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)	
(English)	Program of Mechanical Systems 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) Overview of "Program of Mechanical Systems Engineering"

This program offers education in the fundamentals of mechanical system engineering, the structure and function of mechanical systems and the principles of the design and processing of mechanical systems based on new concepts, computer-aided design (CAE and CAD), measurement and control technology, mechatronics technology, the principles of the design and production of new mechanical systems through intelligent numerical simulation and information processing, as well as basic fields such as the mechanics of materials, the dynamics of vibrations, system controls, and other fields. By offering such education, it aims to develop engineers who, having a broader perspective on human-machine relations and environmental issues, are able to assume cutting-edge design and development roles in production engineering. In order to provide an efficient and integrated education, the teachers belonging to the academic society (Science and Engineering Field, Machine Engineering/Science and Technology Unit) are in charge of education for this program. 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.

Around sixty percent of graduates from this program will advance 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 R&D, design, production engineering, and engineering marketing.

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

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

Based upon the above, 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.

Acquisition of the fundamentals of mechanical system engineering, the structure and function of mechanical

system and the principles of the design and processing of mechanical systems based on new concepts, computer-aided design (CAE and CAD), measurement and control technology, mechatronics technology, the principles of the design and production of new mechanical systems through intelligent numerical simulation and information processing, as well as basic fields such as the mechanics of materials, the dynamics of vibrations, system controls, and other fields.

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.

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4. Curriculum Policy (Policy for Preparing & Implementing Curriculum)

To ensure that students are able to achieve the goals of the program, the program develops and puts into practice a curriculum based on the following policy:

. The Program offers not only basic mechanical education but also specialized education in the structure and function of mechanical systems and the principles of the design and processing of mechanical systems based on new concepts, computer-aided design (CAE and CAD), measurement and control technology, mechatronics technology, and the principles of the design and production of new mechanical systems through intelligent numerical simulation and information processing.

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 first semester of the second year, the students take the specialized basic subjects that are important, together with subjects common to Cluster 1 such as "Mechanics of Materials Ⅰ" and "Fluid Dynamics Ⅰ". Then, from the second semester, the students take specialized subjects, such as highly professional subjects related to advanced technology that reflect the characteristics of this program, and subjects related to integrated systems technology.

In the third year, specialized subjects become major subjects, and the students take subjects required for this program. The program tries, as far as possible, not to allocate multiple specialized subjects to the same time-slot, allowing students to take specialized subjects provided by other programs in Cluster 1 according to their personal interests.

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.

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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 Mechanical Systems 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.)

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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).

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

Academic achievement	Evaluation 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 Work) (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, 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.

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　Basic Specialized Subjects

◎ Required subject
○Compulsory elective subject
△Free elective subject

Group	Class Subjects	Credits	Mechanical Systems Engineering	Transportation Systems	Materials Processing	Energy Transform Engineering	1st grade Spring 1T	1st grade Spring 2T	1st grade Fall 3T	1st grade Fall 4T	2nd grade Spring 1T	2nd grade Spring 2T	2nd grade Fall 3T	2nd grade Fall 4T	3rd grade Spring 1T	3rd grade Spring 2T	3rd grade Fall 3T	3rd grade Fall 4T	4th grade Spring 1T	4th grade Spring 2T	4th grade Fall 3T	4th grade Fall 4T	Note
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																
	Introduction of Mechanical and Transportation Engineering	2	◎	◎	◎	◎	4																
	Technical English	1	◎	◎	◎	◎					2	2											
	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)

◎ Required subject
○

Academic Achievements in Educational Program for Mechanical Systems Engin

The Relationship between Evaluation Items and Evaluation Criteria

	Excellent	Very Good	Good
(1)			

Relationships between the evaluation items and class subjects

Sheet 3

Subject type	Class subjects	credits	Type of course registration	Period	Knowledge and Understanding (1) Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Knowledge and Understanding (2) Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Abilities and Skills (1) Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Abilities and Skills (2) Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Comprehensive Abilities (1) Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Total weighted values of evaluation items in the subject
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 Humanities/Social 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	Introduction to Information and Data Sciences	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	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	1	Required	5semsester							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
Specialized Education	Mechanical Engineering Design and Production	1	Required	6semsester							100	1			100
Specialized Education	Computer Programming	2	Elective	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

