

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)	輸送システムプログラム
(English)	Program of Transportation Systems

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

2. Overview

(1) Program overview

Since ancient times, humankind has developed civilization through the transportation of people and goods. Vehicles, which are a product of civilization, play an important role as a means of transporting people and goods. Furthermore, with the development of civilization, these vehicles have expanded their field from the land to the sea and then to the air. In modern times, the globalization of humankind's activity has been increasing, and complicated transportation networks have been established throughout the whole geosphere, including land, sea, and air, to support humankind's various activities. Engineering technology for transportation equipment, especially marine vessels, aircraft, automobiles, railways, and distribution systems, has become more important than ever. Meanwhile today, the geosphere, which is the field in which transportation equipment is moved, is facing serious environmental problems. In considering engineering technology for transportation equipment, it is indispensable to have the perspective of creating and maintaining not only design, from the existing viewpoint of low environmental load, but also a system of coexistence, in which artificial transportation equipment and the natural environment are in harmony with each other. Therefore, it is extremely important to develop engineering technology for creating and maintaining the geospheric environment, while exploring the oceanic and aerial environments, both locally and globally, from a physical engineering perspective. It is crucially important to establish engineering technology that enables transportation equipment and the geosphere to coexist. The Program of Transportation Systems offers the comprehensive education in engineering required by engineers working in such areas.

To be more specific, the program offers general basic education in the first year, basic education in engineering, such as mathematics and dynamics, in the second year, and specialized engineering education in the third and fourth years. During this time, students are required to acquire a wide range of knowledge about transportation equipment and the geospheric environment, and to enlarge their thinking skills. In other words, students learn the engineering skills necessary to plan, manufacture, construct, and maintain transportation equipment that can coexist in harmony with the natural environment and with distribution systems. Students also analyze and assess the geospheric environment, and study the areas of engineering relevant to planning, designing, creating, and maintaining environment-related equipment and environmental systems, in order to reduce the impact on the environment

One of the characteristics of this program is that development of overall ability as engineers is particularly emphasized, in addition to education in engineering knowledge. To that end, one of the key pillars of the program is the Project Creation Group, which allows students to actually plan, design, and manufacture products, and evaluates performance using engineering methodology. Through such learning, the program develops people who can actively take a comprehensive approach to technical issues related to transportation equipment and the geosphere, including land, ocean, air, and environment-related equipment. In other words, the program produces professionals who are able to discover problems on their own, explore solutions to the problems scientifically and rationally, and become engineers or researchers capable of taking action and showing leadership in solving problems in a harmonious and ethical way.

Technology developed by the program is mainly deployed in the areas of transportation equipment, environmental

conservation, and natural energy utilization. To be more specific, the technology is not only deployed in hardware

5. Program Timing/Acceptance Conditions

When to start the program

The second semester of the second year

Credit requirements

Before the start of the second semester of the second year. Assignment to educational programs is decided based on student request and academic results no later than the end of the first semester of the second year.

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, evaluation criteria are applied to each academic achievement evaluation item to clearly demonstrate the attainment level. 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

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

calculated by adding the weighted values to the numerically-converted values of their academic achievements (S = 4, A = 3, B = 2, and C= 1) in

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

each subject being evaluated.

* For the relation between evaluation item and evaluation criteria, see the attached sheet 2.

* For the relation between evaluation item and class subjects, see the attached sheet 3.

* For curriculum map, see the attached sheet 4.

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

○Class Goals

Students are assigned to their respective educational subjects and tutors from the Program of Transportation Systems, and choose a topic related to a specialized field. Students apply their acquired knowledge and abilities and conduct research that enables them to enhance their problem-solving abilities while trying to gain new knowledge.

Doing the above aims at cultivating the following abilities (the learning goals and corresponding evaluation items are also given):

1.Students can demonstrate scientific knowledge concerning multiple solutions to the challenges of the research.

(Goal A, evaluation items: Knowledge/Understanding-1, Ability/Skills-1).

