

Anan College		Year	2024	Course Title	Thermodynamics 2
Course Information					
Course Code	1214D13		Course Category	Specialized / Compulsory	
Class Format	Lecture		Credits	Academic Credit: 2	
Department	Course of Mechanical Engineering		Student Grade	4th	
Term	Second Semester		Classes per Week	後期:4	
Textbook and/or Teaching Materials	Industrial Thermodynamics with Examples Problem (2nd Edition), Tetsuo Hirata,et. al. ,Morikita Publishing Co., Ltd.				
Instructor	Kusano Koji,Nishimoto Koji				
Course Objectives					
1. Explain the first and second laws of thermodynamics. 2. Obtain the thermal efficiency of various heat engines and the Carnot cycle, and explain the changes in entropy in reversible and irreversible changes. 3. Draw P-V diagrams of Otto cycle and Diesel cycle, and explain the difference between the two cycles from the thermal efficiency that affects the compression ratio and cut-off ratio.					
Rubric					
	Ideal Level		Standard Level		Unacceptable Level
Achievement 1	Can explain the 1st and 2nd laws of thermodynamics in his/her own words and obtain each state quantity.		Can explain the first and second laws of thermodynamics in one's own words.		Can explain the 1st and 2nd laws of thermodynamics while looking at textbooks.
Achievement 2	Obtain the thermal efficiency of the Carnot cycle and various cycles, and explain the change in entropy in reversible and irreversible changes.		The thermal efficiency of the Carnot cycle and various cycles can be determined.		Explain the formulas and concepts for calculating the thermal efficiency of the Carnot cycle.
Achievement 3	You can explain the difference between the Otto cycle and diesel cycle PV diagrams, and how to improve their efficiency and performance.		The Otto cycle and the Diesel cycle are explained, and thermal efficiency and physical quantities in each state can be calculated.		You can explain the Otto cycle and diesel cycle while looking at textbooks and calculate the thermal efficiency.
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	In this course, the instructor who was in charge of designing the engine of a snowmobile uses his experience to apply the basics taught in "Thermodynamics", the first law of thermodynamics, and the equation of state of an ideal gas to study pressure and volume.・ Understanding and understanding of thermodynamics through the calculation of temperature, heat quantity, and work, the thermal efficiency of heat engines and the Carnot cycle, and the processes and P-V diagrams of specific heat engines such as the Otto cycle and diesel cycle. The class consists of lectures and exercises for the purpose of acquiring practical skills.				
Style	Students will review and calculate the contents of thermodynamics they learned in the first semester, and will learn the second law of thermodynamics, the Carnot cycle, entropy, and the Otto cycle (gasoline engine) and diesel cycle, which are used as means of transportation on a daily basis as practical applications. learn. Deepen your understanding while answering the exercises. [30 hours of class time + 60 hours of self-study time] This course is a learning credit course, so reports and online tests will be conducted as pre- and post-learning.				
Notice	Try to solve as many specific problems as possible to deepen your knowledge of thermodynamics. After teaching the basics, the lecture takes an active-learning format, in which students work in teams to present the results of their discussions and calculations on exercises created by the instructor.				
Characteristics of Class / Division in Learning					
<input checked="" type="checkbox"/> Active Learning		<input checked="" type="checkbox"/> Aided by ICT		<input checked="" type="checkbox"/> Applicable to Remote Class	
				<input checked="" type="checkbox"/> Instructor Professionally Experienced	
Course Plan					
			Theme	Goals	
2nd Semester r	3rd Quarter	1st	1. Basic review of thermodynamics	(1) To be able to explain the unit system of thermodynamics and to calculate temperature and specific heat.	
		2nd		(2) Explain and calculate the relationship between work, internal energy and enthalpy, and the first law of thermodynamics.	
		3rd		(3) Understand and calculate the ideal gas law.	
		4th		(4) Explain and calculate the definition of the general gas constant.	
		5th		(5) To understand the state change of an ideal gas, and to be able to calculate work, heat, etc.	
		6th	2. Second Law of Thermodynamics	(1) Explain the second law of thermodynamics.	
		7th		(2) Understand the meaning of the cycle and calculate the thermal efficiency of the heat engine.	
		8th	[Mid-term exam]		
	4th Quarter	9th		(3) Understand the state change of the Carnot cycle and calculate the thermal efficiency.	

		10th		(4) Understand the definition of entropy and explain entropy changes in reversible and irreversible changes.
		11th		(5) A cycle can be represented by a T-S diagram.
		12th	3. Otto cycle and diesel cycle (practical engine)	(1) Explain the Otto cycle.
		13th		(2) explain the diesel cycle;
		14th		(3) The thermal efficiency of the Otto cycle and Diesel cycle and physical quantities at each state point can be calculated.
		15th	[routine exam]	
		16th	[Returning answers]	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	50	0	0	0	50	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	50	0	0	0	50	0	100
Cross Area Proficiency	0	0	0	0	0	0	0