For entrants in AY 2022

Appended Form 1

Specifications for Major Program

Name of School (Program)　School of Engineering Cluster 1　〔Mechanical Systems, Transportation, Material and Energy)〕

Program name (Japanese)	エネルギー変換プログラム
(English)	Program of Energy Transform Engineering

1.Academic degree to be Acquired　:　Bachelor's degree in Engineering

2. Overview

(1) Overview of "English-based Bachelor's Degree Program"

This program aims to foster and produce future members of a global society who have the knowledge to be innovative, creative, take leadership, and possess language abilities that will help them play an important role in the international world.

This program focuses specifically on producing individuals who are capable of addressing various global issues from an engineering perspective and contribute to the creation of new and valuable solutions that are significant to both the industrial and academic societies.

Students enrolled in the program will begin the curriculum from the first semester of their first year.
In the second year, students will set off on their major programs and take the designated courses which are offered at each cluster. Major program overview is as (2).

(2)Program overview of "Program of Energy Transform Engineering".

This Program (Energy Transform Engineering) in Cluster 1 helps students acquire the basic knowledge and perspective needed by engineers through the study of design and drafting, as well as through practical training at the Phoenix Workshop. Also, this program offers education in such fields as thermodynamics, basic physics related to quantum physics, fluid dynamics, combustion engineering, and heat-transfer engineering, all of which are indispensable for engineers.

Through such education, this program aims at nurturing engineers and researchers who, contributing to solving energy and environmental problems from a global perspective, being able to assume cutting-edge design and development roles in engineering. In order for students to develop their perspectives in other related fields with also gaining in-depth expertise, this program will be run not only by specialists from the closely-related program of Energy Transform Engineering, but also by specialists from the other three programs in Cluster 1, as well as by highly-skilled technical personnel from the Phoenix Workshop.

Students are assigned to this program in the second semester of the second year. Then, in the first semester of the fourth year, students are assigned to their respective research laboratories, choose their research topics, and write up their graduation theses. For your reference, as of last year about sixty percent of graduates from Cluster 1 in the School of Engineering had advanced to graduate school. Graduates are employed in the general machinery and automotive fields, as well as in electronics, information & communications, heavy industry, the chemical industry, and a broad range of other industries. Centering on manufacturers in the fields of heavy industry, transportation equipment, machinery, and materials, they work actively in the fields of research, design, production engineering, and engineering marketing.

3.Academic Awards Policy (Goals of the Program and Policy for Awarding Degrees)

The Program of Energy Transform Engineering develops professionals capable of taking action and displaying great humanity and rationality, who can contribute to the peace, development, survival, and realization of happiness of humankind, while striving for co-existence with nature.

This program awards a bachelor's degree in engineering to students who have acquired the following abilities in a balanced manner as well as the number of credits necessary to meet the standard of the course.

- The ability with the basic technological knowledge and perspectives required by engineers, centering on mechanical/material-related subjects as well as with the fundamentals of engineering associated with energy

and of indispensable for such fields of engineering as thermodynamics, basic physics related to quantum physics, fluid dynamics, combustion engineering, and heat-transfer engineering.

- The ability to assume roles in the design and development of cutting-edge production technology, while having a broader perspective about human-machine relations and environmental issues.

4. Curriculum Policy (Policy for Preparing and Implementing the Curriculum)

Achievement in learning is measured by performance rating in each subject and by the goals set by the Education Program. To ensure that students are able to achieve the goals of the program, the Program of Energy Transform Engineering develops and puts into practice a curriculum based on the following policy:

- In the first year, the students take Liberal Arts Education subjects such as Peace Science Courses, Basic Courses in University Education, common subjects, and Foundation Courses, as well as specialized basic subjects and specialized practical education, such as machine shop training.
- In the second year, specialized basic subjects such as “Fluid Dynamics Ⅰ” and “Thermodynamics Ⅰ” become major subjects. The students choose one of four programs in Cluster 1(Mechanical Systems Engineering, Transportation Systems, Material Processing, or Energy Transform Engineering) and are assigned to that program.
- In the third year, specialized subjects become major subjects. The students take required classes in accordance with the program they belong to.
- In the fourth year, the students are assigned to their respective research laboratories, choose their research topics, and write their graduation theses.

In the curriculum described above, teaching and learning will be implemented by utilizing active learning and online classes, depending on the delivery methods of the program, such as lectures and seminars.

