Appended Form 1

Specifications for Major Program

Name of School (Program) [School of Education, Cluster (Science, Technology and Society Education) Program in Science Education]

Program name (Japanese)	プログラム
(English)	Secondary School Science Education

1. Academic Diploma to be Acquired: Bachelor's Degree (Education)

2. Overview

This program primarily aims to develop secondary school science teachers, who have the necessary technical training in the principles, contents, and methodology of secondary school science education; the ability to deliver education; and the ability to conduct education and research while integrating theory and practice. It also aims to develop specialized personnel who are able to undertake work related to science education in educational organizations and institutions. Therefore, this program encourages students to acquire a deep knowledge of the content of natural science studied at secondary school level, and to master the wide range of knowledge and skills required for secondary school education.

After graduation, students can aim either to become high school science teachers or specialized personnel in businesses and public organizations, or, by proceeding to the Graduate School (Master's and Doctoral Programs) aim to become researchers and highly specialized professionals.

3. Diploma Policy (Policy of Awarding Degrees and Goal of the Program)

The Secondary School Science Education Program helps to develop professionals who have not only mastered the basic knowledge, skills, and attitudes required by high school science teachers and specialized personnel engaged work related to science education in educational organizations, but who also display scientific thought, research competence, and practical ability in science education. Therefore, this program will award a bachelor’s degree in education to students who have acquired the number of credits specified in the education curriculum as well as the following abilities.

(1) The technical training in the principles and methodology of secondary school science education, and the ability to conduct education and research while integrating theory and practice.
(2) The wide range of knowledge and skills required for working in secondary school science education, and the ability to study teaching materials and deliver education based on fundamental basic knowledge.
(3) Mastery of historical and contemporary developments in humanity and society, and a knowledge of the formation and development processes of the various academic disciplines, as well as an understanding of the relationship between them and the wider culture, in addition to an international perspective, and the ability to voice opinions based on diverse perspectives on a variety of topics.

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

In order to realize its established goals, the Secondary School Science Education Program prepares an educational curriculum according to the following policy:

In the first year, students study Liberal Arts subjects and foreign languages to develop a basis for specialized education. At the same time, they cultivate a broad perspective and the capacity to seek for peace and contribute to international society. They also study “Basic Knowledge of Physics, Chemistry, Biology, and Earth Science”, the specialized basic subjects needed to master and strengthen their knowledge and understanding of the educational contents of science w 0 -1ofucof scicg12.2(naTD [(c))-8( )-11.6(need)-13(uc)-8(.j -0.002 Tc 0.0 w 627 0.289 0 Td EMC /P

improve their professional standards.

In the third year, for the systematic study of science education, they choose one of the research areas (Science Education, Research on Methodology in Science Education, Physics, Chemistry, Biology, and Earth Science), focusing on the related subjects in which they are to acquire specialized knowledge. In addition, “Research Seminar in Science Education” encourages students to master research methods in relation to secondary school science education in order to improve their research abilities.

In the fourth year, students undertake graduation studies under their supervisor. They will focus on their original theme, making the best of the specialized knowledge, skills, and capacities acquired in this program in order to develop the ability to identify and solve problems on their own.

This program includes the subjects “Courses for Professional Teaching” and “Teaching Practice at Lower and Upper Secondary Schools”. The former aims to impart the knowledge and skills required for the license in secondary school science teaching, while the latter encourages students to experience science lesson practices at the affiliated secondary schools, in order to enrich their ability to research teaching materials and lesson practices. They will also learn how to get involved with pupils and how to conduct lessons as professional science teachers.

In the curriculum described above, teaching and learning will be implemented by utilizing active learning, experiential learning and online classes, depending on the delivery methods of each program, such as lectures, practical skill courses 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 this program are achieved.

5. Program Timing and Acceptance Conditions

This program starts in the first year, at which time students are able to select it.

No requirements have been set for students to take this program, although the number of students may be restricted due to availability of equipment and facilities.

