
		16th	Final exam	Score 60 or more marks.

Evaluation Method and Weight (%)

	Examination	Report	Total
Subtotal	70	30	100
Basic Proficiency	0	0	0
Specialized Proficiency	70	30	100
Cross Area Proficiency	0	0	0