

For entrants in AY 2021

Appended Form 1

Specifications for Major Program

Name of School (Program) [School of Science (Department of Biological Science)]

Program name (Japanese)	生物学プログラム
(English)	Biology

- Degree to be obtained: Bachelor of Science
- Overview

The Biology Program aims to contribute to the progress of mankind through both educational activities that develop human resources who can understand biological phenomena from various angles ranging from molecular & cellular levels to individual & crowd levels, and research activities to explore biological phenomena. To understand and explore biological phenomena, it is necessary to acquire knowledge of animals, plants, and microorganisms, as well as basic skills in ecology, physiology, biochemistry, genetics, and other related fields, and to gain a deep understanding of topics ranging over interdisciplinary fields. The results of detailed investigations have been utilized as examples of biotechnology or as techniques to assess the impact of human activities on the natural world.

The Biology Program can be classified into liberal arts education subjects and specialized education subjects. Liberal arts education subjects consist of Peace Science Courses, Basic Courses in University Education, Common Subjects, and Foundation Courses. Peace Science Courses, Basic Courses in University Education & Common Subjects, which are positioned as general cultural subjects that should be acquired as a functioning member of society or as an individual, are important in forming a social point of view and for personality development. Offered classes can be chosen according to individual students' interests. Fundamental subjects are intended to provide a basic knowledge in the science field such as basic science. Specialized education subjects include basic specialized subjects and specialized subjects. Biology, which is a special requirement for science teachers, is a field that requires the ability to communicate their knowledge and achievements through seminars and practices. In the final academic year, students will conduct graduation research in their laboratory. While learning the latest experimental techniques, they will improve their own awareness as a specialist in biology by working on unsolved problems.

This Program is designed to accommodate students who wish to obtain a science teacher's license for junior and senior high schools.
- Diploma policy (policy for awarding degrees and goal of the program)

This Program is designed to educate engineers who have knowledge and practical experience in biology and who engage in basic research and applications, and human resources who can play an active role in the front line in various related fields such as practical work in the industrial world and science education, as well as human resources who can function internationally with presentation abilities.

We will award a bachelor degree in science to students who have acquired the knowledge and skill listed below and the standard number of credits specified in the curriculum based on a comprehensive judgment of their education level and expertise, as well as the results of their graduation research.

- The degree recipient can understand biological phenomena from various angles ranging from molecular & cellular levels to individual & crowd levels, and research activities to explore biological phenomena.

- The degree recipient has knowledge and skills in liberal arts education subjects and specialized education subjects.

- The degree recipient has basic knowledge and skills in English for specialized area in the biology field.

- The degree recipient has practical skills in biological sciences and ability to take initiative in solving the problems in the biology field.

- The degree recipient can describe the opinion related to the biology field and make a presentation.

4. Curriculum policy (policy for organizing and implementing the curriculum)

To achieve the goals described in the Diploma policy, this Program offers educational programs that take into

supplementary education.

Subjects: English, Mathematics, Physics, Chemistry, and Biology

Although the Biology Program is open to all students at the University, the requirements for students outside the Department of Biological Science to select this Program shall be separately specified based on the regulations on transferring to a different School or transferring a different Department.

6. Obtainable qualifications

1. Teaching Licenses

(1) Type-1 Junior High School Teaching License (science)

(2) Type-1 High School Teaching License (science)

2. Qualification as a curator.

7. Class subjects and their contents

* For the class subjects, refer to the subject table in Attachment 1.

* For the details of the class subjects, refer to the syllabus that is published for each academic year.

8. Academic achievement

At the end of each semester, evaluation criteria will be shown with a clear indication of attainment standards according to the evaluation items for academic achievements.

Students' academic achievements from admission to the current semester will be indicated as one of three levels: "Excellent," "Very Good," and "Good," based on evaluation criteria calculated by adding the weighted values to numerically converted evaluations of their academic achievements (S = 4, A = 3, B = 2, and C = 1) in each subject being evaluated.

Evaluation of academic achievement	Converted value
S (90 or more points)	4
A (80 – 89 points)	3
B (70 – 79 points)	2
C (60 – 69 points)	1

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

* Refer to the relationship between evaluation items and evaluation criteria described in Attachment 2.

* Refer to the relationship between evaluation items and class subjects described in Attachment 3.

* Refer to the curriculum map in Attachment 4.

