

# 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)	プログラム
(English)	Program of Material Processing

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

### 2. Overview

The Program of Material Processing in Cluster 1 aims at nurturing engineers and researchers who, having a broader perspective on human-machine relations such as general machinery, automobiles, electrical machinery, information communication, heavy industry, chemical industry, etc., energy, and environmental issues, are able to assume cutting-edge design and development roles in production engineering. In order for students to develop their perspectives in other related fields, while also gaining in-depth expertise, the program will be run not only by specialists from the closely-related Materials and Processing Program, but also by specialists from the other three programs in Cluster 1, as well as by highly-skilled technical personnel from the Phoenix Workshop.

In particular, this program helps students acquire basic knowledge as mechanical engineers through the learning of basic mechanical subjects, drafting and design, and machine shop training at the Phoenix Workshop. Also, this program offers such materials-related specialized subjects as machine materials and materials science; specialized subjects related to the deformation and destruction of materials, such as material strength and elastic-plastic engineering; and specialized subjects that deal with the technology of forming processes, such as forming processes and machine processes. The program provides students with highly specialized education in the design, development, and use of functional materials, and in the principles of production and processing. 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 Material Processing 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.

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 completion of courses in material mechanics, mechanical dynamics, thermodynamics, and fluid dynamics (the so-called 'four dynamics') and other basic mechanical subjects. In addition, the completion of courses in highly-specialized subjects on related to design and development, and to the principles of production and processing of functional materials, which form the foundation of the development and manufacturing technology of products for the next generation.

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

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

The Program of Material Processing offers not only machine-related basic education, but also specialized education concerning the design and development of new functional materials and utilization technology, as well as the principles of production and processing, and their the application.

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:

- 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, specialized basic subjects such as “Mechanics of Materials ” and “Fluid Dynamics ” become major subjects. In the second semester of the second year, the students are assigned to this program. As a result, specialized subjects in accordance with the program become major subjects to be taken.
- In the third year, specialized subjects tailored to the program continue to become major subjects to be taken.
- 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 .3 (at)-1a 852Dd05.8E JDPxC8PrPR001QWRVWUWWK003322.20055>12.20052004A0055>124 0C

- \* 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.

Academic achievement	Evaluation criteria
Excellent	3.00 4.00
Very Good	2.00 2.99
Good	1.00 1.99

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

Positioning

The graduation thesis is positioned as one of the major subjects to achieve the following learning/educational goals:

- (D) Developing the ability to solve engineering issues on one's own initiative with flexible thinking and creativity
- (E) 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 to those who meet the conditions for embarking on a graduation 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, Mechanical Engineering Design and Production, Machine Shop Training, Experiments in Mechanical Engineering
- (4) Students must gain 11 credits or more out of 15 credits, the required number 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

Subject type	Required No. of credits	Class subjects, etc.	No. of credits	Type of course registration	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)																				
					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		Spring		Fall		
					1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	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																					
	4	Courses in Natural Sciences	2	Compulsory elective																					
	Common Subjects	2	Basic English Usage	1																					
				1																					
		2	Communication I	1	Required																				
				1																					
		2	Communication II	1	Required																				
1																									
2		Initial Foreign Languages (Select one language from German, French, Spanish, Russian, Chinese, Korean, and Arabic)	1 subjects from Basic language I	Compulsory elective																					
			1 subjects from Basic language II	Compulsory elective																					
2		Introduction to Information and Data Sciences	2	Required																					
Health and Sports Courses		2		1or2	Compulsory elective																				
		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																					
	Basic Subjects		General Mechanics I	2																					
			General Mechanics II	2																					
			Basic Electromagnetism	2																					
		Experimental Methods and Laboratory Work in Physics I Note	1																						
		Experimental Methods and Laboratory Work in Physics II Note	1																						
		General Chemistry	2																						
2	Experimental Methods and Laboratory Work in Chemistry I(Note 4)	1	Compulsory elective																						
	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

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 or

Note 3

Note 4

## Cluster 1 Basic Specialized Subjects

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

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

Required subject  
Compulsory elective subject  
Free elective subject

1T 2T 3T 4T 1T 2T 3T 4T 1T 2T 3T 4T 1T 2T 3T 4T  
Dynamics of V Dynamics of V Airfa V r v e 1 D gi 43 (c s o) 2 4 T m (4T) T j E T E M C Q B C M C I 3 (c) D C 8 0 8 E 6 8

## Academic Achievements in Educational Program for Materials and Processing 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 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.
Abilities and Skills	(1)	Acquiring basis of mechanical system, material creation and processing engineering steadily, and being able to apply	Acquiring basis of mechanical system, material creation and processing engineering steadily, and being able to apply it	Acquiring basis of mechanical system, material creation and processing engineering steadily, and being able to apply it at the standard 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 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 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 understand the position of machine system engineers and material creating/processing engineers in society, and to solve ethical problems



## Relationships between the evaluation items and class subjects

					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								
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	Area Courses(Courses in Arts and Humanities/Social Sci)	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	Basic English UsageI	1	Required	1semester							100	1	100	
Liberal Arts Education	Basic English UsageII	1	Required	2semester							100	1	100	
Liberal Arts Education	CommunicationIA	1	Required	1semester							100	1	100	
Liberal Arts Education	Communication IB	1	Required	1semester							100	1	100	
Liberal Arts Education	Communication IIA	1	Required	2semester							100	1	100	
Liberal Arts Education	Communication IIB	1	Required	2semester							100	1	100	
Liberal Arts Education	Basic language I	1	Elective	1semester-1T							100	1	100	
Liberal Arts Education	Basic languageII	1	Elective	1semester-2T							100	1	100	
Liberal Arts Education	Introduction to Information and Data Sciences	2	Required	1semester			100	1					100	
Liberal Arts Education	Health and Sports Courses	2	Elective	1,2semester	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	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	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 I (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English II (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English III (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English IV (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English V (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English VI (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English VII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English VIII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English IX (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English X (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XI (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XIII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XIV (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XV (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XVI (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XVII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XVIII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XIX (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XX (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXI (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXIII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXIV (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXV (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXVI (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXVII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXVIII (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXIX (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320
Specialized Education	Technical English XXX (Engineering English)	4	Required	1semester	102	66	142	66	142	104	66	142	104	320