In addition to strict grading using the standards clearly outlined in the syllabus, learning outcomes are evaluated based on the degree to which the goals set by the educational program are achieved.

5. Program Timing/Acceptance Conditions

○ When to start the program : The English-based Bachelor’s Degree programs begin in the first semester of the first year. Enrollment in Program of Energy Transform Engineering occurs in the second semester of the second year.

○Additional Requirements : To determine acceptance into the English-based Bachelor’s Degree program, all applicants are required to have an individual consultation with the faculty committee members.

○ Credit Requirements : By the first semester of the second year, students must have acquired the Liberal Arts Education subjects and specialized basic subjects that are commonly specified in Cluster 1.

6. Qualifications to be Acquired

Type-1 High School Teaching License (Industry)

(Students must acquire the required number of credits for the Type-1 High School Teaching License (Industry), in addition to the required number of credits for this program.)

7. Class subjects and course content

* For class subjects, see the Course List table on the attached sheet.
* For course content, see the syllabus for each fiscal year.
* All class subjects are taught in Japanese. Course materials will be written in both Japanese and English or only English.

8. Academic Achievements

At the end of each semester, the evaluation criteria are applied to each academic achievement evaluation item so that the level of attainment is clearly demonstrated.

Students’ grade calculation for each subject, from admission to the current semester, is given in one of three levels: “Excellent,” “Very Good,” and “Good,” based on evaluation criteria calculated by adding the weighted values to the numerically-converted values of their academic achievement in each subject being evaluated (S = 4, A = 3, B = 2, and C= 1).

Academic achievement	Evaluation

Evaluation of academic achievement	Converted values
S(Excellent: 90 points or higher)	4
A(Superior:80-89 points)	3
B(Good: 70-79 points)	2
C(Fair: 60-69 points)	1

	criteria
Excellent	3.00～4.00
Very Good	2.00～2.99
Good	1.00～1.99

* For the relationship between evaluation items and evaluation criteria, see the attached Sheet 2 .
* For the relationship between evaluation items and class subjects, see the attached Sheet 3.
* For the curriculum map, see the attached Sheet 4.

9. Graduation Thesis (Graduation Research) (Positioning, when and how it is assigned, etc.)

○ Positioning

The graduation thesis is designed to be one component of the overall evaluation of academic achievement.

It is positioned as one of the major subjects to evaluate the following:

Ability/Skills (2) Developing the ability to solve engineering issues on one's own initiative with flexible thinking and creativity

Collective capacity (1) Developing communication skills and the ability to globally collect and dispatch information.

○ When and how it is assigned

When it is assigned: At the start of the fourth year. (Only those who satisfy the conditions for embarking on a graduation thesis will be assigned a thesis.)

○ Conditions for embarking on a graduation thesis

(1) Students must gain 43 credits or more out of 46 credits, the required number for graduation in Liberal Arts Education subjects.

(2) Students must gain 10 credits or more in the first group of specialized basic subjects

(3) Students must gain all of the required credits in Machine Design and Drawing, CAD, Machine Shop Training, Experiments in Mechanical Engineering Ⅰ, Experiments in Mechanical Engineering Ⅱ, and Mechanical Engineering Design and Production.

(4) Students must gain 11 credits or more out of 15 credits, the required number in Liberal Arts Education subjects, in the second group of specialized basic subjects.

(5) Students must gain a total of 68 credits or more in specialized basic subjects and specialized subjects.

○ How it is assigned

The research details of each laboratory to which the students can be assigned are explained by giving out handouts at a briefing held in February, in the second semester of the third year. After the number of students acceptable to each laboratory is given at the start of the fourth year, students who can begin their graduation theses are assigned as requested. In the case that the number of students exceeds the acceptable limit for a laboratory, adjustments may be made.

The graduation thesis must be written in English in "English-based Bachelor's Degree Program".

10. Responsibility-taking System

(1) PDCA Responsibility-taking System ("Plan," "Do," "Check," and "Act")

The cluster leader and program leader are responsible for executing this program. Faculty committee members responsible for this program make plans, while self-check/evaluation committee members responsible for this program make evaluations. The cluster and program teachers committee scrutinize the plans and evaluations from time to time for further improvement. When major issues arise, a working group may be established at the discretion of cluster leader and program leader.

