

Tsuyama College		Year	2021		Course Title	Energy Conversion Engineering
Course Information						
Course Code	0158		Course Category	Specialized / Elective		
Class Format	Lecture		Credits	Academic Credit: 2		
Department	Department of Integrated Science and Technology Communication and Informations System Program		Student Grade	5th		
Term	First Semester		Classes per Week	2		
Textbook and/or Teaching Materials	Textbooks : "Enerugi Kikai" (Jikkyou Shuppan)					
Instructor	SATO Shinji					
Course Objectives						
Learning purposes : To understand the theory and fundamentals of energy conversion and to acquire the basic knowledge to deal with related issues, and to deepen their interest in energy conservation and environmental preservation.						
Course Objectives : 1. To understand the differences between various energy machines. 2. To understand the classification and effective use of energy machines. 3. To understand the fundamentals and theories of energy machinery and to be able to deal with problems and issues related to various types of energy machinery by using these knowledge and theories.						
Rubric						
	Excellent	Good	Acceptable	Not acceptable		
Achievement 1	The student can understand the different directions and characteristics of energy conversion and apply that knowledge to problems in real-world technical areas.	The student can understand the basic differences in the direction and characteristics of energy conversion and apply this knowledge to solve a variety of energy machinery problems.	The student can understand the basic differences in the direction and characteristics of energy conversion in various energy machines.	The student will not try to understand the basic differences in the direction and characteristics of energy conversion in different energy machines.		
Achievement 2	The student can understand the classification and effective use of energy machinery and be able to apply this knowledge to real-world technical problems in the field.	The student can understand the classification and effective use of energy machinery and can use this knowledge to solve problems.	The student can understand the classification and effective use of energy machinery.	The student will not try to understand the classification and effective use of energy machines.		
Achievement 3	The student can understand a variety of energy machinery knowledge and theories, and based on this knowledge and theory, can investigate and refer to the necessary materials and select the most appropriate method to address the problems associated with energy machinery.	The student can understand the knowledge and theories of different energy machines and use these knowledge and theories to address a variety of energy machine problems and refer to the necessary material.	The student can understand the basic knowledge and theories of various energy machines and be able to deal with basic problems of various energy machines on the basis of these knowledge and theories.	The student will not try to understand the basic knowledge and theory of various energy machines.		
Assigned Department Objectives						
Teaching Method						
Outline	General or Specialized : Specialized Field of learning : Energy, Measurement and control Required, Elective, etc. : Elective must complete subjects Foundational academic disciplines : Engineering,/Mechanical Engineering  Relationship with Educational Objectives : This class is equivalent to "(3) Acquire deep foundation knowledge of the major subject area ".  Relationship with JABEE programs : The main goal of learning / education in this class is "(A), also A-2" is involved.  Course outline : An overview of heat engines that convert thermal energy into mechanical energy and fluid machines that convert fluid-held energy into mechanical work, as well as energy conservation, renewable energy use, and environmental protection will be discussed.					
Style	Course method : Classes will be centered on the blackboard, and concrete explanations will be given as simply as possible, including a review of necessary peripheral knowledge. In addition, in order to deepen understanding, exercises and reports will be given, and each problem will be explained.  Grade evaluation method : The results of the two regular exams will be evaluated equally (70%). Textbooks and notebooks are not allowed to be brought in for each mid-term exam, but only notebooks are allowed for the first semester and the final exam. Exercises and reports (30%).					

Notice	<p>Precautions on the enrollment : This is a "class that requires study outside of class hours". Classes are offered for 15 hours per credit, but 30 credit hours are required in addition to this. Follow the instructions of your instructor for these studies.</p> <p>Course advice : As much as possible, familiar examples will be given, so it is best not to get too caught up in the derivation of detailed equations and try to understand the physical meaning of them in depth.</p> <p>Foundational subjects : Fluid Engineering (4th year), Thermodynamics (4th)others</p> <p>Related subjects : Energy System Engineering (Advanced Engineering Course 1st)others</p> <p>Attendance advice : You cannot acquire problem analysis ability in a passive posture. Make sufficient preparations and reviews, and actively work on exercises and reports. Late arrivals will be treated as late until half of each time has passed, but will be treated as absent after that.</p>
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#### Characteristics of Class / Division in Learning

<input type="checkbox"/> Active Learning	<input type="checkbox"/> Aided by ICT	<input type="checkbox"/> Applicable to Remote Class	<input type="checkbox"/> Instructor Professionally Experienced
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#### Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Guidance/ Incompressible fluid mechanics and fluid machinery 1 [Continuity equation / Energy equation]	Understand the fundamentals of incompressible fluids (continuity equation and Bernoulli's equation) and their relationship to various fluid machines.
		2nd	Incompressible fluid mechanics and fluid machinery 2 [Law of momentum]	Understand the fundamentals of incompressible fluids ((laws of momentum) and their relationship to various fluid machines.
		3rd	Water turbine [Structure and performance of water turbine]	Understand the structure of various types of water turbine and the basics of their work (power and efficiency).
		4th	Pump 1 [Structure of various pumps]	Understand the structure of various pumps.
		5th	Pump 2 [Pump performance]	Understand the basics of pump work (power and efficiency).
		6th	Blowers and Compressors 1 [Classification of blowers / Turbo blower and compressor].	Understand the classification of blowers and the basics of turbo type (centrifugal and axial flow type) blowers and compressors.
		7th	Blowers and Compressors 2 [Positive displacement blower and compressor].	Understand the basics of positive displacement (rotary and reciprocating) blower and compressor.
		8th	1st semester midterm exam	
	2nd Quarter	9th	Return of 1st semester midterm examinations and answer explanations / Types and overview of internal combustion engines	Understand the classification and fundamentals of internal combustion engines.
		10th	Gasoline engine	Understanding the principle of operation, structure, and various components of gasoline engines.
		11th	Diesel engine	Understand the principle of operation and components of diesel engines, and how they differ from gasoline engines.
		12th	Performance of internal combustion engines / Gas turbines	Understand the basics of internal combustion engine work (cycle and efficiency), gas turbine cycle, etc.
		13th	Steam generator [Thermal properties of steam / Structure and performance of boiler].	Understand the basics of thermal properties of steam, structure and performance of boilers.
		14th	Steam turbine	Understand the basics of steam turbine work (power and efficiency).
		15th	1st semester final exam	
		16th	Return of 1st semester final examinations and answer explanations	

#### Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	self-evaluation	Exercise	Total
Subtotal	70	0	0	0	30	100
Basic Proficiency	0	0	0	0	0	0
Specialized Proficiency	70	0	0	0	30	100
Cross Area Proficiency	0	0	0	0	0	0