Tsuyama College	Year	2021	Course Title	Mechanics Ⅲ

Course Information

Course Code	0066	Course Category	General / Compulsory
Class Format	Lecture	Credits	School Credit: 1
Department	Department of Integrated Science and Technology Electrical and Electronic Systems Program	Student Grade	3rd
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials	Tadanori Kojima et al. "Ace Fluid Dynamics" (Asakura Shoten)		
Instructor	HOSOTANI Kazunori,KATO Manabu		

Course Objectives

"Purpose of study: Understand the basics of static fluid mechanics and hydrodynamics, and acquire the basic ability to analyze related problems by applying them.

Achievement goal:
1. To acquire basics of fluid properties and problem-solving abilities.
2. To acquire basics of static fluid mechanics and problem analysis ability.
3. To acquire basic matters and problem analysis ability related to kinematics and hydraulics.
4. To acquire basic matters and problem analysis ability regarding Bernoulli's theorem, law of momentum. "

Rubric

	Ideal Level	Standard Level	Acceptable Level	Unacceptable Level
Achievement 1	Explain the definition of fluid and how to handle it mechanically. Exactly explain the definitions and units of various physical quantities that represent the properties of fluids. Exactly explain the difference between compressible fluids and incompressible fluids. Explain Newton's law of viscosity and non-Newtonian fluid accurately.	Explain the definition of fluid and how to handle it mechanically. Explain the definitions and units of various physical quantities that represent the properties of fluids. Explain the difference between compressible fluids and incompressible fluids. Exercises can be solved using Newton's law of viscosity.	Explain the definition of fluid and how to handle it mechanically. Explain the definitions and units of various physical quantities that represent the properties of fluids. Explain the difference between compressible fluids and incompressible fluids. Exercises can be generally solved using Newton's law of viscosity.	It has not reached the left.
Achievement 2	Explain absolute pressure and gauge pressure, and solve exercises. Explain Pascal's principle and solve exercises. You can explain pressure measurement using a liquid column gauge or a manometer, and you can solve exercises. The pressure and pressure center acting on a flat surface or curved surface can be calculated. Be able to explain the buoyancy acting on an object and solve exercises.	Can solve absolute pressure and gauge pressure exercises. You can solve the exercises of Pascal's principle. You can solve the exercises of pressure measurement using a liquid column gauge or a manometer. The pressure acting on the plane and the pressure center can be calculated. You can solve the exercise of buoyancy acting on an object.	Can solve most of the exercises of absolute pressure and gauge pressure. You can generally solve the exercises of Pascal's principle. It is possible to solve most of the exercises of pressure measurement using a liquid column gauge or a manometer. The pressure acting on the plane and the pressure center can be roughly calculated. You can generally solve the exercise of buoyancy acting on an object.	It has not reached the left.
Achievement 3	Explain the difference between steady flow and unsteady flow accurately. The definitions of streamlines and streams can be explained using figures. Explain the law of conservation of mass and the continuity equation, and solve exercises. Bernoulli's equation can be derived and explained from Euler's equations of motion.	Explain the difference between steady and unsteady flows. Explain the definitions of streamlines and streams. The flow velocity and flow rate can be calculated using the continuity equation. Explain Euler's equations of motion and Bernoulli's equations.	Explain the difference between steady flow and unsteady flow. Can explain the definitions of streamlines and streams. The flow velocity and flow rate can be roughly calculated using the continuity equation. Can explain Euler's equations of motion and Bernoulli's equations in general.	It has not reached the left.
Achievement 4	Explain the measurement principle of flow rate and flow velocity using Pitot tube, Ventury tube, and orifice. Understand the equation of momentum and calculate the force that a fluid exerts on an object.	Can solve exercises using Pitot tubes, Ventury tubes, and orifices. The force exerted by a fluid on an object can be calculated using the equation of momentum.	Can generally solve exercises using Pitot tubes, Ventury tubes, and orifices. The force exerted by a fluid on an object can be roughly calculated using the equation of momentum.	It has not reached the left.

