For entrants in AY 2022

Appended Form 1

Specifications for Major Program

Name of School (Program) School of Engineering Cluster 2(Electrical, Electronic and Systems Engineering)

Program name (Japanese)	
(English)	Program of Electrical, Systems and Information Engineering

1 Academic degree to be acquired Bachelor's degree in engineering

2. Overview

In the fields of electricity, electronics, systems, information, and in other related fields, technological innovation has been advancing rapidly. We are now in a situation where technological innovation, ideas, and theories are being produced not only by deepening expert knowledge in a specific area, but by combining expert knowledge from multiple fields. As the impact of such technology on society is getting greater, it is always necessary to keep in mind the relationship between humankind, society, and nature.

On the basis of these social trends, Cluster 2 in the School of Engineering (electricity, electronics, systems, and information) has prepared the following programs with the aim of developing professionals who have a wide range of perspectives and insights, a sense of responsibility, and an ethical outlook, as well as specialized technological, problem-analyzing, and problem-solving abilities.

The Program of Electrical, Systems and Information Engineering

The Program of Electronic Devices and Systems

Except for in exceptional circumstances, students who are enrolled in Cluster 2 in the School of Engineering (Electrical, Electronic and Systems Engineering) can choose one of the above two options for this program at the start of the second year, after going through liberal arts education and specialized education for one year after enrollment.

TheProgram of Electrical,Systems and Information Engineering develops professionals who have acquired a broad basic knowledge and the technical expertise related to electrical and electronic circuits, electric energy, measurement control, system planning management, and information processing required for system construction, as well as the ability to solve complicated problems in a highly informatized society, and to take the lead in future technological innovation on their own initiative.

To that end, this program offers a curriculum in which students can learn, comprehensively and systematically, the specialized subjects related to electricity, systems, and information, from the basics to practical application. In concrete terms, students study mathematics, electric circuits, technical English, programming that is commonly used in all fields related to electricity, systems and information, experimentation, practicum, and introductory subjects such as "specialized basic subjects". These are studied mainly in the first and second years, and enable students to acquire a broad range of knowledge and a wide field of vision. From the second year to the fourth year, students can systematically acquire the knowledge and applied skills required in each field by taking combined "specialized subjects" classified into the six fields of physical engineering, electric circuits and energy, measurement control, system planning management, computing, and mathematical information. Specialized basic subjects and specialized subjects are designed for students to be able to acquire specialization and a broad range of knowledge. Consideration is given to ensuring that students have a degree of freedom in choosing their future career path.

This program has prepared a curriculum through which students can acquire the qualifications below.

If students complete the designated subjects, they are exempted, wholly or in part, from the applicable national examination for the acquisition of these qualifications.

Type-1 High School Teaching License (Industry) (mastery of teaching related subjects is required)

Electrical Chief Engineer (some years' work experience after graduation is required)

Engineer for Architectural Equipment (Qualification of candidacy for an exam is given to those who gain two or more years' experience after graduation.)

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

The Program of Electrical, Systems and Information Engineering develops professionals who have a broad perspective, insight, a sense of responsibility, and an ethical outlook, as well as expertise, technical knowledge, and the ability to analyze and solve problems.

To that end, this program covers the fields of electricity, systems, and information, and offers an education that deals with “electricity” in a comprehensive way, from the two perspectives of electricity as a thing in itself, and of the abstract concept of electricity, systems, and information. By providing everything, from the basic concepts to cutting-edge knowledge, in each field and, furthermore, identifying the mutual relationships between the fields in a systematic manner, this program aims at developing professionals who can take the lead in engineering development in these fields, and who have the ability to develop innovative technology by synthesizing the different fields, which is of growing importance for the future.

This program awards a bachelor’s degree in engineering to students who, in addition to the number of credits necessary to meet the standard of the course, have acquired the following knowledge and abilities:

Goal A Acquisition of the ability to recognize the relationship between science and technology, and humankind, society, and the natural environment, from various perspectives, and the ability to understand the responsibilities engineers have for society.

Goal B Acquisition of the basic knowledge commonly required in the field of electronic systems and information, and the abilities applicable to the field.

Goal C Acquisition of the ability to analyze given challenges by using expertise, and draw solutions that meet the requirements of society.

Goal D Acquisition of the ability to draw up plans and measures to resolve challenges, and the will to carry these measures out.

Goal E Acquisition of the ability to gather information and to communicate in Japanese and English. Acquisition of the ability to sum up one's thoughts and accomplishments, to write logically, and to give a presentation.

