

Anan College		Year	2024	Course Title	Thermodynamics 1
Course Information					
Course Code	1214D03		Course Category	Specialized / Compulsory	
Class Format	Lecture		Credits	Academic Credit: 2	
Department	Course of Mechanical Engineering		Student Grade	4th	
Term	First Semester		Classes per Week	前期:2	
Textbook and/or Teaching Materials	例題でわかる工業熱力学(森北出版)				
Instructor	Matsuura Fuminori				
Course Objectives					
V-A-4 Mechanical System::Heat-Fluid					
a. Fundamentals of Thermodynamics					
a1. Can explain the definitions and units of various physical quantities used in thermodynamics.					
a2. Can explain the meaning of closed and open systems, system equilibrium, and state properties.					
b. First Law of Thermodynamics					
b1. Can explain the first law of thermodynamics.					
b2. For closed and open systems, can calculate heat, work, internal energy, and enthalpy using the energy equation.					
b3. Can explain the work done by closed and open systems on the surroundings using a p-V diagram.					
c. Properties and State Changes of Ideal Gases					
c1. Can explain the relationship between the pressure, volume, and temperature of an ideal gas using the state equation.					
c2. Can explain the interrelationships between specific heats at constant volume and pressure, the heat capacity ratio, and the gas constant.					
c3. Can explain the relationship between changes in internal energy or enthalpy and temperature.					
c4. Understands the meaning of isobaric changes, isochoric changes, isothermal changes, reversible adiabatic changes, polytropic changes, and throttling changes, and can calculate state properties, heat, and work.					
c5. Can calculate the gas constant, specific heat, internal energy, and enthalpy of a mixture of gases.					
c6. For moist air, can calculate absolute humidity, relative humidity, specific volume, and enthalpy, both from calculations and using the psychrometric chart.					
Rubric					
	Ideal Level		Standard Level		Unacceptable Level
Achievement 1	In the exam questions and report assignments related to learning objective [a], the achievement rate is above 80%		In the exam questions and report assignments related to learning objective [a], the achievement rate is above 65%		In the exam questions and report assignments related to learning objective [a], the achievement rate does not fall below 60%
Achievement 2	In the exam questions and report assignments related to learning objective [b], the achievement rate is above 80%		In the exam questions and report assignments related to learning objective [b], the achievement rate is above 65%		In the exam questions and report assignments related to learning objective [b], the achievement rate does not fall below 60%
Achievement 3	In the exam questions and report assignments related to learning objective [c], the achievement rate is above 80%		In the exam questions and report assignments related to learning objective [c], the achievement rate is above 65%		In the exam questions and report assignments related to learning objective [c], the achievement rate does not fall below 60%
Assigned Department Objectives					
学習・教育到達度目標 B-3 学習・教育到達度目標 D-1					
Teaching Method					
Outline	Enable to explain the basic matters, the first law of thermodynamics, and about ideal gases in thermodynamics. Explanations will be based on the textbook, and problem exercises will be conducted.				
Style	Lecture hours: 30 hours + Self-study hours: 60 hours				
Notice					
Characteristics of Class / Division in Learning					
☐ Active Learning		☐ Aided by ICT		☒ Applicable to Remote Class	☐ Instructor Professionally Experienced
Course Plan					
			Theme	Goals	
1st Semester r	1st Quarter	1st	Fundamentals of Thermodynamics	Can explain the meaning of closed and open systems, heat, and thermal equilibrium	
		2nd	Fundamentals of Thermodynamics	Can explain the definitions and units of physical quantities used in thermodynamics, as well as the meaning of state properties	
		3rd	The First Law of Thermodynamics	Can explain the first law of thermodynamics	
		4th	The First Law of Thermodynamics	Can explain the relationship between heat, work, and change in internal energy for absolute work (work done by closed systems)	
		5th	The First Law of Thermodynamics	Can calculate heat, work, internal energy, and enthalpy for industrial work (work done by open systems)	
		6th	Problem Exercises	Can answer problems related to the fundamentals of thermodynamics and the first law of thermodynamics	
		7th	Midterm Exam		

	2nd Quarter	8th	Properties and State Changes of an Ideal Gas	Can explain the state equation of an ideal gas
		9th	Properties and State Changes of an Ideal Gas	Can explain specific heat, internal energy, and enthalpy
		10th	Properties and State Changes of an Ideal Gas	Can explain the state changes of an ideal gas
		11th	Properties and State Changes of an Ideal Gas	Can explain the isothermal and isobaric reversible changes of an ideal gas
		12th	Properties and State Changes of an Ideal Gas	Can explain the isochoric and adiabatic reversible changes of an ideal gas
		13th	Properties and State Changes of an Ideal Gas	Can explain the polytropic reversible changes of an ideal gas
		14th	Properties and State Changes of an Ideal Gas	Can explain the handling of mixed gases and determine the absolute and relative humidity of moist air from the psychrometric chart
		15th	Final Exam	
		16th		

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