

# For entrants in AY 2024

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
<b>1. Academic Degree to be Acquired</b> Bachelor's degree in Engineering	
<b>2. Overview</b> <p>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.</p> <p>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 &amp; 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&amp;D, design, production engineering, and engineering marketing.</p>	
<b>3. Academic Awards Policy (Goals of the Program and Policy for Awarding Degrees)</b> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	
<b>4. Curriculum Policy (Policy for Preparing &amp; Implementing Curriculum )</b> <p>To ensure that students are able to achieve the goals of the program, the program develops and puts into</p>	

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.

#### 5. Program Timing/Acceptance Conditions

When to start the program

The second semester of the second year

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. Acceptance conditions for the program are not particularly specified.

#### 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.

#### 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)	
A(Superior:80-89 points)	
B(Good: 70-79 points)	

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.

#### 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 (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 1T	Fall 1T	Spring 2T	Fall 2T	Spring 3T	Fall 3T	Spring 4T	Fall 4T	Spring 1T	Fall 1T	Spring 2T	Fall 2T	Spring 3T	Fall 3T	Spring 4T	Fall 4T			
Peace Science Courses	2		2	Compulsory elective																	○		
Basic Courses in University Education	2	Introduction to University Education	2	Required	⊙																		
	2	Introductory Seminar for First-Year Students	2	Required	⊙																		
	0	Advanced Seminar	1	Free elective					△	△													
	4	Courses in Arts and Humanities/Social Sc	2	Compulsory elective					○	○													
Area Courses	4	Courses in Natural Sciences	2	Compulsory elective					○	○													
	2	Basic English Usage	1		⊙	⊙																	
Common Subjects	English Usage (Note 3)	2	Basic English Usage I	1					⊙	⊙													
		1	Basic English Usage II	1					⊙	⊙													
	English Communication (Note 2)	2	Communication IA	1	Required	⊙	⊙																
		1	Communication IB	1		⊙	⊙																
	Communication	2	Communication IIA	1					⊙	⊙													
		1	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	1 subjects from Basic language II	1						○													
2	Introduction to Information and Data Sciences	2	Required	⊙																			
Health and Sports Courses	2		1or2	Compulsory elective	○	○	○	○															
Basic Subjects		Calculus I	2						⊙														
		Calculus II	2							⊙													
		Linear Algebra I	2						⊙														
		Linear Algebra II	2							⊙													
		Seminar in Basic Mathematics I	1						⊙														
	18	Seminar in Basic Mathematics II	1	Required						⊙													
		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									⊙											
		General Chemistry	2																				
		2	1	Compulsory elective																			
No. of credits required for graduation	46		1																				

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 scheduled.

Note 2: The credit obtained by mastery of 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

Note 3:

Note 4:

**Cluster 1 Specialized Subjects**  
(Program of Mechanical Systems Engineering)

- ◎ Required subject  
 ○ Compulsory elective subject  
 △ Free elective subject

Class Subjects	Credits	Type of course registration	Class Hours/Week																Note
			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	
Dynamics of Vibrations I	2	◎								4									
Experiments in Mechanical Engineering	1	◎									3	3							
Mechanical Engineering Design and Production	1	◎											3	3					
Mechanical Materials I	2	○									4								
Mechanical Materials II	2	○												4					
Fracture Mechanics	2	○												4					
Fusion and Solidification Processings I	2	△									4								
Plastic Working and Powder Metallurgy II	2	△											4						
Materials Science	2	○							4										
Machining	2	◎									4								
Fluid Dynamics II	2	○							4										
Heat Transfer I	2	○						4											
Combustion Engineering Fundamentals	2	△								4									
Internal Combustion Engines	2	△											4						
Data Processing and Numerical Analysis	2	◎							4										
Theory of Elasticity and Plasticity	2	○									4								
Computational Solid Mechanics	2	○										4							
Mechanics of Materials II	2	○						4											
Mechanism and Kinematics	2	○							4										
Dynamics of Vibrations II	2	○									4								
Control Engineering II	2	○						4											
Electrical and Electronic Engineering	2	○									4								
Mechatronics	2	○										4							
Measurement and Signal Processing	2	◎											4						
Mechanical System Control	2	○									4								
Data Structure and Algorithm	2	○											4						
Manufacturing System	2	○										4							
Machine Elements Design	2	◎						4											
Machine Design	2	○										4							
Systems Engineering	2	◎							4										
Computer Programming	2	○									4								
Transportation	2	△						4											
Internship	1	○										3	3						
Graduation Thesis	5	◎																	