4.Curriculum Policy Policy for Preparing & Implementing Curriculum)

The Program of Electrical, Systems and Information Engineering prepares and implements a curriculum that provides the following knowledge and abilities so that students are able to achieve the goals of the program.

In the curriculum, 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.

Knowledge/Understandings

Cultivation of the understanding of society-technology relations and the ethical outlook necessary for an engineer (Goal A). This is obtained through mastery of liberal arts education subjects such as “Introduction to University Education”, and “Courses in Arts and Humanities/Social Sciences”, and basic specialized subjects such as “Introduction to Energy and Information Systems” to be offered in the first year.

Basic knowledge of mathematics, such as differential and integral calculus, and linear algebra, required by scientists and engineers (Goal B). This is obtained through mastery of such fundamental subjects as “Calculus” to be offered in the first year.

Basic knowledge of physical theory and experimental methods required by scientists and engineers (Goal B). This is obtained through mastery of fundamental subjects such as “General Mechanics”, “Experimental Methods and Laboratory Work in Physics” to be offered in the first year.

General understanding and acquisition of knowledge about technologies in the field of electronic systems, and acquisition of the basic knowledge common to this field (Goal B). This is obtained through mastery of “Introduction to Energy and Information Systems” and “Electric Circuit Theory I” to be offered in the first year.

Abilities/Skills

The mathematical methodology required by experts in the field of electrical, systems and information (Goal B). This is obtained through mastery of basic specialized subjects such as “Applied Mathematics” to be offered during the period from the third or fourth term of the first year through the second year.

The concepts, knowledge, and methodology that form the foundation of the field of electrical, systems and information (Goal B). This is obtained through mastery of specialized subjects to be offered during the period from the third or fourth term of the first year through the third year.

The ability to apply basic concepts, knowledge, and methodology in the field of electrical, systems and information to concrete, professional issues (Goal B). This is obtained through mastery of specialized subjects to be offered during the period from the third or fourth term of the first year through the third year.

The ability to resolve problems and challenges by using experiments to solve practical problems, by using methods of numerical calculation, and by gathering relevant data (Goal D). This is obtained through mastery of basic specialized subjects such as “Basic Experiments in Electrical Engineering” and “Programming” to be offered during the period from the first or second term of the second year through the third year.

The ability to make action plans on one’s own initiative in relation to practical issues and challenges, make adjustments and resolve problems and challenges by using basic and specialized knowledge and methods (Goal C, D). This is obtained through mastery of “Graduation Thesis” to be offered in the fourth year.

Comprehensive Abilities

Creative and logical thinking to analyze practical problems and challenges, and to reach rational solutions that meet the requirements of society, as well as the engineering development abilities to physically realize such solutions (Goal C, D)

The ability to organize research results and write logically, including regarding the significance and validity of the obtained outcomes, and to present these research outcomes and discuss them verbally and in an easy-to-understand manner (Goal E). This is obtained through mastery of “Graduation Thesis” to be offered in the fourth year.

The teamwork, leadership, and communication abilities needed to work in a group (Goal E) These are obtained through mastery of Basic specialized subjects such as “Basic Experiments in Electrical Engineering” to be offered during the period from the second year through the third year.

The ability to take an approach to solving various problems after understanding that such problems that exist in humankind, society, and among individuals can be interpreted in various ways depending on social conditions, cultures, etc. This is obtained through mastery of liberal arts education subjects such as “Basic language I” and “Area Courses”.

The ability to read, write, converse, and retrieve information in the English language, necessary for conducting research (Goal E) This is obtained through mastery of “Technical English” to be offered in the third year and “Graduation Thesis“ to be offered in the fourth year.

5. Program Timing/Acceptance Conditions

At the beginning of the second year, students are assigned to this program based on consideration of their request and academic results. In order to be assigned to this program, students must acquire a total of 34 or more credits in liberal arts education subjects and specialized education subjects by the end of the first year.

6.Qualifications to be Acquired

By mastering the predetermined courses, students can obtain Type-1 High School Teaching License (Industry), Students qualify as electrical chief engineers and engineers for architectural equipment after having hands-on experience for some years after graduation. The details are given in student handbook.

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 academic year.

8 Academic Achievements

At the end of each semester, the evaluation criteria are applied to each evaluation item of academic achievement to clearly demonstrate the level of attainment. 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 achievements (S = 4, A = 3, B = 2, and C= 1) in each subject being evaluated.

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

Evaluation of academic achievement	Converted values
S(Excellent: 90 points or higher)	
A(Superior:80-89 points)	
B(Good: 70-79 points)	
C(Fair: 60-69 points)	1

* See the relationship between evaluation items and evaluation criteria in the attached sheet 2.
* See the relationship between evaluation items and class subjects in the attached sheet 3.
* See the curriculum map in the attached sheet 4.