(2) Program assessment

○ Criteria for program assessment

・Whether or not each class subject is properly allocated in light of the goals of the program, and whether course content is appropriate

・Whether or not, on average, students taking the course have achieved or exceeded the goals

・Whether or not the system runs in proper cycles that enable the continuous improvement of the program

○ How the program is assessed

・Conducting self-assessment for each subject based on class improvement questionnaires from students who have taken course, and based on performance rating results

・Conducting questionnaires (obtained at graduation) in suitable cycles, to evaluate the validity of the goals

○ Position on feedback to students and how it should be conducted

Search records of each student's learning status, prepared by tutors, are kept in the office. Based on these records, study guidance is given to each student. At the same time, requests from students are discussed at teachers' meetings as needed. Furthermore, based on the results of the course improvement questionnaires obtained from students, subject teachers draw up class improvement plans that reflect the questionnaire results.

Cluster 1 (Mechanical Systems, Transportation, Material and Energy)

◎ Required subject (period of registration specified)

○ Compulsory elective subject (any of these subjects shall be registered)

△ Free elective subject (any of these subjects shall be registered)

Subject type				Required No. of credits	Class subjects, etc.	No. of credits	Type of course registration	Year in which the subject is taken(*The lower figure means semester)(Note 1)															
								1st grade				2nd grade				3rd grade				4th grade			
								Spring		Fall		Spring		Fall		Spring		Fall		Spring		Fall	
								1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T
Liberal Arts Education Subjects	Peace Science Courses			2		2	Required		○														
	Basic Courses in University Education	Introduction to University Education		2	Introduction to University Education	2	Compulsory elective	◎															
		Introductory Seminar for First-Year Students		2	Introductory Seminar for First-Year Students	2	Compulsory elective		◎															
	Common Subjects	Area Courses		4	Courses in Arts and Humanities/Social Sc	2	Compulsory elective	○		○													
				4	Courses in Natural Sciences	2	Compulsory elective		○		○												
		Foreign Languages	English (Note 2・3) Basic English Usage	2	Basic English UsageI	1	Required	◎	◎														
					Basic English UsageII	1				◎	◎												
			English (Note 2・3) Communication I	2	CommunicationIA	1	Required	◎	◎														
					Communication IB	1		◎	◎														
			English (Note 2・3) Communication II	2	Communication IIA	1	Required			◎	◎												
					Communication IIB	1				◎	◎												
			Initial Foreign Languages (Select one language from German, French, Spanish, Russian, Chinese, Korean, and Arabic)	2	1 subjects from Basic language I	1	Compulsory elective	○															
					1 subjects from Basic language II	1			○														
		Information and Data Science Courses		2	Introduction to Information and Data Sciencies	2	Required		◎														
		Health and Sports Courses		2		1or2	Compulsory elective	○	○	○	○												
	Basic Subjects			18	CalculusI	2	Required		◎														
					CalculusII	2					◎												
					Linear AlgebraI	2		◎															
					Linear AlgebraII	2				◎													
					Seminar in Basic Mathematics I	1			◎														
					Seminar in Basic Mathematics II	1					◎												
					General Mechanics I	2		◎															
					General Mechanics II	2				◎													
					Basic Electromagnetism	2							◎										
					Experimental Methods and Laboratory Work in Physics I(Note 4)	1				◎													
					Experimental Methods and Laboratory Work in Physics II(Note 4)	1					◎												
				2	General Chemistry	2	Compulsory elective						○										
					Experimental Methods and Laboratory Work in Chemistry I(Note 4)	1				○													
					Experimental Methods and Laboratory Work in Chemistry II(Note 4)	1					○												
	No. of credits required for graduation			46																			

Note 1: When students fail to acquire the credit during the term or semester marked with ◎, ○, △ in the boxes for the year in which the course is taken, they can take the course in subsequent terms or semesters. Depending on class subject, courses may be offered in semesters or terms different from those

Note 2: The credit obtained by mastery of "English-speaking Countries Field Research" or self-directed study of "Online Seminar in English A・B" cannot be counted towards the credit necessary for graduation. The credit obtained by Overseas Language Training can be recognized as Communication Ⅰ or Ⅱ if application is made in advance. For more details, please refer to the article on English in Liberal Arts Education in the student handbook.

Note 3: We have a recognition of credit system for foreign language proficiency tests. For more details, please refer to the article on English in Liberal Arts Education in the student handbook.

Note 4: Students must take both「Experimental Methods and Laboratory WorkⅠ(1credit)」and「Experimental Methods and Laboratory WorkⅡ(1credit)」.