6. Qualifications to be Obtained

Students can acquire the teaching certificate of Science for junior and senior high school on the condition that all the credits in special elective subjects for the teaching profession are acquired. Furthermore, licenses such as curator and school librarian can be obtained by taking the specified program and acquiring the credits.

7. Subjects and Course Contents

※ For subjects, please refer to the course list in Attachment 1. (Attach the List.)

※ For the contents of the course, please refer to the syllabus for each school year.

8. Academic Results

At the end of each semester, the result of evaluation will be explicitly stated for each evaluation item to show the achievement level.

The academic result evaluation of each item will be converted into S=4, A=3, B=2, and C=1. These results are combined and classified as one of three levels: Excellent, Very Good, and Good from the first semester of the first year to the current semester.

Result Evaluation	Conversion
S 90 points or over	4
A 80 to 89 points	3
B 70 to 79 points	2
C 60 to 69 points	1

Academic results	Standard
Excellent	3.00 ~ 4.00
Very Good	2.00 ~ 2.99
Good	1.00 ~ 1.99

*Attachment 2: Relationship between the evaluation items and evaluation standards

*Attachment 3: Relationship between the evaluation items and subjects

*Attachment 4: Curriculum Map

9. Study in Graduation Thesis (Purpose, Assignment, Timing, etc.)

○ Purpose

The graduation thesis is a compilation of the entire program. It aims to develop the student's accumulated foundation of knowledge and understanding, ability and skills, and attitudes required for a secondary school science teacher.

Overview

Students select a major research area from among Science Education, Methodology in Science Education, Physics, Chemistry, Biology, and Earth Science. Under the instruction of their supervisor, they continue with the research they have selected, compiling their results as a graduation thesis to be presented at the presentation conference.

○ Assignment Timing and Method

At the end of the second year, students select their major research field according to their interests (choose a seminar). Starting from the third year, they focus on studying the required subjects and major subjects in their selected area, acquiring the knowledge and abilities for conducting research. In the fourth year, they undertake the study of “Graduation Thesis” under the guidance of their supervisor.

System of Responsibility

(1) PDCA System (Plan, Do, Check, and Action)

This program is implemented mainly by teachers of Science Education Course at the Graduate School of Education. The program head (Head of Science Education Course) is responsible for its implementation. The group of teachers of this program will make a plan, implement the plan, evaluate it, and take action based on their evaluation.

(2) Evaluation of the Program

○ Evaluation Perspectives of the Program

This program encompasses evaluation perspectives related to both educational and social benefits: As for the educational benefits, the learning of the students will be evaluated after the implementation of the program. In terms of the social benefits, the social effectiveness of the learning results of the program will be evaluated.

○ How to implement evaluation

In principle, the benefits of the program will be evaluated in the academic year beginning four years after entrance to the university, based on the viewpoints above.

Educational benefits will be evaluated based on the degree of achievement of the students who take the program (the fulfillment the requirements for graduation and obtaining the license of secondary school science teacher) and the overall evaluation of the group of teachers in charge of the program. Based on these, the program investigates whether each student has reached the standard of the program and what percentage of students have achieved the goal, in order to ascertain whether the degree of attainment exceeds 75%.

As for the social benefits, information about the pass rate in the school teachers' employment examination, and how the students who took this program are evaluated in the society after graduation, will be collected for comprehensive evaluation of the effectiveness of the program.

○ Feedback to the Students

The group of teachers in charge of this program examine the effectiveness of every subject based on the evaluation results in order to review and improve the program, reflecting on the management and implementation of the program and the guidance to be given to students in the following years.

