Tsuyama College	Year	2021	Course Title	Applied Mathematics Ⅱ

Course Information

Course Code	0089	Course Category	General / Compulsory
Class Format	Lecture	Credits	School Credit: 2
Department	Department of Integrated Science and Technology Communication and Informations System Program	Student Grade	4th
Term	Year-round	Classes per Week	2
Textbook and/or Teaching Materials	Textbooks : Supervised by Kenji Ueno, "Technical College Text Series Applied Mathematics" written in Japanese (Morikita Publishing)		
Instructor	SAEKI Fumihiro,KATO Manabu,SHIMADA Takao,MIYASHITA Takuya,SHIMADA Hirohiko		

Course Objectives

Learning purposes : Students will acquire the mathematical knowledge, calculation techniques, and applied abilities necessary to solve basic engineering problems through Laplace transform, Fourier series and Fourier transform, and vector analysis.

Course Objectives :
1. You can apply mathematical methods to solve problems in your area of expertise.
2. To understand the concepts of Laplace transform, Fourier analysis, and vector analysis, and apply them to the solution of differential equations that appear in the field of engineering.

Rubric

	Excellent	Good	Acceptable	Not acceptable
Achievement 1	Solve applied problems related to Laplace transform.	Can solve about 70% of basic problems related to Laplace transform.	Can solve about 60% of basic problems related to Laplace transform.	Cannot solve about 60% of the basic problems related to Laplace transform.
Achievement 2	Solve applied problems related to Fourier series and Fourier transform.	Can solve about 70% of basic problems related to Fourier series and Fourier transform.	Can solve about 60% of basic problems related to Fourier series and Fourier transform.	Cannot solve about 60% of basic problems related to Fourier series and Fourier transform.
Achievement 3	Solve applied problems related to vector analysis.	Can solve about 70% of basic problems related to vector analysis.	Can solve about 60% of basic problems related to vector analysis.	Cannot solve about 60% of basic problems related to vector analysis.

Assigned Department Objectives

Teaching Method

Outline	General or Specialized : General Field of learning : Common and basics of natural science Foundational academic disciplines : Mathematical science / Mathematics / Basic analysis Relationship with Educational Objectives : This class is equivalent to "(2) Acquire basic science and technical knowledge". Relationship with JABEE programs : The main goals of learning / education in this class is (A),A-1: Course outline : The 1st semester deals with Laplace transform, Fourier series, and Fourier transform. The 2nd semester deals with Vector analysis.
Style	Course method : Format is mainly lectures, but exercises are also given to deepen understanding. Grade evaluation method : Evaluate based on the total of the results of the four regular exams (60% evaluated equally) and others (40% for exercises / submissions, etc.). Depending on the grades, re-exams and additional report assignments may be imposed.
Notice	Precautions on the enrollment : Students must take this class (no more than one-third of the required number of class hours missed) in order to complete the 3rd year course. Course advice : Make sure to check what you have learned in mathematics up to the 3rd year, especially trigonometric functions, spatial vectors, determinants, differential methods (including partial differentials), and integral methods (including multiple integrals) as preparatory learning in advance. Foundational subjects : Fundamental Mathematics (1st year), Fundamental Mathematics Practice (1st), Differential and Integral Ⅰ (2nd), Fundamental Linear Algebra (2nd), Differential and Integral Ⅱ (3rd), Fundamental Differential Equations(3rd) Related subjects : 4th year and above physics, specialized subjects Attendance advice : Late arrivals are handled in 1/4 (= 0.5 hour) of class time (= 2 hour).

Characteristics of Class / Division in Learning

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

Must complete subjects

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Guidance Correspondence confirmation about distance learning, trial of Microsoft Teams	Understand the outline of the lesson and check the environment for distance lessons.
		2nd	Laplace transform	The Laplace transform of the basic function can be obtained.

		3rd	Inverse Laplace transform	The inverse Laplace transform of the basic function can be obtained.
		4th	Differentiation formulas and solutions for differential equations	The Laplace transform can be used to solve basic differential equations.
		5th	Unit step function and delta function	The Laplace transform of the unit step function and the delta function can be obtained.
		6th	Composition product	The composition product of basic functions can be calculated.
		7th	Linear system	For linear systems, the response to basic inputs can be found.
		8th	Exercise	Confirm basic matters, submit report
	2nd Quarter	9th	Periodic function	The integral of the period of the periodic function and the basic trigonometric function can be obtained.
		10th	Fourier series	The Fourier series of the basic periodic function can be obtained.
		11th	Partial differential equations and Fourier series	Applied problems can be solved using Fourier series.
		12th	Complex Fourier series	The complex Fourier series of the basic periodic function can be obtained.
		13th	Fourier Transform and Fourier Integral Theorem	The Fourier transform of the basic function can be obtained. In addition, it is possible to solve a problem applying the Fourier integral theorem.
		14th	Discrete Fourier transform	The discrete Fourier transform of the basic function can be obtained.
		15th	(1st semester final exam)	
		16th	Return and commentary of exam answers	Confirm basic matters
2nd Semester	3rd Quarter	1st	Guidance Vectors and their dot products	The vector dot product can be calculated.
		2nd	Vector cross product	The vector cross product can be calculated.
		3rd	Scalar field and vector field Gradient	The gradient of the scalar field can be obtained.
		4th	Divergence	The divergence of the scalar field can be sought.
		5th	Rotation	The rotation of the scalar field can be sought.
		6th	Line integral of curve and scalar field	The line integral of the scalar field can be obtained.
		7th	Line integral of vector field	The line integral of the vector field can be obtained.
		8th	(2nd semester mid-term exam)	
	4th Quarter	9th	Return and commentary of exam answers Surface parameter display, curved surface tangent vector and normal vector	The parameter display of the curved surface and the tangent vector and normal vector of the curved surface can be obtained.
		10th	Surface integral of scalar field	The surface integral of the scalar field can be obtained.
		11th	Surface integral of vector field	The surface integral of the vector field can be obtained.
		12th	Exercise	Confirm basic matters
		13th	Gauss's divergence theorem Green's theorem	Gauss's divergence theorem can be used to find the surface integral of a solid surface.
		14th	Stokes' theorem	Using Stokes' theorem, we can find the line integral along the boundary of a curved surface.
		15th	(2nd semester final exam)	
		16th	Return and commentary of exam answers	Confirm basic matters

Evaluation Method and Weight (%)

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