

Akashi College		Year	2022	Course Title	Image Engineering
Course Information					
Course Code	4529		Course Category	Specialized / Elective	
Class Format	Lecture		Credits	Academic Credit: 2	
Department	Electrical and Computer Engineering Computer Engineering Course		Student Grade	5th	
Term	Second Semester		Classes per Week	2	
Textbook and/or Teaching Materials					
Instructor	NAKAI Yuichi				
Course Objectives					
(1) Understand the scope and examples of applications of image encoding technology. (2) Understand the nature of image information and understand why image encoding technology is needed. (3) Understand the outline and characteristics of various types of image encoding. (4) Understand the practical use of basic image processing and image encoding technologies.					
Rubric					
	Ideal Level		Standard Level		Unacceptable Level
Achievement 1	Can fully explain the scope and examples of applications of image encoding technologies.		Can explain the scope and examples of applications of image encoding technologies.		Cannot explain the scope and examples of applications of image encoding technologies.
Achievement 2	Understand the nature of image information and can accurately explain why image encoding technologies are needed.		Understand the nature of image information and can explain why image encoding technologies are needed.		Cannot explain the nature of image information and why image encoding technologies are needed.
Achievement 3	Can specifically explain the outline and characteristics of various types of image encoding.		Can explain the outline and characteristics of various types of image encoding.		Cannot explain the outline and characteristics of various types of image encoding.
	Can accurately explain the practical use of basic image processing and image encoding technologies		Can explain the practical use of basic image processing and image encoding technologies.		Cannot explain the practical use of basic image processing and image encoding technologies.
Assigned Department Objectives					
Teaching Method					
Outline	When handling images as digital information, technologies for reducing their data volume (image encoding or image compression) are a must. In this lecture, we will be explaining the nature of the image information briefly, and then giving lectures on various image encoding technologies. In addition, we will ensure the knowledge learned in the lecture by doing exercise assignments using matrix computing software, etc.				
Style	Slides will be mainly used to explain the content in class. Also, since this is a learning-credit subject, there will be three to four assignments over the course of half a semester. Assignments will be about creating programs that perform specified processes, so we will explain the application students can use for the assignments in advance.				
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. As this is a learning-credit subject, there will be three to four assignments over the course of half a semester. All assignments must be submitted to earn the credits. Since the assignments involve programming, it's desirable to have experiences in programming (in any language). Students who miss 1/3 or more of classes will not be eligible for a passing grade.				
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
Course Plan					
			Theme	Goals	
2nd Semester	3rd Quarter	1st	The nature of image information	Digitized image information is generally said to have stronger image correlation. Can explain what image correlation is and what happens when image correlation is stronger.	
		2nd	Image manipulation by Python (1)	Understand how to use Python to accomplish the assignments.	
		3rd	Image manipulation by Python (2)	Can use Python to do the processing given as an assignment.	
		4th	Entropy encoding (1)	Can explain the concept of entropy encoding, which is often used together with various types of encoding.	
		5th	Entropy encoding (2)	Can briefly explain Huffman and arithmetic encodings as typical techniques for entropy encoding.	
		6th	Predictive encoding (1)	Can explain the principle of predictive encoding, the simplest of image encoding.	
		7th	Predictive encoding (2)	Can explain the characteristics of predictive encoding, and can explain how to compensate for the shortcomings.	
		8th	Midterm exam		

	4th Quarter	9th	Transform encoding (1)	Can explain the concept of transform encoding, and can explain the two-dimensional discrete cosine transform (DCT), which is the mainstream of image encoding today.
		10th	Transform encoding (2)	Can explain JPEG, which is an image coding method based on DCT.
		11th	Wavelet transformation	Can briefly explain the wavelet transform, which is gaining attention as the next-generation method of transform encoding.
		12th	Vector quantization (1)	Can explain the overview of vector quantization, an extension of scalar quantization.
		13th	Vector quantization (2)	Can explain the performance, design techniques and challenges of vector quantization.
		14th	Other image encoding	Can explain outline of other image encoding methods such as block truncation encoding, progressive encoding, etc.
		15th	Video encoding	Can explain various video encoding methods briefly.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Exercise	Other	Total
Subtotal	70	0	0	0	30	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	70	0	0	0	30	0	100
Cross Area Proficiency	0	0	0	0	0	0	0