**Cluster 1 Specialized Subjects**  
(Program of Mechanical Systems Engineering)

- ◎ Required subject  
 ○ Compulsory elective subject  
 △ Free elective subject

Class Subjects	Credits	Type of course registration	Class Hours/Week																Note		
			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			
Dynamics of Vibrations I	2	◎							4												
Experiments in Mechanical Engineering	1	◎									3	3									
Mechanical Engineering Design and Production	1	◎											3	3							
Mechanical Materials I	2	○									4										
Mechanical Materials II	2	○												4							
Fracture Mechanics	2	○												4							
Fusion and Solidification Processings I	2	△									4										
Plastic Working and Powder Metallurgy II	2	△											4								
Materials Science	2	○							4												
Machining	2	◎									4										
Fluid Dynamics II	2	○							4												
Heat Transfer I	2	○							4												
Combustion Engineering Fundamentals	2	△									4										
Internal Combustion Engines	2	△											4								
Data Processing and Numerical Analysis	2	◎							4												
Theory of Elasticity and Plasticity	2	○									4										
Computational Solid Mechanics	2	○										4									
Mechanics of Materials II	2	○							4												
Mechanism and Kinematics	2	○								4											
Dynamics of Vibrations II	2	○									4										
Control Engineering II	2	○							4												
Electrical and Electronic Engineering	2	○									4										
Mechatronics	2	○											4								
Measurement and Signal Processing	2	◎												4							
Mechanical System Control	2	○									4										
Data Structure and Algorithm	2	○												4							
Manufacturing System	2	○										4									
Machine Elements Design	2	◎							4												
Machine Design	2	○											4								
Systems Engineering	2	◎								4											
Computer Programming	2	○										4									
Transportation	2	△							4												
Internship	1	○											3	3							
Graduation Thesis	5	◎																			

# Academic Achievements in Educational Program for Mechanical Systems Engin

## The Relationship between Evaluation Items and Evaluation Criteria

Excellent

Very Good

Good

(1)