Cluster 1　Basic Specialized Subjects

◎ Required subject
○Compulsory elective subject
△Free elective subject

	Class Subjects	Credits	Type of course registration				Class Hours/Week														Note
			Mechanical Systems Engineering	Transportation Systems	Materials Processing	Energy Transform Engineering	1st grade				2nd grade				3rd grade				4th grade				
							Spring		Fall		Spring		Fall		Spring		Fall		Spring		Fall		
							1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	
1st group	Applied Mathematics I	2	◎	◎	◎	◎			4														
	Applied Mathematics II	2	◎	◎	◎	◎					4												
	Applied Mathematics III	2	◎	◎	◎	◎							4										
	Engineering Mathematics A	2	○		○	○									4								
	Engineering Mathematics C	2	○		○	○								4									
	Probability and Statistics	2	◎	◎	◎	◎					4												
	Synthesis of Applied Mathematics	2	○		○	○											4						
	Practice of Mechanics	1	○	△	○	○			4														
	Engineering Mechanics	2	○	△	○	○				4													
	Introduction of Mechanical and Transportation Engineering	2	◎	◎	◎	◎			4														
	Technical English	1	◎	◎	◎	◎					4												
	Basic Engineering Computer Programming	2	◎	◎	◎	◎						4											
2nd group	Mechanics of Material I	2	◎	◎	◎	◎					4												
	Thermodynamics I	2	◎	◎	◎	◎					4												
	Fluid Dynamics I	2	◎	◎	◎	◎						4											
	Control Engineering I	2	◎	◎	◎	◎						4											
	An Introduction to Engineering Materials	2	◎	◎	◎	◎					4												
	Fundamentals of Materials Processing	2	◎	◎	◎	◎						4											
	Machine Design and Drawing	1	◎	◎	◎	◎			3	3													
	Computer Aided Design	1	◎	◎	◎	◎					3	3											
	Machine Shop Training (a)	1	◎	◎	◎	◎			3	3													
	Machine Shop Training (b)	1	◎	◎	◎	◎					3	3											

※Students can select either Machine Shop Training (a) or Machine Shop Training (b)

Cluster 1 Specialized Subjects

(Program of Energy Transform Engineering)

◎ Required subject
○Compulsory elective sul
△Free elective subject

Class Subjects	Credits	Type of course	Class Hours/Week																Note
			1st grade				2nd grade				3ed grade				4th grade				
			Spring		Fall		Spring		Fall		Spring		Fall		Spring		Fall		
			1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	
Dynamics of Vibrations I	2	◎							4										
Experiments in Mechanical Engineering I	1	◎									3	3							
Experiments in Mechanical Engineering II	1	◎											3	3					
Mechanical Engineering Design and Production	1	◎											3	3					
Elementary Electromagnetism	2	◎							4										
Introduction to Quantum Physics	2	◎								4									
Introduction to chemical physics	2	○										4							
Fluid Dynamics II	2	◎								4									
Compressible Fluid Dynamics	2	○									4								
Computational Fluid Dynamics	2	○											4						
Fluid Machinery	2	○												4					
Thermodynamics II	2	○								4									
Statistical and Thermal Physics	2	○											4						
Heat Transfer I	2	◎							4										
Heat Transfer II	2	○									4								
Combustion Engineering Fundamentals	2	○									4								
Basic Chemical Kinetics	2	○										4							
Internal Combustion Engines	2	○											4						
Steam Power	2	○											4						
Plasma Engineering	2	○										4							
Data Processing and Numerical Analysis	2	○								4									
Computer Programming	2	◎										4							
Radiation Engineering	2	○												4					
Nuclear Engineering	2	○												4					
Theory of Elasticity and Plasticity	2	○									4								
Computational Solid Mechanics	2	○												4					
Electrical and Electronic Engineering	2	○									4								
Measurement and Signal Processing	2	◎							4										
Optical Measurement Techniques	2	○												4					
Machine Elements Design I	2	○							4										
Natural-Energy Utilization Engineering	2	○												4					
Internship	1	△											3	3					
Mechanism and Kinematics	2	△								4									
Systems Engineering	2	△								4									
Mechanics of Materials II	2	△							4										
Transportation	2	△							4										
Control Engineering II	2	△							4										
Materials Science	2	△								4									
Machine Elements Design II	2	△									4								
Mechanical Materials I	2	△										4							
Dynamics of Vibrations II	2	△									4								
Machining	2	△										4							
Reliability Engineering	2	△										4							
Manufacturing System	2	△										4							
Fusion and Solidification Processings I	2	△										4							
Plastic Working and Powder Metallurgy II	2	△											4						
Mechanical System Control	2	△									4								
Machine Design	2	△											4						
Mechanical Materials II	2	△												4					
Fracture Mechanics	2	△												4					
Mechatronics	2	△											4						
Graduation Thesis	5	◎																	

