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 : J (((	

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 ((((6Q((4 ((((((4 ((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.

environmental conservation, and natural energy utilization. To be more specific, the technology is not only deployed in hardware areas such as marine vessels, aircraft and spacecraft, automobiles, information and telecommunication equipment, and wind and ocean-current power generation, but also in software areas such as transportation and distribution systems, electronic and computer systems, systems engineering, and a wide range of other areas.

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

The Program of Transportation Systems aims to nurture engineers and researchers with expertise related to transportation equipment (engineering for planning, manufacturing, building, and maintaining transportation equipment and distribution systems that can coexist in harmony with the natural environment), and coexistence with the environment (engineering for planning, designing, creating and maintaining environment-related equipment and environmental systems to analyze and better understand the geospheric environment, and to reduce the impact on the environment). In addition to that, the Program of Transportation Systems trains engineers and researchers capable of taking action and showing leadership, who are able to actively discover engineering problems, explore solutions to the problems scientifically and rationally, and solve various engineering issues in an ethical and harmonious way.

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education aimed at developing a broad and deep range of general knowledge, a global perspective for peace, general decision-making skills, and a well-rounded character; a specialized education designed to meet the goals listed below; and the number of credits necessary to meet the standard of the course.

Goal A: The acquisition of general knowledge in the three fields of natural science, humanities and society, and education, aimed at nurturing ethics and the ability to think about things from various perspectives.
Goal B: The acquisition and understanding of the fundamental knowledge required by engineers and researchers.
Goal C: The nurturing of expertise related to transportation equipment and coexistence with the environment, and the nurturing of the ability to apply this expertise to solving problems.
Goal D : The nurturing of the ability to create designs related to transportation equipment and coexistence with the environment, and the nurturing of the ability to run projects.
Goal E : The nurturing of communication skills and the ability to transmit information required by engineers and researchers.

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

The Program of Transportation Systems prepares and puts into practice a curriculum based on the following policy, to ensure that students are able to achieve the goals of the program. Learning achievement is evaluated by performance rating in each subject and the attainment of the goals set by the Education Program.

・In the first year, students take core subjects composed of compulsory and elective subjects. These subjects correspond to Goal A. They are composed of languages, information subjects, mathematics and science subjects, the introductory subjects of this program, and other Liberal Arts Education subjects.

・In the second year, students take compulsory subjects and elective subjects. These are composed of mathematical and dynamic systems subjects, which correspond to Goal B, and subjects related to mechanics of materials and fluid dynamics, which correspond to Goal C.

・In the third year, students take subjects that are closely related to transportation equipment and coexistence with the environment. At the same time, students cultivate highly professional knowledge and abilities through experiments, training, and subjects related to design and production projects. These are composed of subjects based on professional dynamic systems, which correspond to Goal C, and subjects based on project work, which correspond to Goals D and E.

・In the fourth year, students work on their graduation theses, making full use of the abilities gained by meeting Goals A to E in the Program of Transportation Systems. Based on the theses and presentations submitted, mastery of Goals A to E is generally evaluated.

5. Program Timing/Acceptance Conditions

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The second semester of the second year

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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 ((((6 (((((4from admission to the current 4 (((((B M 4((O 4((O 4(((((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 each subject being evaluated.

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 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)

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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 subject are explained.

2. In the middle of February in the third year, students attend a final presentation for further understanding of graduation theses.

3. At the end of March in the third year, where to assign those who pass the standard for embarking on a thesis is decided at orientation.

4. How to proceed with research varies according to the topic of research for each educational subject. Students begin with research into the literature, then attend seminars, conduct surveys and experiments, and continue to work actively on research under the guidance of tutors. (The tutors evaluate learning and research attitudes in the middle of February.)

5. More than one tutor, including the head tutor, check the evaluation of class goals 5 and 1 - 3.

6 At the beginning of February in the fourth year, the students submit their theses to two examiners (head tutor and deputy head tutor) to receive evaluation of their level of attainment of class goals 1 - 7.