9. Graduation Thesis (Graduation Research) (Positioning, When and how to be assigned, etc.)

○ Positioning

Graduation work aims at imparting general research skills by conducting research in line with the research agenda established for each student. The following are more concrete goals:

1 The acquisition of the ability to make a research plan based on the research agenda and execute the research in accordance with the plan

2 The acquisition of the ability to collect materials related to the research agenda, demonstrate a deep understanding of the research agenda, and identify problems

3 The acquisition of the ability to analyze the problems in the research agenda and reach solutions in accordance with the requirements of society

4 The acquisition of the ability to read, write, converse, and retrieve information in the English language necessary for conducting research

5 The acquisition of the ability to organize research results and write in coherent sentences the significance and validity of the obtained outcomes

6 The acquisition of the ability to present the research outcomes and discuss them verbally in an easy-to-understand manner

○ When and how it is assigned

The requirements for embarking on a graduation thesis are as described in student handbook. Students in the fourth year or over, who satisfy the requirements for embarking on a graduation thesis, are to be assigned as requested. How adjustments are made in relation to assignment is explained to the applicable students at a briefing held in advance. A briefing session about research topics or an open laboratory is held around the time from February to April for students who are to be assigned to the research laboratory and to the program.

10. Responsibility System

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

This Program is operated by teachers who support the Program of Electrical, Systems and Information

Engineering, however, the program targets students who belong to Cluster 2 and, therefore, the person responsible for executing the program is the Cluster 2 leader. Planning, implementing, evaluation, and handling are discussed mainly in the Cluster 2 Education Program committee and in the Cluster 2 committee (held, in principle, on the first Wednesday of every month) in an appropriate manner. Depending on the situation or content, a working group is established at the instruction of the Cluster leader to focus in the issues at hand.

When there is a need to consider the response on a program basis, research laboratory groups responsible for the applicable program take the necessary measures. In that case, the responsible person is appointed by the Cluster 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 students taking the course have one average achieved the goal or above

Whether or not the system runs in proper cycles that enable the program to continually improve in an upward spiral

○ How it is assessed

Conducting self-assessment for each subject based on the results of class evaluations carried out by students who have taken the course, and also based on grade calculation results

Regarding the upward spiral of the program, obtaining the questionnaire from graduates in suitable cycles and also collecting the needs from business corporations

○Position on giving feedback to students and how it is approached

For individual courses, the teacher in charge gives comments on course evaluation results and academic achievement results.

For re-examining the program structure, the reasons for and the purposes of re-examinationare given on the website.