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	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items		
Liberal Arts Education	Introduction to University Education	2	Required	1semester:1T	100	1										100
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	1semester							50	1	50	1		100
Liberal Arts Education	Peace Science Courses	2	Elective	1semester:2T	100	1										100
Liberal Arts Education	Basic English UsageI	1	Required	1semester									100	1		100
Liberal Arts Education	Basic English UsageII	1	Required	2semester									100	1		100
Liberal Arts Education	CommunicationI	1	Required	1semester									100	1		100
Liberal Arts Education	Communication I	1	Required	1semester									100	1		100
Liberal Arts Education	Communication II	1	Required	2semester									100	1		100
Liberal Arts Education	Communication II	1	Required	2semester									100	1		100
Liberal Arts Education	Basic language I	1	Elective	1semester:1T									100	1		100
Liberal Arts Education	Basic language II	1	Elective	1semester:2T									100	1		100
Liberal Arts Education	Area Courses: Courses in Arts and Humanities/Social Sc	4	Elective	1,2,3,4semester	100	1										100
Liberal Arts Education	Area Courses: Courses in Natural Sciences	4	Elective	1,2,3,4semester	100	1										100
Liberal Arts Education	Health and Sports Courses	2	Elective	1,2semester	100	1										100
Liberal Arts Education	Introduction to Information and Data Sciences	2	Required	1semester			100	1								100
Liberal Arts Education	CalculusI	2	Required	1semester			100	1								100
Liberal Arts Education	CalculusII	2	Required	2semester			100	1								100
Liberal Arts Education	Linear AlgebraI	2	Required	1semester			100	1								100
Liberal Arts Education	Linear AlgebraII	2	Required	2semester			100	1								100
Liberal Arts Education	Seminar in Basic Mathematics I	1	Required	1semester			100	1								100
Liberal Arts Education	Seminar in Basic Mathematics II	1	Required	2semester			100	1								100
Liberal Arts Education	General Mechanics I	2	Required	1semester			100	1								100
Liberal Arts Education	General Mechanics II	2	Required	2semester			100	1								100
Liberal Arts Education	Basic Electromagnetism	2	Required	3semester			100	1								100
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I	2	Required	2semester			100	1								100
Liberal Arts Education	General Chemistry	2	Elective	3semester			100	1								100
Liberal Arts Education	Experimental Methods and Laboratory Work in Chemistry I	2	Elective	2semester			100	1								100
Specialized Education	Applied Mathematics I	2	Required	2semester					100	1						100
Specialized Education	Applied Mathematics II	2	Required	3semester					100	1						100
Specialized Education	Applied Mathematics III	2	Required	4semester					100	1						100
Specialized Education	Engineering Mathematics A	2	Elective	5semester					100	1						100
Specialized Education	Engineering Mathematics C	2	Elective	4semester					100	1						100
Specialized Education	Probability and Statistics	2	Required	3semester					100	1						100
Specialized Education	Synthesis of Applied Mathematics	2	Elective	6semester					100	1						100
Specialized Education	Practice of Mechanics	1	Elective	2semester					100	1						100
Specialized Education	Introduction of Mechanical and Transportation Engineering	2	Required	2semester					100	1						100
Specialized Education	Technical English	1	Required	3semester					100	1						100
Specialized Education	Basic Engineering Computer Programming	2	Required	3semester			100	1								100
Specialized Education	Experiments in Mechanical Engineering	1	Required	5semester							80	1	20	1		100
Specialized Education	Fundamentals of Materials Processing	2	Required	3semester					100	1						100
Specialized Education	An Introduction to Engineering Materials	2	Required	3semester					100	1						100
Specialized Education	Mechanics of Material I	2	Required	3semester					100	1						100
Specialized Education	Dynamics of Vibrations I	2	Required	4semester					100	1						100
Specialized Education	Control Engineering I	2	Required	3semester					100	1						100
Specialized Education	Fluid Dynamics I	2	Required	3semester					100	1						100
Specialized Education	Thermodynamics I	2	Required	3semester:1T					100	1						100
Specialized Education	Machine Design and Drawing	1	Required	2semester					100	1						100
Specialized Education	Computer Aided Design	1	Required	3semester							100	1				100
Specialized Education	Mechanical Engineering Design and Production	1	Required	6semester							100	1				100
Specialized Education	Computer Programming	2	Elective	5semester			100	1								100
Specialized Education	Machine Shop Training (a)	1	Required	2semester							100	1				100
Specialized Education	Machine Shop Training (b)	1	Required	3semester							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	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	
Specialized Education	Mechanical Materials I	2	Elective	5semester					100	1					100
Specialized Education	Mechanical Materials II	2	Elective	6semester					100	1					100
Specialized Education	Fracture Mechanics	2	Elective	6semester					100	1					100
Specialized Education	Fusion and Solidification Processings I	2	Elective	5semester					100	1					100
Specialized Education	Plastic Working and Powder Metallurgy II	2	Elective	6semester					100	1					100
Specialized Education	Materials Science	2	Elective	4semester					100	1					100
Specialized Education	Machining	2	Required	5semester					100	1					100
Specialized Education	Fluid Dynamics II	2	Elective	4semester-4T					100	1					100
Specialized Education	Heat Transfer I	2	Elective	4semester-3T					100	1					100
Specialized Education	Combustion Engineering Fundamentals	2	Elective	5semester					100	1					100
Specialized Education	Internal Combustion Engines	2	Elective	6semester					100	1					100
Specialized Education	Data Processing and Numerical Analysis	2	Required	4semester					100	1					100
Specialized Education	Theory of Elasticity and Plasticity	2	Elective	5semester					100	1					100
Specialized Education	Computational Solid Mechanics	2	Elective	5semester					100	1					100
Specialized Education	Mechanics of Materials II	2	Elective	4semester					100	1					100
Specialized Education	Mechanism and Kinematics	2	Elective	4semester					100	1					100
Specialized Education	Dynamics of Vibrations II	2	Elective	5semester					100	1					100
Specialized Education	Control Engineering II	2	Elective	4semester					100	1					100
Specialized Education	Electrical and Electronic Engineering	2	Elective	5semester					100	1					100
Specialized Education	Mechatronics	2	Elective	6semester					100	1					100
Specialized Education	Measurement and Signal Processing	2	Required	6semester					100	1					100
Specialized Education	Mechanical System Control	2	Elective	5semester					100	1					100
Specialized Education	Data Structure and Algorithm	2	Elective	6semester					100	1					100
Specialized Education	Manufacturing Systems	2	Elective	5semester					100	1					100
Specialized Education	Machine Elements Design	2	Elective	5semester					100	1					100
Specialized Education	Machine Design	2	Elective	4semester					50	1	50	1			100
Specialized Education	Systems Engineering	2	Required	4semester					100	1					100
Specialized Education	Transportation	2	Elective	4semester					100	1					100
Specialized Education	Internship	1	Elective	6semester	40	1					30	1	30	1	100
Specialized Education	Graduation Thesis	5	Required	7,8semester							55	1	45	1	100