Assigned Department Objectives

Teaching Method

Outline	General or Specialized : General Field of learning :: Common to Natural Sciences / Basic Required, Elective, etc. : ""Must complete subjects Foundational academic disciplines :: Engineering / Mechanical Engineering / Fluid Engineering Relationship with Educational Objectives : This class is equivalent to (2)Acquire basic science and technical knowledge. Relationship with JABEE programs : The main goal of learning / education in this subject is ""(A)and A-1is involved. Course outline : Fluid engineering is a system that combines hydraulics, which mainly analyzes water and other fluids by experimental methods, and fluid mechanics, which is elucidated by theoretical methods. The explanation will focus on clarifying the physical meaning of the phenomenon while using as few mathematical formulas as possible.
Style	Course method: Classes will be conducted according to the textbook, centering on the board, and explanations will be given as concretely as possible. In addition, each time, assignments are given to request additional learning outside class hours. (Items not listed in the learning textbook will be presented as assignments.) Grade evaluation method: Equally evaluate the results of the two regular examinations (70%). Textbooks and notebooks are not allowed for the exam. Out-of-class learning outcomes (quizzes conducted) (30%).
Notice	Precautions for Courses: In order to complete the course of the academic year, it is mandatory to take this course (the number of absent hours is one-third or less of the prescribed number of class hours). Course advice: I will explain with examples that are as familiar as possible, so it is better not to be too obsessed with deriving detailed mathematical formulas and to try to understand the physical meaning deeply. Basic subjects: Basic mathematics (1st year), Physics I (1st), Physics II (2nd), Mechanics I (3rd), Mechanics II (3rd), Introduction to hydrodynamics (3rd) Related subjects: Fluid engineering (4th year), Thermodynamics (4th), Energy conversion engineering (5th), heat transfer engineering (5th), fluid mechanics (2nd AC), etc. Attendance advice: Preparation / review and actively work on exercises. Be sure to review and work on assignments outside of class hours to prepare for the quiz. If you are late for half of one unit time, you will be regarded as absent.

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	Guidance Fluid characteristics and how to handle them "Issues related to fluid characteristics"	Explain the characteristics of fluids and how to handle them.
		2nd	Mechanics of static fluid 1 [Force, stress, and pressure acting on fluid] "Issues related to static fluid dynamics 1"	You can solve exercises related to forces, stresses, and pressures acting on fluids.
		3rd	Mechanics of static fluid 2 [Static fluid in gravitational field] "Problems related to static fluid dynamics 2"	You can solve exercises about the pressure acting on a stationary fluid.
		4th	Mechanics of static fluid 3 [Mechanics in relative stationary state] "Problems related to static fluid dynamics 3"	Can solve exercises related to relative rest.
		5th	Flow and method of expressing it 1 [Streamline equation, method of expressing flow]	Explain the definition of fluid flow.
		6th	Flow and method to express it 2 [Acceleration of fluid particles, continuity equation]	You can solve exercises related to the continuity equation.
		7th	Euler's equations of motion "Continuity equations-Problems related to Euler's equations of motion"	Explain Euler's equations of motion.
		8th	(First term midterm exam)	
	4th Quarter	9th	Return of the first half test and explanation of the answer Bernoulli's theorem 1	You can use Bernoulli's equation to solve exercises.
		10th	Bernoulli 's Theorem 2 "Problems with Torricelli's Theorem"	The Torricelli theorem can be derived.
		11th	Bernoulli's Theorem 3 "Problems of Venturi and Pitot tubes"	Can solve exercises on Venturi and Pitot tubes.
		12th	Momentum of fluid "Problems related to the law of momentum"	Explain the law of momentum.
		13th	Application of the law of momentum "Problems related to the law of momentum"	You can solve exercises related to the law of momentum.
		14th	Law of angular momentum and its application	Can solve exercises related to the law of angular momentum.
		15th	Exam	
		16th	Return of the final exam and explanation of the answer	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Report	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