Tsuyama College	Year	2021		Course Title	Mathematical Science

Course Information

Course Code	0097		Course Category	Specialized / Compulsory
Class Format	Lecture		Credits	School Credit: 1
Department	Department of Integrated Science and Technology Advanced Science Program		Student Grade	4th
Term	First Semester		Classes per Week	2
Textbook and/or Teaching Materials	Handout			
Instructor	TANIGUCHI Keisuke			

Course Objectives

Learning purposes :
  Physics is one of the most basic disciplines in the natural sciences, and the results and methods of physics are applied to various fields of engineering. Therefore, it is necessary to understand the basics of physics when studying each specialized field.

Course Objectives :
1. Solve typical physics problems at the 1st and 2nd year level of a science university.
2. Explain the concept of "Physics I", "Physics II" and "Mechanics I" from a high point of view.
3. Be interested in recent science and everyday science.

Rubric

	Excellent	Good	Acceptable	Not acceptable
Achievement 1	You can build models and formulate relational expressions for advanced problems beyond typical examples	You can build a model for a typical example and formulate a relational expression.	You can build models for typological examples	You cannot build models for typological examples
Achievement 2	You can solve physical phenomena by solving non-homogeneous second-order differential calculus formulas	You can solve homogeneous second order differential calculus to analyze physical phenomena	You can analyze physical phenomena by solving variable-separated differential calculus formulas	You cannot analyze physical phenomena by solving variable-separated differential calculus formulas
Achievement 3	You can discover familiar mathematical phenomena yourself, build a model, and analyze it quantitatively.	You can construct a model and quantitatively analyze the presented mathematical phenomenon.	You can build a model for the presented mathematical phenomenon	You cannot build a model for the presented mathematical phenomenon

Assigned Department Objectives

Teaching Method

Outline	General or Specialized : Specialized
	
	Field of learning :
	  Lectures on physics at the level and content equivalent to the first and second grades of universities. We will deepen the contents of mechanics, thermodynamics, wave motion, optics, and electromagnetism while solving specific problems. We will also introduce everyday physical phenomena and recent scientific topics.
	
	Foundational academic disciplines : Mathematical science / physics / physics in general
	
	Relationship with Educational Objectives :
	  This class is equivalent to the learning / educational goals of the Department of Comprehensive Science and Engineering "(2) Acquisition of solid basic science knowledge".
	
	Relationship with JABEE programs :
	  The main goal of this subject is "(A) Deepening of basic knowledge about technology, A-1: Acquiring knowledge in a wide range of natural sciences as basic knowledge about engineering. "

Style	Course method :
	  The class will be carried out on board writing. Students are encouraged to discuss as much as possible in order to deepen their understanding. Classes will focus on understanding physics.
	  This course is a second semester course.
	
	Grade evaluation method :
	  70% for two exams and 30% for exercises / reports. Supplementary classes and re-examinations will be held for those with poor grades, and the grades of the examination will be replaced with a maximum of 60 points.

Notice	Precautions on the enrollment :
	  This course is a half-year (second half) course. Students must take this class (no more than one-third of the required number of class hours missed) in order to complete the 4th year course.
	
	Course advice :
	  It is recommended that those who want to acquire basic physics skills, transfer to a university, or those who wish to go on to a major course should take this course.
	  To solve the problem and attend the class. In order to obtain a versatile solution peculiar to physics, it is indispensable to make an effort to solve it by oneself.
	
	Foundational subjects : Physics I (2nd years), Physics II (3rd), Mechanics I, II, III (3rd), Mathematics subjects in general
	
	Related subjects: Rigid body mechanics (4th years), electromagnetism (4th), quantum science (5th), and other specialized subjects in general

Characteristics of Class / Division in Learning

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

			Theme	Goals
1st Semester	1st Quarter	1st	Guidance/ Basics of mass point mechanics	Review and confirmation of mass mechanics / Calculation of falling motion in the air
		2nd	Mechanics of mass points / Examples and explanations of aerodynamic motion with air resistance	Solving the equation of motion
		3rd	Examples and explanations of dynamics of mass point / vibration phenomena	Understanding the solution of the equation of motion of vibration phenomena
		4th	Dynamics of mass point / Examples and explanations of the motion of multiple interacting objects	Understanding how to analyze the motion of multiple objects
		5th	Rigid Body Mechanics / Rigid Body Pendulum	Understanding the rigid pendulum and shock center
		6th	Rigid body mechanics / rotational motion	Understanding and formulating the equation of motion of a rotating body
		7th	Thermodynamic examples and explanations	Understanding the basic equations of thermodynamics
		8th	2nd semester mid-term exam	Score of 60 points or more
	2nd Quarter	9th	Return and commentary of exam answers / Explanation of this year's Nobel Prize in Physics	Review/ Interest in topics
		10th	Examples and explanations of wave phenomena	Understanding of wave phenomenon
		11th	Examples and explanations of wave phenomena	Understanding the principle of superposition
		12th	Examples and explanations of atomic physics	Understanding Bohr model
		13th	Examples and explanations of electromagnetics	Understanding of electric potential
		14th	Examples and explanations of electromagnetics	Understanding Maxwell's equation
		15th	(2nd semester final exam)	Score of 60 points or more
		16th	Return and commentary of exam answers	Review

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	70	0	0	0	30	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	70	0	0	0	30	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Must complete subjects

Course Plan

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