2. Students can explain knowledge and methodology that forms a basis for constituent technology related to the challenges of the research. (Goal B, evaluation items: Knowledge/Understanding-2, -3, Ability/Skills-2, -3)

3. Students can explain not only the constituent technology, related to the phenomena which form the object of their research, but also integrated, applied technology. They are also able to explain the validity and credibility of their analytical method, the applicability of their engineering knowledge, and the limits and social significance of the technology. (Goal C, evaluation items: Knowledge/Understanding-4, -5, -6, Ability/Skills-4, -5, -6)

4. Students can discover problems in their chosen research on their own initiative, explore solutions to the problems scientifically and rationally, and solve the problems logically, harmoniously, and ethically. Students can explain the validity and credibility of their analytical method. (Goal D, evaluation item: Overall Ability-1)

5. Students can express the details of their research through the effective use of written explanations, charts, and formulas, and, at the same time, are able to give presentations in a proper way. (Goal E, evaluation item: Overall Ability-2)

6. Students can identify knowledge and issues in their research results in order to answer further complex questions. (Goal E, evaluation item: Overall Ability-2)

7. Students can conduct research systematically within constraints, and can compile their results to complete a paper. (Goal E, evaluation item: Overall Ability-2)

When and how it is assigned

In principle, educational subjects are decided based on the student's request. However, the acceptable number of students for each educational subject is limited due to the need for educational guidance. As such, when students' requests are disproportionately distributed, some adjustment is made. The following is the schedule for graduation theses.

1. In early February of the third year, how theses are assigned and the topic of the theses for each educational

Other

This program aims to cultivate overall abilities by making full use of wide-ranging education and vision (Goal A , evaluation items: Knowledge/Understanding -1. Ability/Skills -1), basic knowledge (Goal B, evaluation items: Knowledge/Understanding -2, 3 Ability/Skills -2, 3), specialized knowledge and applied skills (Goal C, evaluation items: Knowledge/Understanding -4, 5, 6 Ability/Skills -4, 5, 6) design skills and the ability to get things done (Goal D, evaluation item: Overall Ability -1), communication skills and information transmitting skills (Goal E , evaluation item: Overall ability -2) , all of which are obtained through taking the Program of Transportation Systems. Also, based on the thesis and presentation content, mastery of the abilities that graduates of this program must acquire is evaluated in a comprehensive manner.

10. Responsibility-taking System

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

In order to monitor and improve this education program, an educational monitoring and improvement system has been established, as shown in the chart below, and has been in operation since 2003. This educational monitoring and improvement system is composed of two PDCA systems, the PDCA system responsible for the monitoring and improvement of each subject and its related subjects, and the PDCA system responsible for the monitoring and improvement of the entire Education Program, including the educational goals and the image of students that is presented.

Under the monitoring and improvement system for each course, each subject and its related subjects are monitored and improved in PDCA cycles as described below.

