Tsuyama College	Year	2022	Course Title	Industrial Mathematics

Course Information

Course Code	0037	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Advanced Electronics and Information System Engineering Course	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	Textbooks : Haruto Ohta, "Let's Start Topological Space" (Nihonhyoronsha), Reference Books : Haruto Ohta, "Let's Solve Topological Space" (Nihonhyoronsha)		
Instructor	YOKOTANI Masaaki		

Course Objectives

Learning purposes : Learn topology and its way of thinking.

Course Objectives :
1. Acquire the knowledge of mathematics, computational skills, and applied skills necessary to solve basic engineering problems.
2. Understand Euclidean geometry and topology.
3. Understand Euclidean space and its shapes.
4. Understand the deformation and mapping of figures.

Rubric

	Excellent	Good	Acceptable	Not acceptable
Achievement 1	Have mastered the applied skills of mathematics necessary to solve basic engineering problems.	Be familiar with the knowledge of mathematics and have mastered computational skills necessary to solve basic engineering problems.	Have acquired the knowledge of mathematics necessary to solve basic engineering problems.	Insufficient knowledge of mathematics and calculation skills necessary to solve basic engineering problems.
Achievement 2	Understand the relationship between isometric transformations and joint transformations.	Understand the concept of topology.	Understands Euclidean geometry and similar geometry.	Lack of understanding of Euclidean geometry and topology.
Achievement 3	Understands figure crafting, graphs, and self-similar figures.	Understand the concept of figures from a topological point of view.	Understand distance and Euclidean space.	Lack of understanding of the concept of Euclidean space and figures.
Achievement 4	Understand the sequence of points in a shape and its convergence.	Understand the nature of mapping.	Understand that the deformation of a figure is represented by a map.	There is a lack of understanding of the deformation of figures and the sequence of points.

Assigned Department Objectives

Teaching Method

Outline	General or Specialized : Specialized Field of learning : Common and basics of natural science Foundational academic disciplines : Mathematical science / mathematics / mathematics in general Relationship with Educational Objectives : This class is equivalent to "(1) To deepen the knowledge of natural science subjects centered on mathematics and physics, and acquire the ability to apply it as basic academic ability related to mechanical / control system engineering and electronic / information system engineering". Relationship with JABEE programs : The main goals of learning / education in this class are "(A), A-1". Course outline : One way to solve problems that occur in engineering is to grasp the essence of the phenomenon and cut it down from what you can understand. The significance of this lecture is to learn how to see and use useful things in such cases. Topology is a discipline that examines the property of maintaining invariance even when a figure is continuously deformed. Through this, we learn how to see what is invariant, that is, what captures the essence.
Style	Course method : Classes will be centered on board writing, but at the same time, as much exercise time as possible will be provided so that students can understand the content of the lecture more deeply and acquire the ability to solve problems on their own. Grade evaluation method : Evaluate by regular examination (60%) and report (40%). Depending on the grades, etc., a re-examination may be conducted (report assignment is imposed).
Notice	Precautions on the enrollment : This is a class that requires study outside of class hours. A total of 45 hours of study is required per credit, including both class time and study outside class time. Follow the instructions of the instructor regarding study outside of class hours. Course advice : ・ As a preparatory study to be conducted in advance, review the contents of basic mathematics I, basic mathematics II, calculus I, calculus II, and basic linear algebra, which are the basic subjects. ・ It is important to make sure to prepare and review, and to understand the lecture contents more deeply by solving the exercises on your own. Foundational subjects : Basic Mathematics I (1st year), Basic Mathematics II (1), Calculus I (2), Calculus II (3), Basic Linear Algebra (2) Related subjects : Subjects of each specialized department Attendance advice : It is important to understand the content of the lecture well and solve the problem by yourself. I want you to value finding a solution on your own. If you are late a lot, you may be treated as absent after giving a warning.

Characteristics of Class / Division in Learning			
☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Elective subjects

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Guidance, Euclidean geometry Learning content outside class hours: Report assignment (1) "Euclidean geometry and topology"	Understand congruence transformation and become familiar with the properties of invariant figures under congruence transformation.
		2nd	Similar geometry Learning content outside class hours: Report assignment (1) "Euclidean geometry and topology	Understand similarity transformations and become familiar with the properties of invariant figures under similarity transformations.
		3rd	topology Learning content outside class hours: Report assignment (1) "Euclidean geometry and topology	Familiarize yourself with the idea of topology.
		4th	Isometric transformation and joint transformation Learning content outside class hours: Report assignment (1) "Euclidean geometry and topology	Understand the relationship between isometric transformation and joint transformation.
		5th	Exercise (Euclidean geometry and topology) Learning content outside class hours: Report assignment (1) "Euclidean geometry and topology	
		6th	Distance and Euclidean space Learning content outside class hours: Report assignment (2) "Euclidean space and its figures"	Familiarize yourself with distance and Euclidean space.
		7th	Shape Learning content outside class hours: Report assignment (2) "Euclidean space and its figures"	Familiarize yourself with some examples of shapes in Euclidean space.
		8th	Crafting figures, graphs, and self-similar figures Learning content outside class hours: Report assignment (2) "Euclidean space and its figures"	Familiarize yourself with figure work, graphs, and self-similar figures.
	2nd Quarter	9th	Set and logic Learning content outside class hours: Report assignment (2) "Euclidean space and its figures"	Familiarize yourself with sets and logic.
		10th	Exercise (Euclidean space and its figures) Learning content outside class hours: Report assignment (2) "Euclidean space and its figures"	
		11th	Shape transformation Learning content outside class hours: Report assignment (3) "Transformation and mapping of figures"	Understand the basic properties of figure deformation and represent the deformation by mapping.
		12th	Map Learning content outside class hours: Report assignment (3) "Transformation and mapping of figures"	Familiarize yourself with the nature of mapping.
		13th	Sequences and point sequences of figures Learning content outside class hours: Report assignment (3) "Transformation and mapping of figures"	Understand the sequence of numbers and the sequence of points of figures, and show convergence by the ε-N theory.
		14th	Exercise (transformation and mapping of figures) Learning content outside class hours: Report assignment (3) "Transformation and mapping of figures"	
		15th	(final exam)	
		16th	Return and commentary of the final exam answer	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	60	0	0	0	0	40	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	60	0	0	0	0	40	100
Cross Area Proficiency	0	0	0	0	0	0	0