Academic Achievement in Educational Program for Energy Transform Engineer

The Relationship between Evaluation Items and Evaluation Criteria

Academic Achievements			Evaluation Criteria		
Evaluation Items			Excellent	Very Good	Good
Knowledge and Understanding	(1)	To develop the ability to work positively and independently on the development of local societies, international society, and business and industries.	To be able to be sufficiently engaged in the development of local societies, international society, and business and industry.	To be able to be engaged in the development of local societies, international society, and business and industry at the standard level.	To be able to be engaged in the development of local societies, international society, and business and industry at the minimum level.
	(2)	Acquiring necessary basic knowledge for an engineer and developing the ability to consider logically.	Acquiring necessary basic knowledge for an engineer and being able to sufficiently and logically consider it.	Acquiring necessary basic knowledge for an engineer and being able to logically consider it at the standard level.	Acquiring necessary basic knowledge for an engineer and being able to logically consider it at the minimum level.
Abilities and Skills	(1)	Acquring basis of mechanical system engineering steadily and developing the applied skill.	Acquring basis of mechanical system engineering steadily, and being able to apply it sufficiently.	Acquring basis of mechanical system engineering steadily, and being able to apply it at the standard level.	Acquring basis of mechanical system engineering steadily, and being able to apply it at the minimum level.
	(2)	Developing the ability of solving the technological issues with flexible ideas and creativity.	Based on flexible ideas and creativity, to be able to sufficiently solve problems related to engineering.	Based on flexible ideas and creativity, to be able to independently solve problems related to engineering to the standard level.	Based on flexible ideas and creativity, to be able to independently solve problems related to engineering at the minimum level.
Overall Abilities	(1)	Cultivating abilities of communication and of internationally collecting information and releasing it	To be able to communicate sufficiently with others, collect and release information internationally.	To be able to communicate with others, collect and release information internationally at the standard level	To be able to communicate with others, collect and release information internationally at the minimum level.

Placement of the Liberal Arts Education in the Major Program

We aim to cultivate a well-rounded character, backed up by a broad range of basic knowledge and an understanding of global environmental issues and problems in the social environment. Furthermore, we aim to cultivate the ability to consider ways to solve problems in the context of the multifaceted relations between people and society, and between nature and engineering. To that end, the following are offered: (1) The acquisition of the necessary abilities and attitudes to see various social issues multilaterally and to understand the complete picture (2) The acquisition of a broader perspective after being exposed to fields outside of one's area of expertise (3) Through sports, the acquisition of knowledge of health and physical strength that form basis of human living (4) The cultivation of the ability to