Table of Registration Standards for the Subjects of Liberal Education

Cluster 2: Program in Science Education

Type	Subject type				Required Credits	Class subjects, etc.	Credits	Type of course registration	Semester for the subject to be taken (Note 1)							
									1st year		2nd year		3rd year		4th year	
									1	2	3	4	5	6	7	8
Subjects of Liberal Education	Peace Science Courses				2		2	Elective/required	○							
	Basic Courses in University Education	Introduction to University Education			2	Introduction to University Education	2	Required	○							
		Introductory Seminar for First-Year Students			2	Introductory Seminar for First-Year Students	2	Required	○							
	Common Subjects	Area Courses	Courses in Arts and Humanities/Social Sciences		4	(Note4)	1or2	Elective/required	○	○	○	○				
			Courses in Natural Sciences		4	(Note5)	1or2	Elective/required	○	○	○	○				
		Foreign Languages	English Note2	Basic English Usage	2	Basic English Usage I	1	Required	○							
						Basic English Usage II	1			○							
				Communication I (Note3)	4	Communication I A	1	Elective/ required	○							
						Communication I B	1		○							
				Communication II (Note3)		Communication II A	1			○						
						Communication II B	1			○						
						At least 2 subjects from the four subjects above										
			Non-English Foreign Languages (Note6)		(0)	Foreign Languages: Basic Studies I	1	Free elective	○							
						Foreign Languages: Basic Studies II	1		○							
						Foreign Languages: Basic StudiesIII	1			○						
						Foreign Languages: Basic StudiesIV	1			○						
		Information and Data Science Courses			4	Introduction to Information and Data Sciences	2	Required	○							
						(Note7)	2	Elective/required	○	○○						
		Health and Sports Courses			2		1or2	Elective/required								
									○							
									○							
						Experimental Methods and Laboratory Work in Physics I	1			○						
						Experimental Methods and Laboratory Work in Physics II	1			○						
						Experimental Methods and Laboratory Work in Chemistry I	1			○						
						Experimental Methods and Laboratory Work in Chemistry II	1			○						
						Experimental Methods and Laboratory Work in Biology I	1			○						
						Experimental Methods and Laboratory Work in Biology II	1			○						
						Experimental Methods and Laboratory Work in Earth Sciences I	1			○						
						Experimental Methods and Laboratory Work in Earth Sciences II	1			○						
	Free elective subjects				6	(Note9)	1 3	Elective/required	○	○	○	○				
	Total				40											

Note 1: marks the standard semester for the subjects the students will study. Students can study in the following semester if they cannot obtain the credits in this semester. The timetable for a subject may change year by year. Please check the timetable for Liberal Arts subjects issued every year.

Note 2: Field Research in an English-speaking country through the short-term overseas education, etc. or the study of Online English Seminar I / II □II□through self-initiated learning can be included in the English credits required for graduation. In addition, there is a credit recognition system for foreign language proficiency tests and language training. Please refer to the sections on English and Liberal Arts Education in the Student Handbook and the "Handling of Credit Recognition for Foreign Language Proficiency Tests, etc."

Note 3 Due to the requirements of organizing the timetable, Communication IA and Communication IB are designated for the 1st semester, while Communication IIA and Communication IIB are designated for the 2nd semester.

Note 4 In order to acquire the license of education personnel, students need to take two credits in "Japanese Constitutional Law."

Advanced English for Communication, Non-English Foreign Languages: Intensive Studies, or Overseas Language Seminar can be included in the Area Courses (Courses in Arts and Humanities/Social Sciences) credits required for graduation.

Note 5 More than 4 credits obtained by taking “Information and Data Science Courses” can be included in the Area Courses (Courses in Natural Sciences) credits required for graduation.

Note 6 Select one language from German, French, Spanish, Russian, Chinese, South Korean and Arabic

Note 7 Selection from “Fundamental Data Science” or “Data science for education” is recommended, though “Computer Programming”, “Intelligence and Computer” or “Ground zero programming” is also acceptable.

Note 8 Take at least four credits in experiment-related subjects.

Study same subjects from among "Experimental Methods and Laboratory Work I (1 credits)" and "Experimental Methods and

Laboratory Work II (1 credits)". Unacceptable to study only I or II.

It is recommended to take the lecture subjects that students did not study at high school.