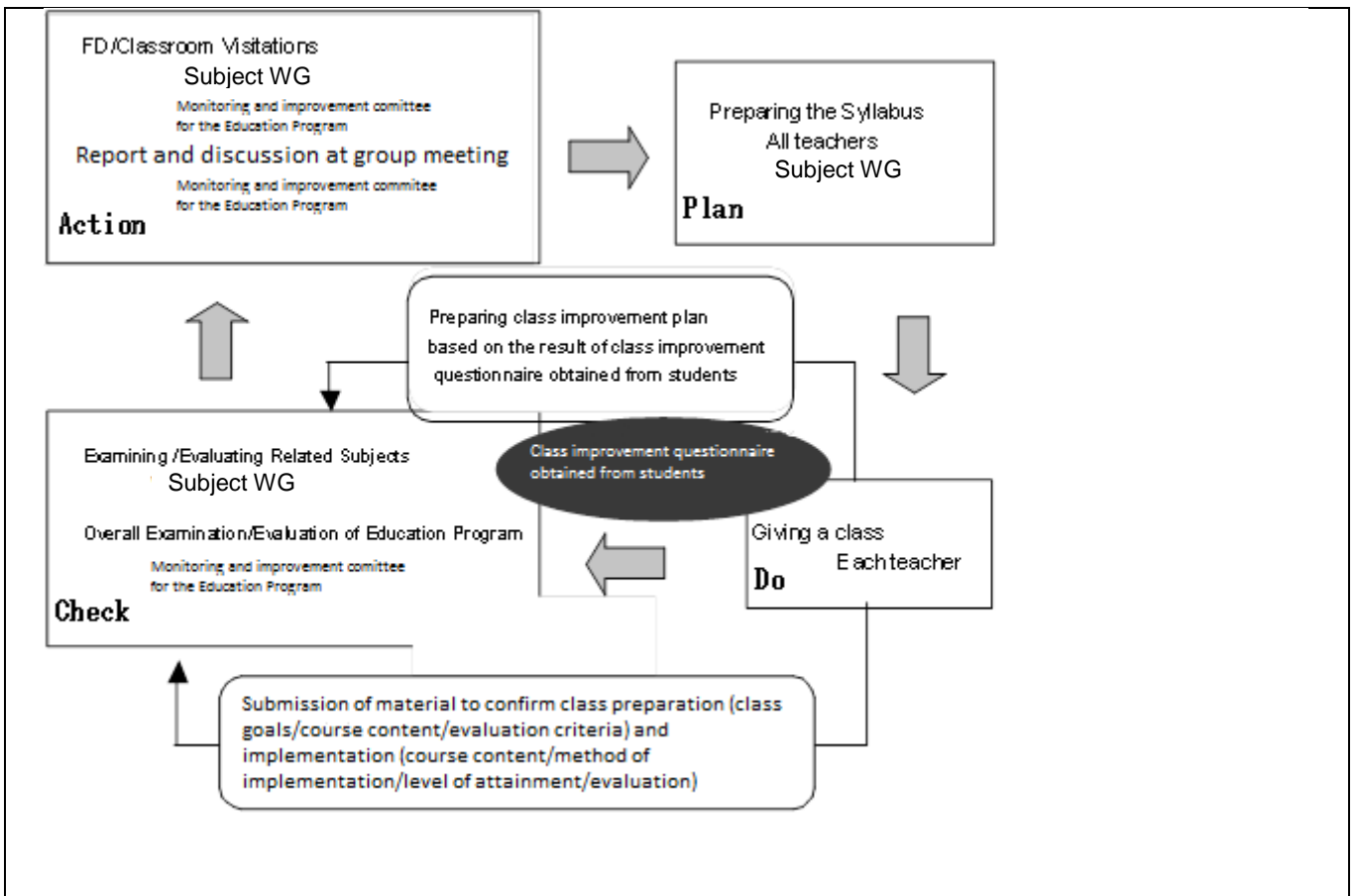
Plan: Preparing the Syllabus

- For each subject, a WG checks the syllabus prepared by the person in charge of the subject, then either ratifies it or makes improvements.

Do: Giving a class

- The person in charge of the subject gives a class based on the syllabus approved by the subject

WG



(2) Education Program PDCA

In the monitoring and improvement system for the Education Program, the Education Program is monitored and improved in the PDCA style described below.

Plan: Creating the Education Program

- The Education Program is created at by the subject WG, the monitoring and improvement committee for the Education Program, and the Educational Affairs Committee of the School of Engineering.

Do: Implementing the Education Program and Cooperating with Related Subjects

- The Education Program is implemented by each teacher, by the subject WG, and by the monitoring and improvement committee for the Education Program. At that time, cooperation is enlisted from related subjects.

Check: Self-examination of the Education Program and External Evaluation

- In the monitoring and improvement committee for the Education Program, problems with the program are examined based on the questionnaires obtained from graduates and students of the school for confirmation or making improvements
- In the monitoring and improvement committee for the School of Engineering, external examination and evaluation of the planning and implementation of the Education Program are made.

Action: Proposing New Educational Philosophy, Educational Goals/Educational Purposes

- At the next Education Program review committee, the educational philosophy and educational goals and purposes are reviewed by using the results of the above self-examination and external evaluation as reference.

(3) Program evaluation

Under the two PDCA systems detailed above, the subject WG and monitoring and improvement committee for the Education Program carry out their checks and evaluations. The following describes the activities of each committee in detail.

Subject WG

All subjects provided by this Education Program are divided into several categories. A subject WG is held by the person in charge of each related subject.

In the subject WGs, class plans, achievements, and the result of classes given (based on class improvement questionnaires) are discussed.