Relationships between the evaluation items and class subjects

Sheet 3

Subject type	Class subjects	credits	Type of course registration	Period	Evaluation items										Total weighted values of evaluation items in the subject
					Knowledge and Understanding				Abilities and Skills				Comprehensive Abilities		
					(1)		(2)		(1)		(2)		(1)		
					Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	
Liberal Arts Education	Introduction to University Education	2	Required	1semsester-1T	100	1									100
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	1semsester							50	1	50	1	100
Liberal Arts Education	Peace Science Courses	2	Elective	1semsester-2T	100	1									100
Liberal Arts Education	Basic English UsageI	1	Required	1semsester									100	1	100
Liberal Arts Education	Basic English UsageII	1	Required	2semsester									100	1	100
Liberal Arts Education	CommunicationIA	1	Required	1semsester									100	1	100
Liberal Arts Education	Communication IB	1	Required	1semsester									100	1	100
Liberal Arts Education	Communication IIA	1	Required	2semsester									100	1	100
Liberal Arts Education	Communication IIB	1	Required	2semsester									100	1	100
Liberal Arts Education	Basic language I	1	Elective	1semsester-1T									100	1	100
Liberal Arts Education	Basic language II	1	Elective	1semsester-2T									100	1	100
Liberal Arts Education	Area Courses(Courses in Arts and HumanitiesSocial Sc)	4	Elective	1,2,3,4semsester	100	1									100
Liberal Arts Education	Area Courses(Courses in Natural Sciences)	4	Elective	1,2,3,4semsester	100	1									100
Liberal Arts Education	Health and Sports Courses	2	Elective	1,2semsester	100	1									100
Liberal Arts Education	Information and Data Science Courses	2	Required	1semsester			100	1							100
Liberal Arts Education	CalculusI	2	Required	1semsester			100	1							100
Liberal Arts Education	CalculusII	2	Required	2semsester			100	1							100
Liberal Arts Education	Linear AlgebraI	2	Required	1semsester			100	1							100
Liberal Arts Education	Linear AlgebraII	2	Required	2semsester			100	1							100
Liberal Arts Education	Seminar in Basic Mathematics I	1	Required	1semsester			100	1							100
Liberal Arts Education	Seminar in Basic Mathematics II	1	Required	2semsester			100	1							100
Liberal Arts Education	General Mechanics I	2	Required	1semsester			100	1							100
Liberal Arts Education	General Mechanics II	2	Required	2semsester			100	1							100
Liberal Arts Education	Basic Electromagnetism	2	Required	3semsester			100	1							100
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I・II	2	Required	2semsester			100	1							100
Liberal Arts Education	General Chemistry	2	Elective	3semsester			100	1							100
Liberal Arts Education	Experimental Methods and Laboratory Work in Chemistry I・II	2	Elective	2semsester			100	1							100
Specialized Education	Applied Mathematics I	2	Required	2semsester					100	1					100
Specialized Education	Applied Mathematics II	2	Required	3semsester					100	1					100
Specialized Education	Applied Mathematics III	2	Required	4semsester					100	1					100
Specialized Education	Engineering Mathematics A	2	Elective	5semsester					100	1					100
Specialized Education	Engineering Mathematics C	2	Elective	4semsester					100	1					100
Specialized Education	Probability and Statistics	2	Required	3semsester					100	1					100
Specialized Education	Synthesis of Applied Mathematics	2	Elective	6semsester					100	1					100
Specialized Education	Practice of Mechanics	1	Elective	2semsester					100	1					100
Specialized Education	Engineering Mechanics	2	Elective	2semsester					100	1					100
Specialized Education	Introduction of Mechanical and Transportation Engineering	2	Required	2semsester					100	1					100
Specialized Education	Technical English	1	Required	3semsester					100	1					100
Specialized Education	Basic Engineering Computer Programming	2	Required	3semsester			100	1							100
Specialized Education	Experiments in Mechanical Engineering I	1	Required	5semsester							80	1	20	1	100
Specialized Education	Experiments in Mechanical Engineering II	1	Required	6semsester							80	1	20	1	100
Specialized Education	Fundamentals of Materials Processing	2	Required	3semsester					100	1					100
Specialized Education	An Introduction to Engineering Materials	2	Required	3semsester					100	1					100
Specialized Education	Mechanics of Material I	2	Required	3semsester					100	1					100
Specialized Education	Dynamics of Vibrations I	2	Required	4semsester					100	1					100
Specialized Education	Control Engineering I	2	Required	3semsester					100	1					100
Specialized Education	Fluid Dynamics I	2	Required	3semsester					100	1					100
Specialized Education	Thermodynamics I	2	Required	3semsester-1T					100	1					100
Specialized Education	Machine Design and Drawing	1	Required	2semsester					100	1					100
Specialized Education	Computer Aided Design	1	Required	3semsester							100	1			100