7 The students receive evaluation of class goals 5 and 6 at the final presentation held in the middle of February in the fourth year.

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(1)Tutors make appropriate checks to ensure that students spend time studying on a daily basis, so that they can continually enhance their problem-solving abilities, and that they conduct research, using their research daybooks, seminar data, research notebooks, relevant literature, etc. as reference and, based on this, the tutors evaluate the students' learning and research attitudes during the year.

(2)The head and deputy-head tutors evaluate the level of attainment of the class goals 1 - 7 based on the theses submitted.

(3)Furthermore, in the mid-term and final presentations, one or more teachers in attendance make an evaluation based mainly on the level of attainment of class goal 5.

Students who have earned a mark of 60% or more in all three of the above evaluations are considered to have passed and are awarded credit.

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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- ((0 4(L 4(K 4((I 1

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 WG for the subject.

Check: Examining and Evaluating Related Subjects, Overall Examination and Evaluation of the Education Program

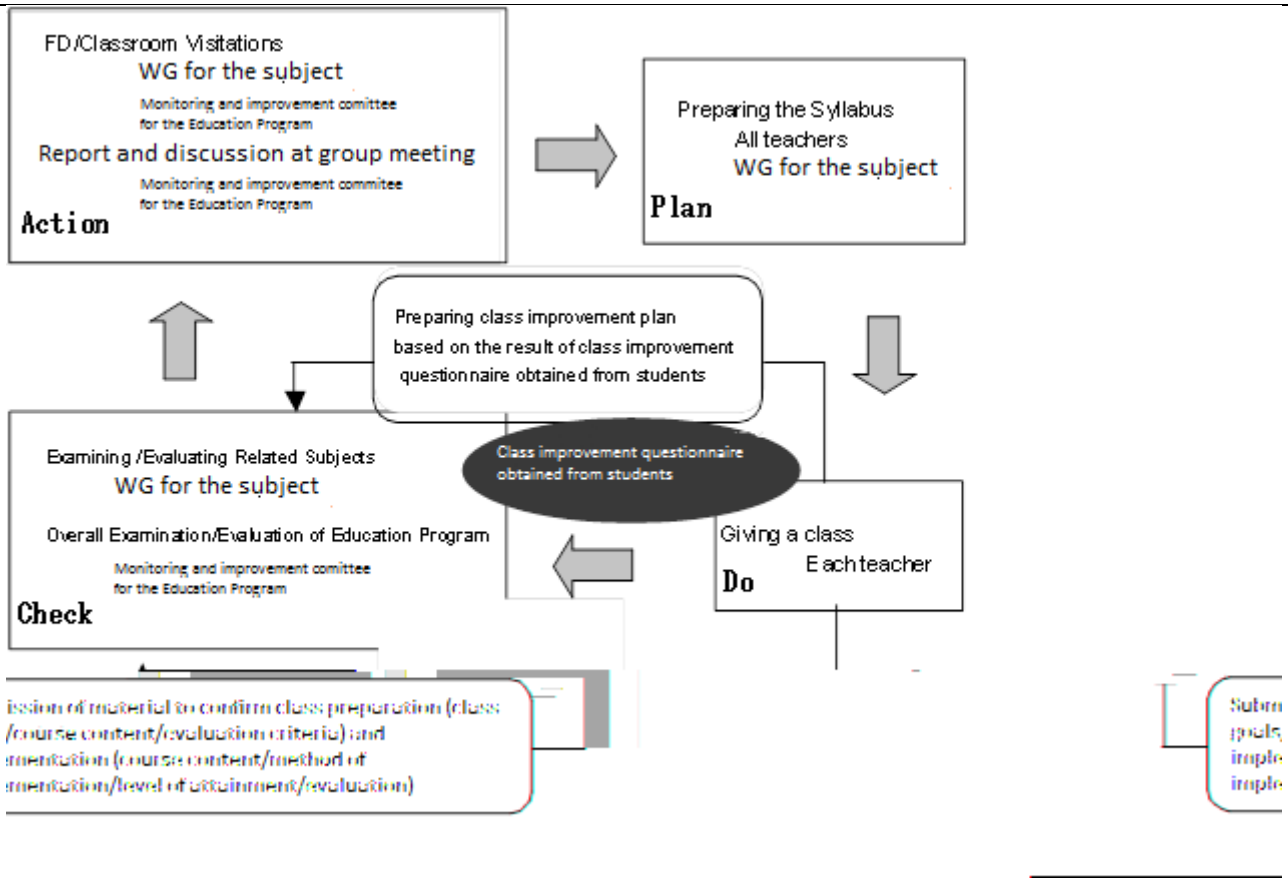
・The WG for the subject checks if the planning and implementation of the class is appropriate, then ratifies it or makes improvements.