Note 9 This includes Area Courses, Foreign Languages (Second Foreign Languages), Information and Data Science Courses, Social Cooperation Courses, and Foundation Courses.□

Registration standards for Specialized Education Subjects

Cluster 2 Program in Science Education

	Teaching Contents of Biology III			
	Teaching Contents of Earth Science I			
Specialized subjects	Teaching Contents of Earth Science II			Program in Science Education
	Teaching Contents of Earth Science III			
	Seminar on Teaching Contents in Physics	4		
	Seminar on Teaching Contents in Chemistry			
	Seminar on Teaching Contents in Biology			
	Seminar on Teaching Contents in Earth Science			
	Laboratory Work in Physics Education	2		
	Laboratory Work in Chemistry Education			
	Laboratory Work in Biology Education			
	Laboratory Work in Earth Science Education			
Specialized Elective subjects		26		School of Education etc.
Free Elective subjects				
Graduation Research		6		Program in Science Education

＜Matters to note when taking subjects＞

1. The six credits in Graduation Research will come from two credits in Research Seminar in Science Education and four credits in Graduation Thesis.
2. The number of credits in Free Elective Subjects acquired in minor courses and specific programs will be up to 26 credits.
3. The number of credits exceeding 40 credits in Specialized Subjects can be included in the number of credits for Free Elective Subjects.
4. In order to study the Practical Seminar for the Teaching Profession (High School) (8th Semester), in principle, students must obtain the credits in Practical Study at the High School I and II at the end of the 7th semester. If, however, they cannot obtain the credits in Practical Study by the semester in which they take the Practical Seminar for the Teaching Profession, their registration will be accepted on the condition of their obtaining them during the same semester.