Cluster 2　Electrical, Electronic and Systems Engineering

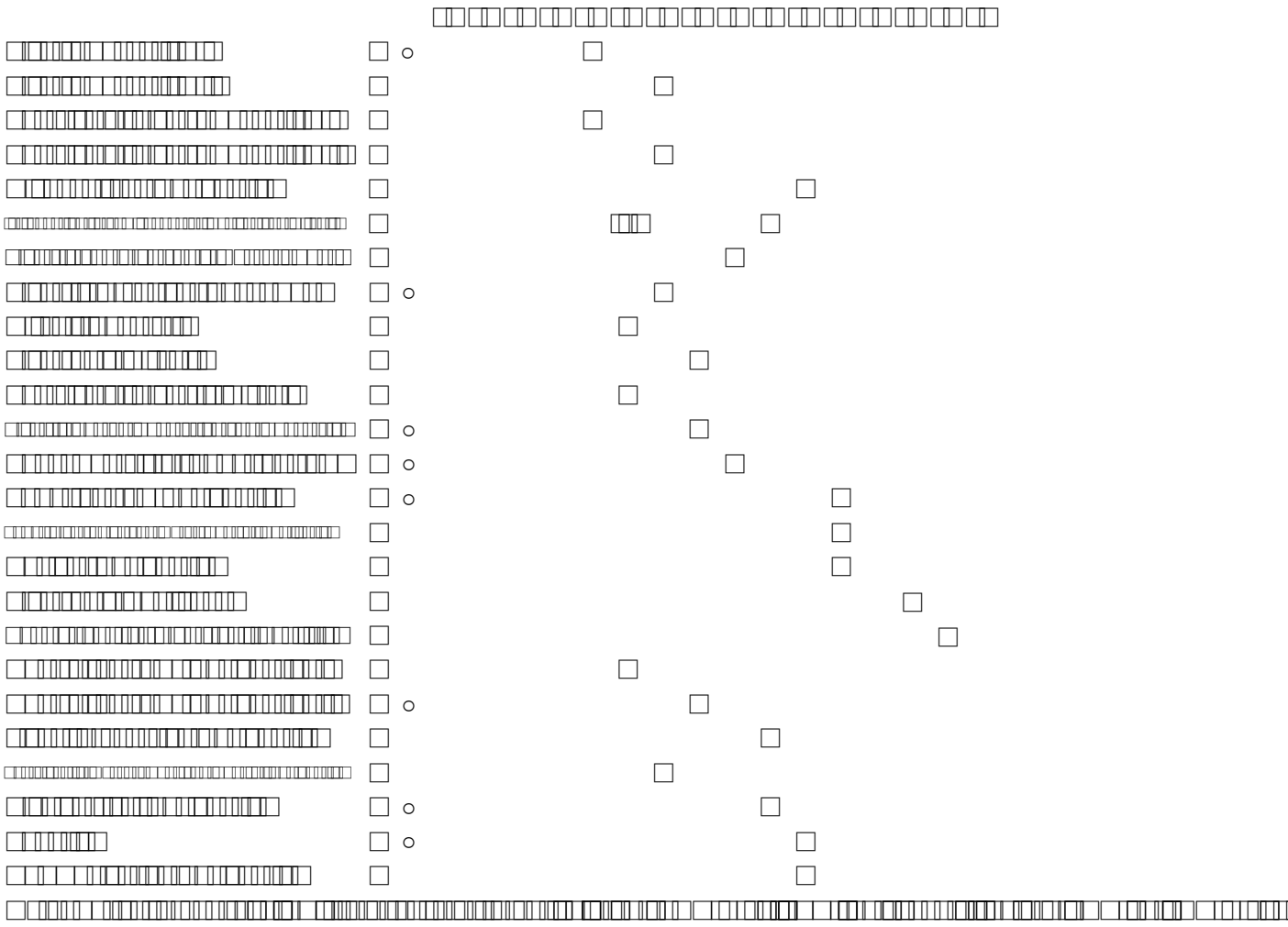
Required subject (period of registration specified)
○ Compulsory elective subject (any of these subjects shall be registered)
Free elective subject (any of these subjects shall be registered)

Subject Type	Required No. of credits	Class subjects, etc.	No. of credits	Type of course registration	Year in which the subjects are offered: Spring 1T	Spring 2T	Spring 3T	Spring 4T	Fall 1T	Fall 2T	Fall 3T	Fall 4T	1T	2T	3T	4T
Peace science curse	2		2	Compulsory elective		○										
	2	Introduction to University Education	2	Required												
	2	Introductory Seminar for First-Year Students	2	Required												
Area Courses	4	Courses in Arts and Humanities/Social Sciences	2	Compulsory elective	○		○									
	4	Courses in Natural Sciences	2			○		○								
Communication		Basic English UsageI	1													
		Basic English UsageII	1													
		CommunicationI	1													
		Communication I	1													
		Communication II	1													
		Communication II	1													
		1 subjects from Basic language I	1													
		1 subjects from Basic language II	1													
	2	Introduction to Information and Data Sciencies	2	Required												
	2		1or2	Compulsory elective	○	○	○	○								
		CalculusI	2													
		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													
		Experimental Methods and Laboratory Work in Physics I Note 4	1													
		Experimental Methods and Laboratory Work in Physics II Note 4	1													
	6	From all Subject Type Note 5		Free elective												
	48															