・The monitoring and improvement committee for the Education Program checks if the planning and implementation of the class is appropriate, then either ratifies it or makes improvements. At that time, the materials for confirming the planning and implementation of the subject, as well as the results of class improvement questionnaire obtained from students, are used.

Action: FD/Classroom Visitations, Report to Faculty Member Meeting/ Discussion

・FD and classroom visitations are conducted at the initiative of the WG for the subject and the monitoring and improvement committee for the Education Program.

・When faculty members participate in external FD, the details must be reported at a faculty meeting.



(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

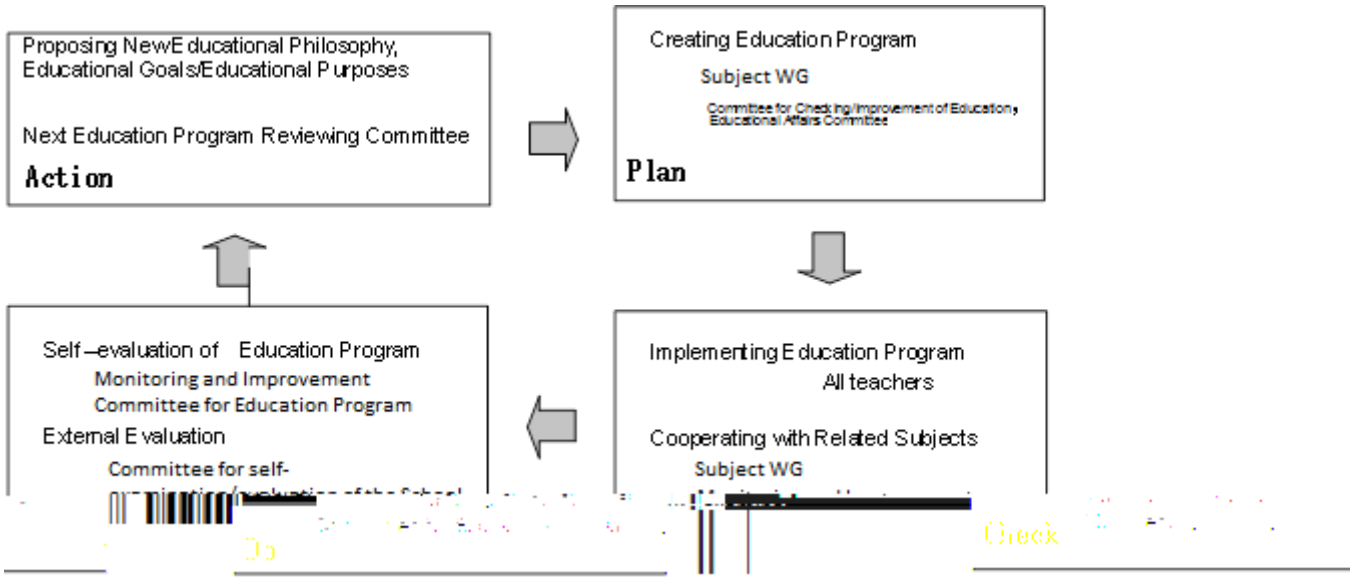
- The Education Program is implemented by each teacher, by the subject WG, and by the monitoring and improvement committee for the Education Program. At that time, cooperation is enlisted from related subjects.