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 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	Required	5semsester					100	1					100
Specialized Education	Fluid Dynamics II	2	Elective	4semsester-4T					100	1					100
Specialized Education	Heat Transfer I	2	Elective	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	Required	4semsester					100	1					100
Specialized Education	Theory of Elasticity and Plasticity	2	Elective	5semsester					100	1					100
Specialized Education	Computational Solid Mechanics	2	Elective	5semsester					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	6semsester					100	1					100
Specialized Education	Mechanical System Control	2	Elective	5semsester					100	1					100
Specialized Education	Data Structure and Algorithm	2	Elective	6semsester					100	1					100
Specialized Education	Manufacturing Systems	2	Elective	5semsester					100	1					100
Specialized Education	Machine Elements Design	2	Elective	5semsester					100	1					100
Specialized Education	Machine Design	2	Elective	4semsester					50	1	50	1			100
Specialized Education	Systems Engineering	2	Required	4semsester					100	1					100
Specialized Education	Transportation	2	Elective	4semsester					100	1					100
Specialized Education	Internship	1	Elective	6semsester	40	1					30	1	30	1	100
Specialized Education	Graduation Thesis	5	Required	7,8semsester							55	1	45	1	100

Curriculum Map of Mechanical Systems Engineering

Academic achievements		1st grade		2nd grade		3rd grade		4th grade	
Evaluation Items		Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Knowledge and Understanding	To develop the ability to work positively and independently on the development of local societies, international	Area Courses（○） Health and Sports Courses（○） Introduction to University Education（◎） Peace Science Courses（○）	Area Courses（○） Health and Sports Courses（○）	Area Courses（○）	Area Courses（○）		Internship（○）		
	Acquiring necessary basic knowledge for an engineer and developing the ability to consider logically.	Introduction to Information and Data Sciences ◎ CalculusI ◎ Seminar in Basic Mathematics I Linear AlgebraI General Mechanics I	CalculusII（◎） Seminar in Basic Mathematics II（◎） Linear AlgebraII（◎） General Mechanics II（◎） Experimental Methods and Laboratory Work in Physics I・II（◎） Experimental Methods and Laboratory Work in Chemistry I・II（○）	Basic Electromagnetism（◎） General Chemistry（○） Basic Engineering Computer Programming（◎）					
Abilitis and Skills	Acquring basis of mechanical system engineering steadily and developing the applied skill.		Practice of Mechani Introduction of Mechanical and Transportation Engineering（○） Applied Mathematics I（◎） Machine Design and Drawing（◎）	Applied Mathematics II（◎） Probability and Statistics（◎） Mechanics of Material I（◎） Fluid Dynamics I（◎） Fundamentals of Materials Processing（◎） An Introduction to Engineering Materials（◎） Control Engineering I（◎） Thermodynamics I（◎）	Applied Mathematics III（◎） Engineering Mathematics C（○） Dynamics of Vibrations I（◎） Fluid Dynamics II（○） Mechanics of Materials II（○） Mechanism and Kinematics（○） Systems Engineering（◎） Materials Science（○） Heat Transfer I（○） ◎ Transportation（△）	Engineering Mathematics A（○） Mechanical Materials I（○） Machining（◎） Combustion Engineering Fundamentals（△） Manufacturing Systems（○） Electrical and Electronic Engineering（○） Theory of Elasticity and Plasticity（○） Fusion and Solidification Processings I（△） Dynamics of Vibrations II（○） Computational Solid Mechanics	Synthesis of Applied Mathematics（○） Mechanical Materials II（○） Fracture Mechanics（○） Internal Combustion Engines（△） Mechatronics（○） Machine Design（○） Plastic Working and Powder Metallurgy II（△） Data Structure and Algorithm（○） Measurement and Signal Processing		
	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)（◎） Computer Aided Design（◎）	Systems Engineering（◎）	Experiments in Mechanical Engineering I（◎）	Mechanical Engineering Design and Production（◎） Internship（○）	Graduation Thesis（◎）	Graduation Thesis（◎）
Comprehensive Abilities	Cultivating abilities of communication and of internationally collecting information and releasing it	Introductory Seminar for First-Year Students（◎） Basic English UsageI（◎） CommunicationIA（◎） Communication IB（◎） Basic language I（○） Basic language II（○）	Basic English UsageII（◎） Communication IIA（◎） Communication IIB（◎）	Technical English（◎）		Experiments in Mechanical Engineering I（◎）	Internship（○）	Graduation Thesis（◎）	Graduation Thesis（◎）

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