Akashi College	Year	2023		Course Title	Random Signal Analysis

Course Information

Course Code	5018		Course Category	Specialized / Elective
Class Format	Lecture		Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering		Student Grade	Adv. 1st
Term	Second Semester		Classes per Week	2
Textbook and/or Teaching Materials				
Instructor	INOUE Kazunari			

Course Objectives

(1) Can explain basic issues and calculate probability using basic rules in relation to probability and probability theory
(2) Can calculate queues using parameters such as average arrival and average service in relation to queuing theory.
(3) Can calculate the failure rate, life expectancy, and reliability of parallel and series systems, in relation to reliability analysis.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can fully explain the basic issues and calculate probability using the basic rules.	Can explain the basics issues and calculate the probability using basic rules.	Cannot explain the basics issues and calculate the probability using basic rules.
Achievement 2	Can fully calculate queues using parameters such as average arrival and average service.	Can calculate queues using parameters such as average arrival and average service.	Cannot calculate queues using parameters.
Achievement 3	Fully understand how to calculate the failure rate, life expectancy, and reliability of series-parallel and redundant systems.	Understand how to calculate the failure rate, life expectancy, and reliability of series-parallel and redundant systems.	Do not understand how to calculate the failure rate, life expectancy, and reliability of series-parallel and redundant systems.

Assigned Department Objectives

Teaching Method

Outline	Handling cumbersome and large amounts of data requires statistical thinking. Statistical analysis of data leads to the fastest possible solution. This course will be held in lecture and exercise formats while introducing irregular data cases.
Style	From weeks 1 to 15, classes will be held in lecture and exercise formats. Assignment exercises will be based on each item set in the Course Objectives and Aims.
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. Students who miss 1/3 or more of classes will not be eligible for evaluation.

Characteristics of Class / Division in Learning

☐ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Explain the guidance, what is covered in this course, and evaluation method.	Understand the guidance, what is covered in this course, and evaluation method.
		2nd	Explain the statistical handling of events and probability, independence and dependency, and probability. Explain binding events, independence, conditional probability, and Bayes' theorem.	Understand the statistical handling of events and probability, independence and dependency, and probability. Understand binding events, independence, conditional probability, and Bayes' theorem.
		3rd	Understand variance and deviation, and Z-conversion as indicators of scattered data.	Understand variance and deviation, and Z-conversion as indicators of scattered data.
		4th	Explain how to organize 2D data and about orthogonality and correlation.	Can understand how to organize 2D data and about orthogonality and correlation.
		5th	Exercise 1 Submit within class time	Exercise 1 Submit within class time
		6th	Explain about calculating using moving average methods and noise reduction.	Understand about calculating using moving average methods and noise reduction.
		7th	Explain signals and noise, and S/N ratio decibel calculations.	Understand signals and noise, and S/N ratio decibel calculations.
		8th	Explain Type 1 and Type 2 errors, and testing.	Understand Type 1 and Type 2 errors, and testing.
	4th Quarter	9th	Exercise 2 Submit within class time	Exercise 2 Submit within class time
		10th	Explain the bathtub curve, failure rate for a period of time, and life expectancy. Explain the calculation of the average remaining count and reliability from the initial number and failure rate.	Understand the bathtub curve, failure rate for a period of time, and life expectancy. Understand the calculation of the average remaining count and reliability from the initial number and failure rate.
		11th	Explain the calculation of the reliability of parallel and series systems and redundant configurations.	Understand the calculation of the reliability of parallel and series systems and redundant configurations.

		12th	Exercise 3 Submit within class time	Exercise 3 Submit within class time
		13th	Program development environment using Jupyter notebook Explain data analysis using pandas and DataFrame creation and editing.	Program development environment using Jupyter notebook Understand program data analysis using pandas, and DataFrame creation and editing.
		14th	Explain visualization with Matplotlib and various graph creation.	Understand visualization with Matplotlib and various graph creation.
		15th	Exercise 4 Submit within class time	Exercise 4 Submit within class time
		16th	No final exam	No final exam

Evaluation Method and Weight (%)

	Exercise						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