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.

Monitoring and Improvement Committee of the Education Program

While the responsibility for planning and implementing each subject, and its related subjects, lies with the above-mentioned WGs, the responsibility for identifying and solving problems with the entire Education Program rests on the monitoring and improvement committee for the Education Program. This committee is composed of directors and the persons responsible for the subject WGs. The committee checks and analyzes the activities of the subject WGs, as well as discussing problems with the entire Education Program.

◎ 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)

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2	Introduction to University Education	2	Compulsory elective	◎											
2	Introductory Seminar for First-Year Students	2	Compulsory elective		◎										
4	Courses in Arts and Humanities/Social Sc	2	Compulsory elective	○		○									
4	Courses in Natural Sciences	2	Compulsory elective		○		○								
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	Communication IIIC	1						○		○					

2	Elements of Information Literacy or Exercise in Information Literacy	2	Compulsory elective	○	○										
2		1or2	Compulsory elective	○	○										

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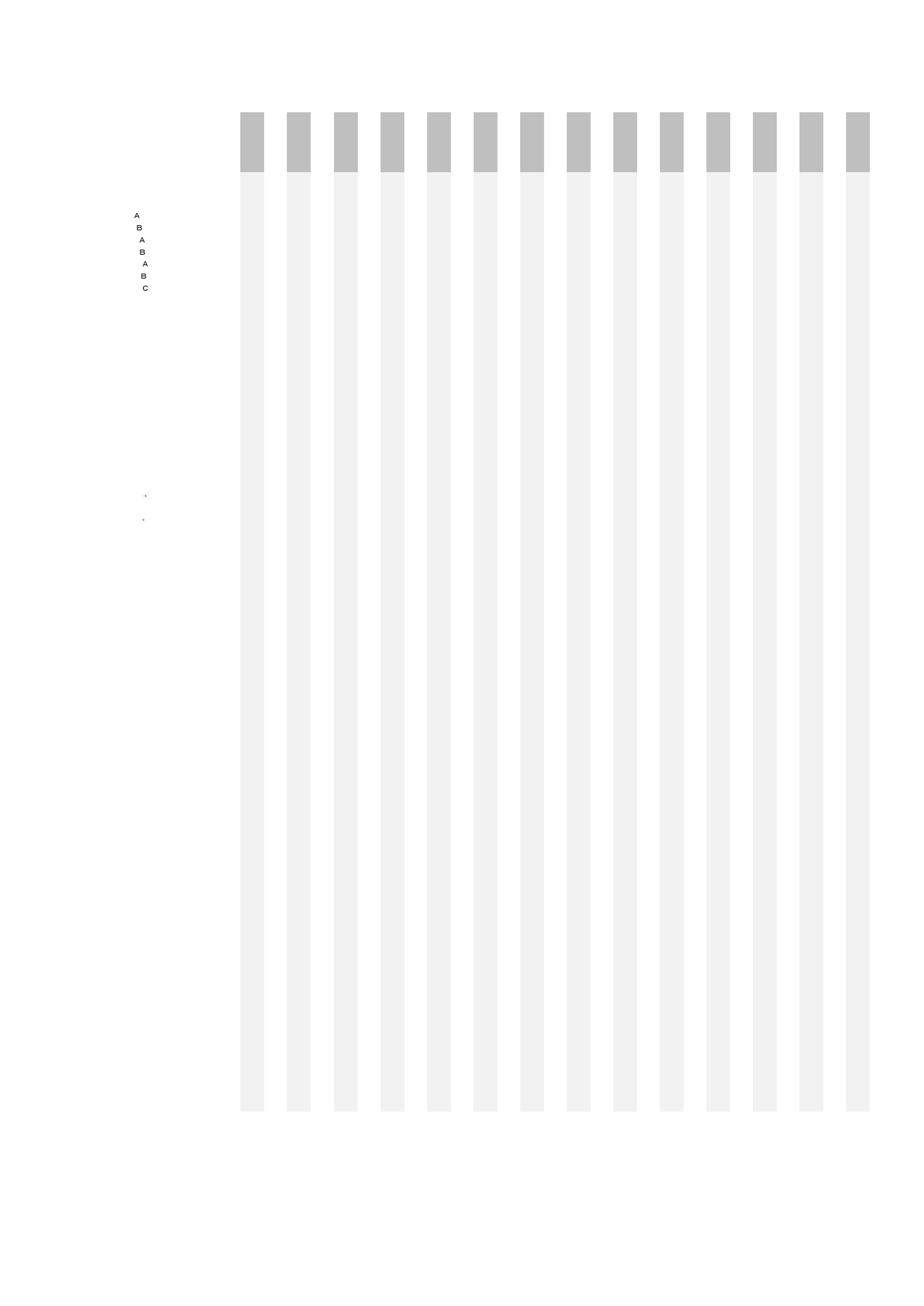
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Curriculum Map of Transportation Systems

