

Akashi College		Year	2022		Course Title	Artificial Intelligence	
Course Information							
Course Code		4523		Course Category		Specialized / Compulsory	
Class Format		Lecture		Credits		School Credit: 1	
Department		Electrical and Computer Engineering Computer Engineering Course		Student Grade		5th	
Term		Second Semester		Classes per Week		2	
Textbook and/or Teaching Materials							
Instructor		MIURA Kinya					
Course Objectives							
(1) Understand the methods of search and apply them to various problems. (2) Understand the various knowledge expressions and the reasoning methods that use them. (3) Understand neural networks and machine learning on them.							
Rubric							
		Ideal Level		Standard Level		Unacceptable Level	
Achievement 1		Fully understand and apply search techniques to a variety of problems.		Generally understand search techniques and can apply them to a number of problems.		Do not understand the search technique and cannot apply it to problems.	
Achievement 2		Fully understand and can explain the various knowledge expressions and the inference methods that use them.		Generally understand and can explain the various knowledge expressions and the reasoning methods that use them.		Do not fully understand and cannot explain the various knowledge expressions and reasoning methods that use them.	
Achievement 3		Fully understand and can explain neural networks and machine learning on them.		Generally understanding and can explain neural networks and machine learning on them.		Do not understand enough about neural networks and machine learning on them, and cannot explain them.	
Assigned Department Objectives							
Teaching Method							
Outline		Describe the basic concepts and techniques of artificial intelligence. In particular, the focus will be on various search techniques and their use to solve problems, knowledge expressions and their use, neural networks and machine learning on them.					
Style		The lecture is mainly based on the content of textbook, but should be supplemented with handouts if required. Also, tasks will be assigned as appropriate. The contact person is Yukihiro Hamada.					
Notice		It is desirable to have a thorough understanding of the content of year 4 classes Discrete Mathematics and Data Structure and Algorithms. Also, it is desirable for students to have acquired any programming language, since it is necessary to have an algorithmic understanding of various methods. 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		
2nd Semester r	3rd Quarter	1st	Artificial intelligence overview		Can explain outline of artificial intelligence research by viewing the history of artificial intelligence research from several perspectives.		
		2nd	Problem solving and search		Can explain problem solving as state space search. Understand the steps of vertical and horizontal searching and apply them to problem solving.		
		3rd	Limited branch search		Understand the cost-aware search and can find the best solution using the limited branch search.		
		4th	Heuristic search and general least cost path search		Understand and conduct searches using estimated costs to the goal (heuristic search, and general least cost path search).		
		5th	Search for And/Or graphs		Understand that problem-solving by problem-breaking methods and game-state-space exploration by two-person becomes a search for And/Or graphs and can apply it to problem-solving.		
		6th	Knowledge representation using predicate logic		Understand the syntax of predicate logic and use logical expressions to express propositional knowledge.		
		7th	The semantics of predicate logic		Understand the semantics of predicate logic and can explain concepts such as satisfiability problem, validity, and logical consequences.		
		8th	Proof system based on the fusion principle		Understand the proof system based on the principle of fusion and the secular form, which is one of the standard forms of predicate logic, and can carry out deductive and proving using it.		
	4th Quarter	9th	Midterm exam It is given during class.				

		10th	Other Knowledge Expressions	Understand and can explain the basic operation of a production system. Understand and can explain simple reasoning using a semantic network.
		11th	Perceptron	Understand the basic operation of neurocells and can explain the operation and learning of the perceptron.
		12th	Backpropagation	Conceptually understand and can explain the learning by backwards propagation of errors in a feed-forward network.
		13th	Auto encoder	Understand and can explain how auto-encoders (self-encoding units) work and the pre-learning of feed-forward networks using auto-encoders.
		14th	Recurrent Neural Network	Conceptually understand and can explain the behavior of the Recurrent Neural Network and its special cases of the Hopfield Network, and the Boltzmann machine .
		15th	Deep learning	Understand outline and can explain some examples of deep learning as a combination of different network configurations and learning techniques.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Task	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	80	20	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	80	20	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0