Cluster 2 Basic Specialized Subjects

Required subject
○ Compulsory elective subje
Free elective subject

Required subject
○ Compulsory elective subject
Free elective subject



Sheet

Curriculum Map of Electrical, Electronic and Systems Engineering

Academic Achievement	2nd grade Spring	2nd grade Fall	3rd grade Spring	3rd grade Fall	4th grade Spring	4th grade Fall
Knowledge /Understanding — (1) The ethics and understanding about the relations between society and technology considered basically necessary for engineers.	(2T)Introduction to Information and Data Sciencies ◎	(1T)Introduction to Energy and Information Systems				
Knowledge /Understanding — (2) Basic knowledge of mathematics such as calculus and linear algebra, which is required for scientists/engineers.	(2T)CalculusI ◎ (1T)Linear AlgebraI (2T)Seminar in Basic Mathematics I (1T)General Mechanics I	(4T)CalculusII (3T)Linear AlgebraII (4T)Seminar in Basic Mathematics II (3T)General Mechanics II Experimental Methods and Laboratory Work in Physics I ( )				
Knowledge /Understanding — Comprehensive understanding and knowledge of technologies in electrical, electronics, systems, and information engineering.		(3T)Electric Circuit Theory I (1T)Introduction to Energy and Information Systems				
Knowledge /Understanding — Mathematical methods required for professionals in electrical, electronics, systems, and information engineering.	(3T)Applied Mathematics I	(1T)Applied Mathematics II ○ (2T)Applied Mathematics III (2T)Discrete Mathematics I ○ (1T)Probability and Statistics	(3T)Synthesis of Applied Mathematics ○ (4T)Engineering Mathematics C	(1T)Engineering Mathematics A		
Abilities/Skills — Concepts, knowledge and methods which are the basis for studies related to electrical, electronics, systems, and information engineering.		Programming I (1T)Electromagnetism I ○ (1T)Exercise of Electromagnetism I (2T)Introduction to Semiconductor Devices and Circuits (2T)Circuit Theory II (2T)Control Systems Engineering I (1T)Mathematical Programming	Programming II (3T)Electromagnetism II (3T)Exercise of Electromagnetism II (3T)Electric Transient Phenomena ○ (4T)Electronic Circuits (3T)Electric Transient Phenomena ○ (4T)Control Systems Engineering II ○ (3T)Digital Circuit Design	Programming III (1T)Signal Processing Engineering (1T)Social System Engineering (2T)Introduction to Semiconductor Devices and Circuits (1T)Theory of Computing	(3T)Robotics ○ (4T)Decision Making ○ ((3T)Digital Circuit Design) ((3T)Algorithms and Data Structures) (4T)Stochastic Modeling		
Abilities/Skills — Ability to apply basic concepts, knowledge, and methods of electrical, electronics, systems, and information engineering to concrete/technical problems.		(2T)Electric and Electronic Measurements	(3T)Exercises in Measurement and Control Engineering (3T)Simulation Engineering ○ (3T)Digital Circuit Design (3T)Algorithms and Data Structures (4T)Fundamentals of Probability Theory (4T)Stochastic Modeling		(3T)Production Control ○ ((3T)Digital Circuit Design) ((3T)Algorithms and Data Structures) (3T)Artificial Intelligence and Machine Learning (4T)Computer Network (4T)Stochastic Modeling (3T)Human Computer Interaction		
Abilities/Skills — Ability to solve practical issues and problems by conducting experiments, using numerical computation methods, and collecting		Basic Experiments in Electrical Engineering I Programming I	Basic Experiments in Electrical Engineering II Programming II	Experiments in Electrical Engineering Electronics and System Engineering I Programming III	Experiments in Electrical Engineering Electronics and System Engineering II		
Abilities/Skills — (5)Ability to solve pracitical issues and problems by voluntarily making a plan, revising it, and utilizing basic and technical knowledge and						Graduation Thesis	Graduation Thesis
Comprehensive Abilities — Creative thinking ability and logical thinking skills to analyze practical problems and tasks, and to lead to rational solutions satisfying social needs, as well as technical development skills to physically realize the solutions.	Introductory Seminar for First-Year Students( ) (1T)Introduction to University Education					Graduation Thesis	Graduation Thesis
Comprehensive Abilities — Skills to organize research results and to describe them logically including the significance and the effectiveness of the obtained outcomes as well as to make easy-to-understand oral presentations and discussions.	Introductory Seminar for First-Year Students( ) (1T)Introduction to University Education					Graduation Thesis	Graduation Thesis
Comprehensive Abilities — Teamwork, leadership and communication skills in group works.		Basic Experiments in Electrical Engineering I	Basic Experiments in Electrical Engineering II	Experiments in Electrical Engineering Electronics and System Engineering I	Experiments in Electrical Engineering Electronics and System Engineering II		
Comprehensive Abilities — Ability to understand that various problems, which humanity, society, and individuals are facing, can be interpreted variously depending on social status, culture and so on, as well as to deal with those problems to solve	(2T)Peace Science Courses ○ (1T)Area Courses(Courses in Arts and Humanities/Social Sc) ○ (2T)Area Courses(Courses in Natural Sciences) ○ Health and Sports Courses ○ Basic language I ○ Basic language II ○	(2T)Area Courses(Courses in Arts and Humanities/Social Sc) ○ (1T)Area Courses(Courses in Natural Sciences) ○ Health and Sports Courses ○					
Comprehensive Abilities — Ability of English conversation, reading and writing skills necessary for research accomplishment.	Basic English UsageI CommunicationI Communication I	Basic English UsageII Communication II Communication II		(4T)Technical English		Graduation Thesis	Graduation Thesis
	Liberal Arts Education	Basic Specialized Subjects	Specialized Subjects	Graduation Thesis	Required subject	○ Compulsory elective subject	Free elective subject