Sheet 4

Academic Achievement		1st grade		2nd grade		3rd grade		4th grade	
Evaluation Itemas		Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Knowledge and Understanding	(1) Liberal Arts Education	Introduction to University Education(◎) Introductory Seminar for First-Year Students(◎) Peace Science Courses(○) Area Courses (○) Health and Sports Courses(○)	 Area Courses (○) Health and Sports Courses(○)					Graduation Thesis(◎)	Graduation Thesis(◎)
	(2) Mathematics and Dynamics Fields	CalculusⅠ(◎) Linear AlgebraⅠ(◎) Seminar in Basic Mathematics Ⅰ(◎) General Mechanics Ⅰ(◎)	CalculusⅡ(◎) Linear AlgebraⅡ(◎) Seminar in Basic Mathematics Ⅱ(◎) General Mechanics Ⅱ(◎) Basic Electromagnetism(◎) Experimental Methods and Laboratory Work in Physics Ⅰ・Ⅱ(◎) Experimental Methods and Laboratory Work in Chemistry Ⅰ・Ⅱ (○) Applied Mathematics Ⅰ(◎) Practice of Mechanics(△) Engineering Mechanics(△)	Applied Mathematics Ⅱ(◎) Applied Mathematics Ⅲ(◎) Probability and Statistics(◎) Probability and Statistics(◎)	Engineering Mathematics C(◎) Fundamentals in Dynamics(◎)			Graduation Thesis(◎)	Graduation Thesis(◎)
	(3) Information Engineering Fields	Information Courses(○)		Basic Engineering Computer Programming(◎)		Computer Programming(◎)		Graduation Thesis(◎)	Graduation Thesis(◎)
	(4) Structural Engineering Fields			Mechanics of Material Ⅰ(◎) An Introduction to Engineering Materials(◎) Fundamentals of Materials Processing(◎)	Structural Mechanics(◎)	Theory of Elasticity(○) Theory of Vibration(○)	Structural Analysis and Design(○)	Graduation Thesis(◎)	Graduation Thesis(◎)
	(5) Environmental and Fluid Engineering Fields			Thermodynamics Ⅰ(◎) Fluid Dynamics Ⅰ(◎)	Fluid Dynamics for Vehicle and Environmental Systems(◎)	Remote sensing(○) Viscous fluid and Turbulence(○)	Natural-Energy Utilization Engineering(○) Ocean-Atmosphere Systems(○)	Graduation Thesis(◎)	Graduation Thesis(◎)
	(6) System Fields			Control Engineering Ⅰ(◎)	Instrumentation Engineering(○) Mathematical Optimization(○)	Electrical and Electronic Engineering(○) Reliability Engineering(○) Transportation Vessels and Vehicles Ⅰ(○) Transportation Vessels and Vehicles Ⅱ(○) Transportation Vessels and Vehicles Ⅲ(○)	Design of large scale systems(○) Logistics Planning and Design(○)	Graduation Thesis(◎)	Graduation Thesis(◎)
Abilities and Skills	(1) Liberal Arts Education	Introduction to University Education(◎) Introductory Seminar for First-Year Students(◎) Peace Science Courses(○) Area Courses (○) Health and Sports Courses(○)	 Area Courses (○) Health and Sports Courses(○)					Graduation Thesis(◎)	Graduation Thesis(◎)
