

Akashi College		Year	2024		Course Title	Mathematical Informatics
Course Information						
Course Code	6036			Course Category	Specialized / Elective	
Class Format	Lecture			Credits	Academic Credit: 2	
Department	Mechanical and Electronic System Engineering			Student Grade	Adv. 2nd	
Term	First Semester			Classes per Week	2	
Textbook and/or Teaching Materials	Materials written in English are distributed.					
Instructor	HAMADA Yukihiro					
Course Objectives						
[1] Can read a technical book written in English. [2] Can explain the fundamentals of graphs. [3] Can explain the fundamentals of algorithms. [4] Can explain the fundamentals of trees. [5] Can explain graph traversal algorithms.						
Rubric						
	Ideal Level		Standard Level		Unacceptable Level	
Achievement 1	Can read a technical book written in English with little use of a dictionary.		Can read a technical book written in English using a dictionary.		Cannot read a technical book written in English.	
Achievement 2	Can explain the fundamentals of graphs sufficiently.		Can explain the fundamentals of graphs.		Cannot explain the fundamentals of graphs.	
Achievement 3	Can explain the fundamentals of algorithms sufficiently.		Can explain the fundamentals of algorithms.		Cannot explain the fundamentals of algorithms.	
Achievement 4	Can explain the fundamentals of trees sufficiently.		Can explain the fundamentals of trees.		Cannot explain the fundamentals of trees.	
Achievement 5	Can explain graph traversal algorithms sufficiently.		Can explain graph traversal algorithms.		Cannot explain graph traversal algorithms.	
Assigned Department Objectives						
Teaching Method						
Outline	Learn the fundamentals of graphs and graph algorithms using a technical book written in English.					
Style	Read a technical book written in English in turns. Each page is translated in Japanese alternatively by teacher, student 1, teacher, student 2, ... . During a student translates, the teacher asks the student if necessary.					
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. To achieve these goals, students are required to self-study outside of classes: (1) Read several pages of the technical book before each class. (2) Write two assignment reports. Students who miss 1/3 or more of classes will not be eligible for evaluation.					
Characteristics of Class / Division in Learning						
<input checked="" 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		
1st Semester	1st Quarter	1st	What is a graph	Can explain the definition of a graph. Also, can explain what a graph models.		
		2nd	The degree of a vertex, isomorphic graphs	Can explain things related to the degree of a vertex and isomorphic graphs.		
		3rd	Subgraphs and degree sequences	Can explain things related to subgraphs and degree sequences.		
		4th	Connected graphs, cut vertices and bridges	Can explain things related to connected graphs, cut vertices and bridges.		
		5th	Special graphs	Can explain complete graphs, bipartite graphs and hypercubes.		
		6th	Digraphs	Can explain things related to digraphs.		
		7th	Algorithmic complexity	Can explain algorithmic complexity and order notation.		
		8th	Search algorithms and sorting algorithms	Can explain the binary search algorithm and bubblesort algorithm.		
	2nd Quarter	9th	Introducing NP-completeness	Can explain NP-completeness.		
		10th	Greedy algorithms and representing graphs in a computer	Can explain greedy algorithms. Also, can explain the adjacency matrix of a graph, the adjacency list of a graph, stack and queue.		
		11th	Properties of trees	Can explain the fundamental properties of trees.		
		12th	Rooted trees	Can explain things related to rooted trees.		
		13th	Depth-first search	Can explain the depth-first search algorithm.		
		14th	Finding Blocks	Can explain an algorithm that finds the blocks of a graph.		
		15th	Breadth-first search	Can explain the Breadth-first search algorithm.		

		16th	No final exam				
Evaluation Method and Weight (%)							
	Explanation when reading in turns	Report	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	60	40	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	60	40	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0