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) (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

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	○							
	Common Subjects: 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	○							
		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								

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 Schools

Cluster 2: Science, Technology and Society Education

○ Program in Science Education

Subject type, etc.				No. of credits required for graduation	
Liberal Arts Education	Peace Science Courses			2	40
	Basic Courses in University Education	Introduction to University Education		2	
		Introductory Seminar for First-Year Students		2	
	Common Subjects	Area Courses	Courses in Arts and Humanities / Social Sciences	4	
			Courses in Natural Sciences	4	
		Foreign Languages	English	6	
			Non-English Foreign Languages	(0)	
		Information and Data Science Courses		4	
		Health and Sports Courses		2	
		Social Cooperation Courses		(0)	
	Foundation Courses			8	
	Free Elective subjects			6	
Specialized Education	Basic Specialized subjects			16	88
	Specialized subjects			40	
	Specialized Elective subjects			26	
	Free Elective Subjects				
	Graduation Research			6	
Total				128	

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									