	(2) Mathematics and Dynamics Fields	CalculusⅠ(◎) Linear AlgebraⅠ(◎) Seminar in Basic Mathematics Ⅰ(◎) General Mechanics Ⅰ(◎)	CalculusⅡ(◎) Linear AlgebraⅡ(◎) Seminar in Basic Mathematics Ⅱ(◎) General Mechanics Ⅱ(◎) Basic Electromagnetism(◎) Experimental Methods and Laboratory Work in Physics Ⅰ・Ⅱ(◎) Experimental Methods and Laboratory Work in Chemistry Ⅰ・Ⅱ (○) Applied Mathematics Ⅰ(◎) Practice of Mechanics(△) Engineering Mechanics(△)	Applied Mathematics Ⅱ(◎) Applied Mathematics Ⅲ(◎) Probability and Statistics(◎) Probability and Statistics(◎)	Engineering Mathematics C(◎) Fundamentals in Dynamics(◎)			Graduation Thesis(◎)	Graduation Thesis(◎)
	(3) Information Engineering Fields	Information Courses(○)		Basic Engineering Computer Programming(◎)		Computer Programming(◎)		Graduation Thesis(◎)	Graduation Thesis(◎)
	(4) Structural Engineering Fields			Mechanics of Material Ⅰ(◎) An Introduction to Engineering Materials(◎) Fundamentals of Materials Processing(◎)	Structural Mechanics(◎)	Theory of Elasticity(○) Theory of Vibration(○)	Structural Analysis and Design(○)	Graduation Thesis(◎)	Graduation Thesis(◎)
	(5) Environmental and Fluid Engineering Fields			Thermodynamics Ⅰ(◎) Fluid Dynamics Ⅰ(◎)	Fluid Dynamics for Vehicle and Environmental Systems(◎)	Remote sensing(○) Viscous fluid and Turbulence(○)	Natural-Energy Utilization Engineering(○) Ocean-Atmosphere Systems(○)	Graduation Thesis(◎)	Graduation Thesis(◎)
	(6) System Fields			Control Engineering Ⅰ(◎)	Instrumentation Engineering(○) Mathematical Optimization(○)	Electrical and Electronic Engineering(○) Reliability Engineering(△) Transportation Vessels and Vehicles Ⅰ(○) Transportation Vessels and Vehicles Ⅱ(○) Transportation Vessels and Vehicles Ⅲ(○)	Design of large scale systems(○) Logistics Planning and Design(○)	Graduation Thesis(◎)	Graduation Thesis(◎)
Comprehensive Abilities	(1)Ability of design and action		Introduction of Mechanical and Transportation Engineering(◎) Machine Design and Drawing(◎) Machine Shop Training (a)(◎)	Computer Aided Design(◎) Machine Shop Training (b)(◎)	Project Management(◎)	Experiments and Analytical Procedures in Transportation Systems(◎) Ship Design and Practice(◎) Aircraft Design and Practice(○)	Transportation Systems Project(◎) Internship(△)	Graduation Thesis(◎)	Graduation Thesis(◎)
	(2) Ability of communication transmission	Communication Ⅰ(◎) Basic language Ⅰ(○)	Communication Ⅱ(◎) Basic language Ⅱ(○)	Communication Ⅲ(○) Technical English(◎)	Communication Ⅲ(○)	Ship Design and Practice(◎) Aircraft Design and Practice(◎)	Transportation Systems Project(◎)	Graduation Thesis(◎)	Graduation Thesis(◎)

(Ex) Liberal Arts Education | Basic Specialized Subjects | Specialized Subjects | Graduation Thesis | (◎)Required subject | (○)Compulsory elective subject | (△)Free elective subject