

Akashi College		Year	2021		Course Title	Mathematical Informatics
Course Information						
Course Code	0041		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						
Instructor	TSUCHIDA Shuhei					
Course Objectives						
[1] Learn and can explain the basic knowledge of statistical analysis. [2] Understand and can configure the nearest neighbor rules. [3] Understand and can configure the naive Bayes. [4] Understand and can configure decision trees. [5] Understand and can configure regression methods. . [6] Understand and can configure other algorithms such as SVM.						
Rubric						
	Ideal Level		Standard Level		Unacceptable Level	
Achievement 1	Learn and can fully explain the basic knowledge of statistical analysis.		Learn and can explain the basic knowledge of statistical analysis.		Do not learn and cannot explain the basic knowledge of statistical analysis.	
Achievement 2	Understand and can fully configure the nearest neighbor rule.		Understand and can configure the nearest neighbor rule.		Do not understand and cannot configure the nearest neighbor rule.	
Achievement 3	Understand and can fully configure the naive Bayes.		Understand and can configure the naive Bayes.		Do not understand and cannot configure the naive Bayes.	
	Understand and can fully configure decision trees.		Understand and can configure decision trees.		Do not understand and cannot configure decision trees.	
	Understand and can fully configure regression methods.		Understand and can configure regression methods.		Do not understand and cannot configure regression methods.	
	Understand and can fully configure other algorithms such as SVM.		Understand and can configure other algorithms such as SVM.		Do not understand and cannot configure other algorithms such as SVM.	
Assigned Department Objectives						
学習・教育目標 (D) 学習・教育目標 (F) 学習・教育目標 (H)						
Teaching Method						
Outline	Mathematical informatics is a study that solves various phenomena in the world, especially those related to information engineering, by regarding them as mathematical models. Students will learn about the application of statistical analysis called machine learning and data mining with the goal of configuring algorithms to find laws and patterns in data. After learning the basics of statistical analysis, they will take practical algorithms and learn their overviews and how to apply them using R language.					
Style	Classes will use handouts to provide presentation-style explanations and exercises that use computers. Since the exercises will be the assignment subjects that will be covered in the final report for evaluation, it is important for students to solve the exercises conducted during class for a better understanding. English introduction plans: Technical terms					
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) Pre-study and review lecture content. (2) Work on the six assignments given in class.  Evaluation method: Six assignment reports (100%) Evaluation criteria: The following should be learned to achieve the Course Objectives and Aims: [1] Can implement basic processing of statistical analysis in R language. [2] Can implement programs using the nearest neighbor rule in R language. [3] Can implement programs that apply the naive Bayes in R language. [4] Can implement a program that uses decision trees in R language. [5] Can implement programs that apply the regression method in R language. [6] Can implement other programs that apply algorithms such as SVM in R 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 type="checkbox"/> Applicable to Remote Class		<input type="checkbox"/> Instructor Professionally Experienced
Course Plan						
			Theme	Goals		
1st Semester	1st Quarter	1st	Introduction to machine learning	Can explain the evolution of machine learning and the introduction of future learning.		
		2nd	Statistical analysis review 1	Can explain what has been learned about the basic statistics used in statistical analysis, such as mean, dispersion, and deviation.		
		3rd	Statistical analysis review 2	Can handle basic statistics for statistical analysis such as mean, dispersion, and deviation in R language.		

		4th	Nearest neighbor algorithms 1	Can explain what has been explained about nearest neighbor algorithms.
		5th	Nearest neighbor algorithms 2	Can verify a nearest neighbor algorithm in R language.
		6th	Naive Bayes algorithm 1	Can explain what has been explained about the naive Bayes algorithm.
		7th	Naive Bayes algorithm 2	Can verify a naive Bayes algorithm in R language.
		8th	Decision tree algorithms 1	Can explain what has been explained about decision tree algorithms.
	2nd Quarter	9th	Decision tree algorithms 2	Can verify a decision tree algorithms in R language.
		10th	Regression methods 1	Can explain what has been explained about regression methods.
		11th	Regression methods 2	Can verify a regression algorithm in R language.
		12th	Pattern recognition algorithm SVM	Can explain what has been explained about the pattern recognition algorithm SVM.
		13th	Correlation rules	Can explain what has been explained about correlation rules.
		14th	k-means clustering	Can explain what has been explained about k-means clustering.
		15th	Methods for evaluating a model's performance	Can explain what has been explained about methods for evaluating a model's performance.
		16th	No final exam	

Evaluation Method and Weight (%)							
	Report	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	100	0	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0