

Tsuyama College		Year	2021	Course Title	Digital Signal Processing
Course Information					
Course Code	0146		Course Category	Specialized / Elective	
Class Format	Lecture		Credits	Academic Credit: 2	
Department	Department of Integrated Science and Technology Electrical and Electronic Systems Program		Student Grade	5th	
Term	Second Semester		Classes per Week	2	
Textbook and/or Teaching Materials	Textbooks:Masafumi Hagiwara,"Digital Signal processing"(Morikita Publishing Co.,LTD)				
Instructor	YABUKI Noboru				
Course Objectives					
<p>Learning purposes : Learn the basic theory of digital signal processing.In addition, learn basic techniques related to digital image processing, which are often used for digital signal processing.</p> <p>Course Objectives : 1. To understand the theory of digital signal processing. 2. To understand the basic technology related to digital image processing.</p>					
Rubric					
	Excellent	Good	Acceptable	Not acceptable	
Achievement 1	The student can use the theory of digital signal processing.	The student can fully explain the basic theory of digital signal processing.	The student understands the basic theory of digital signal processing. (test)	The student can't explain the basic theory of digital signal processing.	
Achievement 2	The student can apply technology related to digital image processing.	The student can fully explain the basic technology related to digital image processing.	The student Understands the basic technology related to digital image processing (test).	The student can't explain the basic technology related to digital image processing.	
Assigned Department Objectives					
Teaching Method					
Outline	<p>General or Specialized : Specialized Field of learning : Information system programming network Foundational academic disciplines : Electrical and electronic engineering and related fields / Communication and network engineering-related Relationship with Educational Objectives : This class is equivalent to "(3) Acquire deep foundation knowledge of the major subject area"</p> <p>Relationship with JABEE programs : The main goal of learning / education in this class are "(A)... A-2..."</p> <p>Course outline : Comparing analog processing and digital processing has advantages and disadvantages. In recent years, the number of devices and application examples that digitally process analog signals has increased because they are suitable for compression, recording, transmission, and so on. As the basis for these applications, you will learn the basic theory of digital signal processing and the basic technology of images.</p>				
Style	<p>Course method : Classes will be conducted using textbooks and supplementary materials, centered on board writing. In addition, related theorems will be supplementarily explained as necessary. Also, impose exercises and quiz reports to deepen understanding. (This class is offered semi-annually)</p> <p>Grade evaluation method : Examination(60%)+Exercises and report assignments (40%). Regular examinations will be conducted 2 times, with each equally weighted.(60%) <ul style="list-style-type: none"> Each test does not allow notebooks to be brought in. For those who have less than 60 points in each regular test, supplementary lessons will be given, and if the understanding can be confirmed by the retest, the points may be changed. However, the evaluation after the change shall not exceed 60 points. This subject is a compulsory subject to study outside of class hours. Evaluate learning outcomes (exercises, report assignments) outside of class hours (40%).</p>				
Notice	<p>Precautions on the enrollment : Students must take this class (no more than one-third of the required number of class hours 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 : As a preparatory study, students should review the contents of Applied Mathematics II, which is a basic subject. In addition, basic technologies for audio and images will be explained, but students will need to create their own programs in order to acquire specific processing skills. Foundational subjects : Fundamenntals of Integrated Science and Technology(1st year), Digital Engineering (3th) Related subjects : Digital Signal Processing(EC-2nd), Image Processing(EC-2nd), etc.</p> <p>Attendance advice : In order to understand digital signal processing, it is better to create a program by yourself and check its operation. It is also good to create an image processing program. Check for late arrivals in quarters of class time.Late arrivals of 25 minutes or more are treated as one absence.</p>				
Characteristics of Class / Division in Learning					
<input type="checkbox"/> Active Learning		<input type="checkbox"/> Aided by ICT		<input checked="" type="checkbox"/> Applicable to Remote Class	
				<input type="checkbox"/> Instructor Professionally Experienced	
E l e c t i v e m u s t c o m p l e t e s u b j e c t s					

Course Plan					
2nd Semester r	3rd Quarter		Theme	Goals	
		1st	Not offered this year Guidance,What is signal processing?	To understand overview of the relationship between signal processing and mathematics	
		2nd	Fourier series (trigonometric function)	Understand the principles and applications of Fourier series expansion using trigonometric functions.	
		3rd	Fourier series (trigonometric function)	Understand the relationship between trigonometric and complex functions for Fourier series expansion.	
		4th	Fourier transform	Understanding the Fourier Transform by extending the periodic waveform to the aperiodic waveform.	
		5th	Characteristics and properties of Fourier transform	Learn the basic knowledge for performing analysis with Fourier transform.	
		6th	Laplace transform	Learn about the relationship between the Fourier transform and the Laplace transform.	
		7th	Features and properties of Laplace transform	Learn the basic knowledge to perform analysis with Laplace transform.	
	8th	2nd semester mid-term exam	Check what you have learned so far.		
	4th Quarter	9th	Return and commentary of exam answers	Check and supplement the areas where learning is insufficient. Learn the relationship between the z-transform and the Laplace transform ".	
		10th	Features and properties of z-transform	Learn the basic knowledge to perform analysis with z-transform.	
		11th	Discrete Fourier transform, features and properties	Learn the basic knowledge for performing analysis with DFT.	
		12th	Discrete time system	Learn the basic knowledge for performing analysis with DFT.	
		13th	Digital image processing (1)	Learn the expression of image processing as an application of digital signal processing (pixels, gradations, grayscale images, color images, binary images, etc.).	
		14th	Digital image processing (2)	Learn various processing methods for image processing (spatial filtering, frequency filtering, etc.).	
		15th	(2nd semester final exam)	Check what you are learning.	
16th		Return and commentary of exam answers	"Check where learning is inadequate and supplement ".		
Evaluation Method and Weight (%)					
		Examination	Assignments / Mini test	Total	
Subtotal		60	40	100	
Basic Proficiency		0	0	0	
Specialized Proficiency		60	40	100	
Cross Area Proficiency		0	0	0	