Subject type	Class subjects	credits	Type of course registration	Period	Evaluation items										Total weighted values of evaluation items in the subject
					Knowledge and Understanding				Abilities and Skills				Comprehensive Abilities		
					(1)		(2)		(1)		(2)		(1)		
					Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	
Specialized Education	Mechanical Engineering Design and Production	1	Required	6semsester							100	1			100
Specialized Education	Computer Programming	2	Required	5semsester			100	1							100
Specialized Education	Machine Shop Training (a)	1	Required	2semsester							100	1			100
Specialized Education	Machine Shop Training (b)	1	Required	3semsester							100	1			100
Specialized Education	Mechanical Materials I	2	Elective	5semsester					100	1					100
Specialized Education	Mechanical Materials II	2	Elective	6semsester					100	1					100
Specialized Education	Fracture Mechanics	2	Elective	6semsester					100	1					100
Specialized Education	Fusion and Solidification Processings I	2	Elective	5semsester					100	1					100
Specialized Education	Plastic Working and Powder Metallurgy II	2	Elective	6semsester					100	1					100
Specialized Education	Materials Science	2	Elective	4semsester					100	1					100
Specialized Education	Machining	2	Elective	5semsester					100	1					100
Specialized Education	Fluid Dynamics II	2	Required	4semsester-4T					100	1					100
Specialized Education	Heat Transfer I	2	Required	4semsester-3T					100	1					100
Specialized Education	Combustion Engineering Fundamentals	2	Elective	5semsester					100	1					100
Specialized Education	Internal Combustion Engines	2	Elective	6semsester					100	1					100
Specialized Education	Data Processing and Numerical Analysis	2	Elective	4semsester					100	1					100
Specialized Education	Theory of Elasticity and Plasticity	2	Elective	5semsester					100	1					100
Specialized Education	Computational Solid Mechanics	2	Elective	6semsester					100	1					100
Specialized Education	Mechanics of Materials II	2	Elective	4semsester					100	1					100
Specialized Education	Mechanism and Kinematics	2	Elective	4semsester					100	1					100
Specialized Education	Dynamics of Vibrations II	2	Elective	5semsester					100	1					100
Specialized Education	Control Engineering II	2	Elective	4semsester					100	1					100
Specialized Education	Electrical and Electronic Engineering	2	Elective	5semsester					100	1					100
Specialized Education	Mechatronics	2	Elective	6semsester					100	1					100
Specialized Education	Measurement and Signal Processing	2	Required	4semsester					100	1					100
Specialized Education	Mechanical System Control	2	Elective	5semsester					100	1					100
Specialized Education	Manufacturing System	2	Elective	5semsester					100	1					100
Specialized Education	Machine Elements Design II	2	Elective	5semsester					100	1					100
Specialized Education	Machine Design	2	Elective	6semsester					100	1					100
Specialized Education	Systems Engineering	2	Elective	4semsester					50	1	50	1			100
Specialized Education	Reliability Engineering	2	Elective	5semsester	10	1			90	1					100
Specialized Education	Machine Elements Design I	2	Elective	4semsester					100	1					100
Specialized Education	Internship	1	Elective	6semsester	40	1					30	1	30	1	100
Specialized Education	Elementary Electromagnetism	2	Required	4semsester					100	1					100
Specialized Education	Introduction to Quantum Physics	2	Required	4semsester					100	1					100
Specialized Education	Introduction to chemical physics	2	Elective	5semsester					100	1					100
Specialized Education	Compressible Fluid Dynamics	2	Elective	5semsester					100	1					100
Specialized Education	Computational Fluid Dynamics	2	Elective	6semsester					100	1					100
Specialized Education	Fluid Machinery	2	Elective	6semsester					100	1					100
Specialized Education	Thermodynamics II	2	Elective	4semsester-4T					100	1					100
Specialized Education	Statistical and Thermal Physics	2	Elective	6semsester					100	1					100
Specialized Education	Heat Transfer II	2	Elective	5semsester					100	1					100
Specialized Education	Basic Chemical Kinetics	2	Elective	5semsester					100	1					100
Specialized Education	Steam Power	2	Elective	6semsester					100	1					100
Specialized Education	Plasma Engineering	2	Elective	5semsester					100	1					100
Specialized Education	Radiation Engineering	2	Elective	6semsester					100	1					100
Specialized Education	Nuclear Engineering	2	Elective	6semsester					100	1					100
Specialized Education	Optical Measurement Techniques	2	Elective	6semsester					100	1					100
Specialized Education	Natural-Energy Utilization Engineering	2	Elective	5semsester					100	1					100
Specialized Education	Transportation	2	Elective	4semsester-4T					100	1					100
Specialized Education	Graduation Thesis	5	Required	7,8semsester							55	1	45	1	100