Cluster 1 Mechanical Systems, Transportation, Material and Energy

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									
Peace Science Courses																							
Basic Courses in University Education	Introduction to University Education																						
	Introductory Seminar for First-Year Students																						
Common Subjects	Area Courses		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																	
		Communication I	2	CommunicationI	1	Required																	
				Communication I	1																		
		Communication II	2	Communication II	1	Required																	
				Communication II	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 Sciences	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	1																		
			Experimental Methods and Laboratory Work in Physics II Note	1																			
			2	General Chemistry	2	Compulsory elective																	
				Experimental Methods and Laboratory Work in Chemistry I Note	1																		
		Experimental Methods and Laboratory Work in Chemistry II Note		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 or 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 Work 1credit and Experimental Methods and Laboratory Work 1credit .

Cluster 1 Basic Specialized Subjects

Required subject
Compulsory elective subject
Free elective subject

Class Hours/Week

4th grade

Class Subjects	Credits	Type of course registration				Class Hours/Week								Note					
		Mechanical Systems Engineering	Transportation Systems	Materials Processing	Spring		Fall		Spring		Fall								
					1T	2T	3T	4T	1T	2T	3T	4T	1T		2T	3T	4T		
Applied Mathematics I	2							4											
Applied Mathematics II	2																		
Applied Mathematics III	2																		
Engineering Mathematics A	2																		
Engineering Mathematics C	2																		
Probability and Statistics	2																		
Synthesis of Applied Mathematics	2																		
Practice of Mechanics	1																		
Engineering Mechanics	2																		
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																		
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)

Cluster 1 Specialized Subjects

Program of Transportation Systems

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	
Summary of Applied Analysis	2								4										
Basic Electrical and Electronic Engineering	2													4					
Instrumentation Engineering	2								4										
Engineering Computer Programming	2										4								
Reliability Engineering	2										4								
Experiments and Analytical Procedures in Transportation Systems	2										6								
Ship Design and Practice	2								6										
Transportation Systems Project	4												4	4					
Fluid Dynamics for Vehicle and Environmental Systems	2										4								
Structural Mechanics	2								4										
Fundamentals in Dynamics	2								4										
Project Management	2										4								
Aircraft Design and Practice	2												6						
Structural Analysis and Design	2													4					
Theory of Elasticity	2												4						
Theory of Vibration	2											4							
Design of large scale systems	2													4					
Remote sensing	2												4						
Natural-Energy Utilization Engineering	2														4				
Viscous fluid and Turbulence	2										4								
Ocean-Atmosphere Systems	2													4					
Mathematical Optimization	2									4									
Transportation Vessels and Vehicles I	1											2							
Transportation Vessels and Vehicles II	1												2						
Transportation Vessels and Vehicles III	1													2					
Logistics Planning and Design	2														4				
Internship	1													3	3				
Graduation Thesis	5																		

Academic Achievements in Transportation Systems Program

The Relationship between Evaluation Items and Evaluation Criteria

	Excellent	Very Good	Good
(1) Cultural subjects: Acquiring general knowledge from viewpoints of Nature Human and Society Science, and the understanding of a sense of ethics.	To be able to sufficiently understand the current status of earth's environment and possible future problems. Also, to be able to adequately state multiple scientific perceptions concerning engineering	At the standard level, to be able to understand the current status of earth's environment and possible future problems. Also, to be able to state multiple scientific perceptions concerning engineering	At the minimum level, to be able to understand the current status of earth's environment and possible future problems. Also, to be able to state multiple scientific perceptions concerning engineering
(2) Mathematical and mechanical subjects: To understand basic knowledge of mathematical dynamical system, which is essential knowledge for engineers and	To be able to sufficiently understand equations which dominate major elements of phenomena, through basic subjects such as mathematics, mechanics, kinematics, etc.	To be able to understand, in standard level, equations which dominate major elements of phenomena, through basic subjects such as mathematics, mechanics, kinematics, etc.	To be able to understand, at least, equations which dominate major elements of phenomena, through basic subjects such as mathematics, mechanics, kinematics, etc.
(3) Information engineering subjects: To acquire understanding and basic knowledge required for engineers and researchers.	With regard to classes of information engineering, to be able to adequately understand information process technology based on mathematics and mechanics.	With regard to classes of information engineering, to be able to understand information process technology based on mathematics and mechanics at the	With regard to classes of information engineering, to be able to understand information process technology based on mathematics and mechanics at the standard
(4) The area of structural engineering: The ability to apply the technical knowledge on structural engineering to solve issue related with transportation equipment and coexistence with the environment	Being able to fully explain the validity and reliability of way667537(on)18 (m)18T0667		