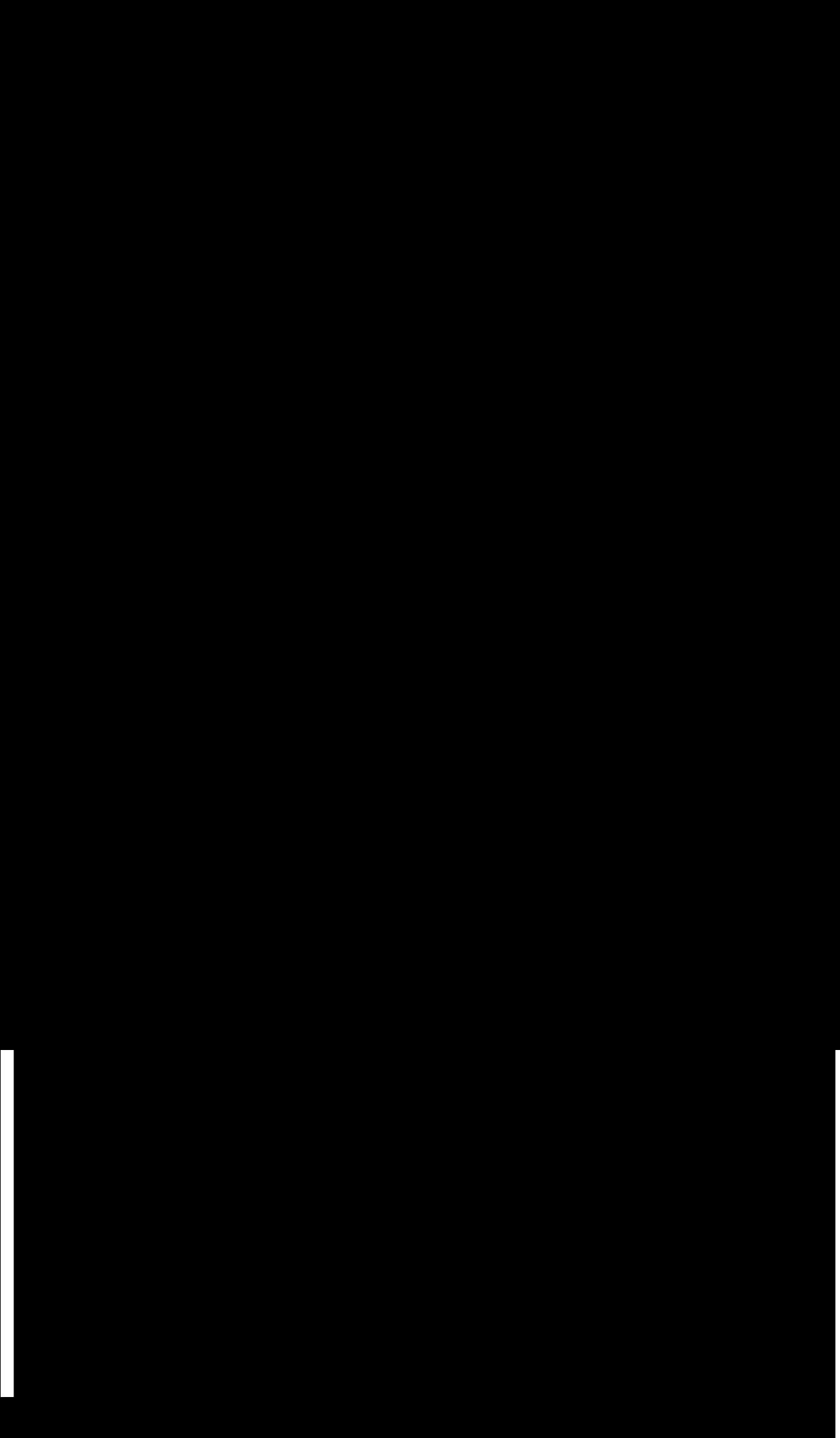
Cluster 2 Program in Science Education

Subjects with a circle in the “No. of credits to obtain” column are required subjects.

The semester marked with ○ is the standard semester for taking the related subject

Type	Class Subject	Credits	Semester in which the subject is taken								Remarks
			1	2	3	4	5	6	7	8	
Basic Specialized subjects	The Principles of Science Teaching I	②			○						
	The Principles of Science Teaching II	②				○					
	Basic Knowledge of Physics	②	○								
	Basic Knowledge of Chemistry	②	○								
	Basic Knowledge of Biology	②	○								

	Basic Knowledge of Earth Science	②	○								
	Practical Work in Physics	①				○					
	Practical Work in Chemistry	①				○					
	Practical Work in Biology	①			○						
	Practical Work in Earth Science	①			○						
Specialized subjects	Practical Study in Science Education	②					○				
	History of Science Teaching	2					○				
	Comparative Studies of Science Education	2				○					
	Designing the Course of Study for Science Education	2							○		
	Designing of Constructed Materials for Science Education	2							○		
	Theory on science curriculum	②			○						
	Evaluation in Science Education	2						○			
	Planning the Teaching and Learning Activities	2				○					
	Theories of Science Teaching-Learning Materials	2					○				
	Scientific Literacy of Physics I	②		○							
	Scientific Literacy of Physics II	②			○						
	Scientific Literacy of Chemistry I	②		○							
	Scientific Literacy of Chemistry II	②			○						
	Scientific Literacy of Biology I	②		○							
	Scientific Literacy of Biology II	②			○						
	Scientific Literacy of Earth Science I	②		○							
	Scientific Literacy of Earth Science II	②			○						
	Teaching Contents of Physics I	2				○					
	Teaching Contents of Physics II	2					○				
	Teaching Contents of Physics III	2						○			
	Teaching Contents of Chemistry I	2				○					
	Teaching Contents of Chemistry II	2					○				
	Teaching Contents of Chemistry III	2						○			
	Teaching Contents of Biology I	2				○					
	Teaching Contents of Biology II	2					○				
	Teaching Contents of Biology III	2						○			
	Teaching Contents of Earth Science I	2				○					
	Teaching Contents of Earth Science II	2					○				
	Teaching Contents of Earth Science III	2						○			



	Instrumental Analytical Chemistry	2							○		School of Science
	Molecular genetics A	2							○		School of Science
	Cell biology A	2							○		School of Science
	Material Sciences of Erath And Planets II	2							○		School of Science
	Ecological Geography of Japan	2								○	School of Integrated Arts and Sciences
Free Elective subjects	Includes special subjects of this course and other courses, and special education subjects held in other schools (including minor and special programs).										
Graduation Research	Research Seminar in Science Education	①・①					○	○			
	Graduation Thesis	④									

□