Curriculum Map of Energy Transform Engineering

Sheet 4

Academic achievements Evaluation Items		1st grade Spring	1st grade Fall	2nd grade Spring	2nd grade Fall	3rd grade Spring	3rd grade Fall	4th grade Spring	4th grade Fall
Knowledge and Understanding	To develop the ability to work positively and independently on the development of local societies, international society, and business and industries.	Introduction to University Education(◎)	Area Courses(○)	Area Courses(○)	Area Courses(○)	Reliability Engineering(△)	Internship(△)		
		Peace Science Courses(○)	Health and Sports Courses(○)						
		Area Courses(○)							
		Health and Sports Courses(○)							
	Acquiring necessary basic knowledge for an engineer and developing the ability to consider logically.	Introduction to Information and Data Sciencies (◎)	CalculusII(◎)	Basic Electromagnetism(◎)					
		CalculusI (◎)	Linear AlgebraII(◎)	General Chemistry(○)					
		Linear AlgebraI (◎)	Seminar in Basic Mathematics II(◎)	Basic Engineering Computer Programming(◎)					
		Seminar in Basic Mathematics I (◎)	General Mechanics II(◎)						
		General Mechanics I (◎)	Experimental Methods and Laboratory Work in Physics I・II(◎)						
			Experimental Methods and Laboratory Work in Chemistry I・II(◎)						
Abilities and Skills	Acquring basis of mechanical system engineering and materials processing steadily and developing the applied skill.		Applied Mathematics I(◎)	Applied Mathematics II(◎)	Applied Mathematics III(◎)	Engineering Mathematics A(○)	Synthesis of Applied Mathematics(○)		
			Practice of Mechani	Probability and Statistics(◎)	Engineering Mathematics C(○)	Computer Programming(◎)	Dynamics of Vibrations II(△)		
			Engineering Mechanics(△)	Mechanics of Material I(◎)	Dynamics of Vibrations I(◎)	Mechanical Materials I(△)	Fracture Mechanics(△)		
			Introduction of Mechanical and Transportation Engineering(◎)	Thermodynamics I(◎)	Materials Science(△)	Fusion and Solidification Processings I(△)	Plastic Working and Powder Metallurgy II(△)		
			Machine Design and Drawing(◎)	Fluid Dynamics I(◎)	Elementary Electromagnetism(◎)	Machining(△)	Statistical and Thermal Physics(○)		
				Control Engineering I(◎)	Introduction to Quantum Physics(◎)	Introduction to chemical physics(○)	Internal Combustion Engines(○)		
				An Introduction to Engineering Materials(◎)	Fluid Dynamics II(◎)	Heat Transfer II(○)	Computational Solid Mechanics(○)		
				Fundamentals of Materials Processing(◎)	Thermodynamics II(○)	Combustion Engineering Fundamentals(○)	Mechatronics(△)		
					Heat Transfer I(◎)	Plasma Engineering(○)	Optical Measurement Techniques(○)		
					Data Processing and Numerical Analysis(○)	Theory of Elasticity and Plasticity(○)	Computational Fluid Dynamics(○)		
					Mechanics of Materials II(△)	Dynamics of Vibrations II(△)	Machine Design(△)		
					Mechanism and Kinematics(○)	Electrical and Electronic Engineering(○)	Fluid Machinery(○)		
					Control Engineering II(△)	Mechanical System Control(△)	Internal Combustion Engines(○)		
					Measurement and Signal Processing (◎)	Manufacturing System(△)	Steam Power(○)		
					Machine Elements Design I(○)	Machine Elements Design II(△)	Radiation Engineering(○)		
					Systems Engineering(△)	Reliability Engineering(△)	Nuclear Engineering(○)		
					Transportation(△)	Compressible Fluid Dynamics(○)			
						Basic Chemical Kinetics(○)			
						Natural-Energy Utilization Engineering(○)			
	Developing the ability of solving the technological issues with flexible ideas and creativity.	Introductory Seminar for First-Year Students(◎)	Machine Shop Training (a)(○)	Machine Shop Training (b)(○)	Systems Engineering(△)	Experiments in Mechanical Engineering I(◎)	Experiments in Mechanical Engineering II(◎)	Graduation Thesis(◎)	Graduation Thesis(◎)
				Computer Aided Design(◎)			Mechanical Engineering Design and Production(◎)		
							Internship(△)		
Comprehensive Abilities	Cultivating abilities of communication and of internationally collecting information and releasing it	Introductory Seminar for First-Year Students(◎)	Basic English UsageII(◎)			Experiments in Mechanical Engineering I(◎)	Experiments in Mechanical Engineering II(◎)	Graduation Thesis(◎)	Graduation Thesis(◎)
		Basic English UsageI(◎)	Communication IIA(◎)	Technical English(◎)			Internship(△)		
		CommunicationIA(◎)	Communication IIB(◎)						
		Communication IB(◎)							
		Basic language I(○)							
		Basic language II(○)							

Color-code Common subjects | Foundation Courses | Basic Specialized Subjects (The first group) | Basic Specialized Subjects (The second group) | Specialized Subjects

Symbol (◎)Required subject (○)Compulsory elective subject (△)Free elective subject