9. Graduation thesis (graduation research) (meaning, student allocation, timing, etc.)

1. Purpose

On the basis of the basic knowledge and basic skills in biology that they have acquired by the third year, students will be involved in the most advanced research conducted in the laboratory at their assignment

destinations. Through that experience, they will absorb the latest knowledge focusing on the relevant research field, and acquire advanced skills. Also, they will learn how to advance their research and refine their capabilities as an engineer or a researcher with originality, aspiration, patience, a spirit of cooperation, and flexibility, and will acquire abilities that they can use in a graduate school or in corporate or social activities. They will enhance their presentation skills through daily discussions and seminars in their laboratory. In completing the Program, they will be able to gain confidence from summarizing the content of their one-year graduation research into a graduation thesis, and by giving a poster presentation on their thesis.

2. Outline of research

An outline of each laboratory is introduced on the official website of the Department of Biological Science. It is also possible to gain information on the activities of laboratory by talking with faculty members qualified to give guidance on graduation research, and/or with students from a graduate school or of the School of Science who belong to a laboratory. Please refer to the explanation on the research content of each laboratory given in the lecture of “Advanced Biology” that will be offered in the third year.

3. Time and Method of assignment

Time of assignment: Students will receive their assignment at the beginning of the fourth year. However, target students must meet the “conditions for taking graduation research.”

(For the “conditions for taking graduation research,” please see the Handbook for Students of the School of Science.)

Method of assignment: For graduation thesis, students are basically assigned to the laboratory where they carry out "Practice for Fundamental Biology IV" during the second semester of the third academic year. In order to assign in which laboratory they carry out "Practice for Fundamental Biology IV", a wish survey will be conducted for applicant students after completion of the first semester of the third academic year. If the number of applicants exceeds the capacity of a given laboratory, priority will be given to students with higher academic achievements.

10. Responsibility

(1) Responsibility for PDCA (plan, do, check, and act) cycle

“Plan” and “Do” shall be conducted by the Faculty Council in Charge of Major Program in Biology (Chief: Dean of the Department).

“Check” and “Act” shall be conducted by the Faculty Council in Charge of Major Program in Biology, taking into account the contents of the report on the consultation between the Dean of the Department and the Academic Affairs Advisory Committee of the Department of Biological Science based on the materials prepared by the Faculty Council in Charge of the Major Program in Biology.

For faculty members who belong to the Faculty Council in Charge of the Major Program, please see Attached Sheet 5.

(2) Evaluation of the program

1. Criteria for program assessment

- (1) Graduates' proficiency levels
- (2) Students' degrees of satisfaction
- (3) Faculty members' degrees of satisfaction
- (4) Achievements in graduate research

2. Implementing the assessment

- (1) Graduates will make an external assessment.
- (2) Enrollees and graduates will respond to a questionnaire on the assessment of the entire Program.
- (3) Faculty members will respond to a questionnaire on the assessment of the entire Program.
- (4) Graduates will respond to a questionnaire on their achievements in graduate research.

3. The idea and method of feedback for students

With "Students-oriented Education" as our basic principle, we will comprehensively review the results of the external assessments by graduates and the questionnaire on the assessment responded to by enrollees and graduates in each fiscal year to identify any problems with the Program. The structure of the Program and the

Table of Registration Standards for Biology Program (Entrants of 2021)

Refer to Study Guidance for the Biology Program for requirements for attending the course.

Students are allowed to take class subjects provided in other programs and schools, and in other universities, in addition to the class subjects listed in this table, and the credit for those subjects that the faculty committee of the Biology Program certifies is accepted as the required credit for graduation.

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Type	Subject	Credits	Semester				
			Fall	Spring	Fall	Spring	Fall
General Education	English 101	3					
	English 102	3					
	Math 101	3					
	Math 102	3					
	Science 101	3					
	Science 102	3					
	History 101	3					
	History 102	3					
	Art 101	3					
	Art 102	3					
Major Requirements	Biology 101	4					
	Biology 102	4					
	Biology 201	4					
	Biology 202	4					
	Biology 301	4					
	Biology 302	4					
	Biology 401	4					
	Biology 402	4					
	Biology 403	4					
	Biology 404	4					
Specialized Subjects	Plant Morphology	2					
	Cell Biology B	2					
	Developmental Biology B	2					
	Animal Physiology B	2					
	Endocrinology • Immunology	2					
	Genome Biology	2					
	Systems Biology	2					
	Regeneration Biology	2					
	Seminar for Developmental Biology	2					
	Seminar for Cell Biology	2					
Electives	Comparative Embryology	2					
	Plant Physiology	2					
	Cellular Respiration	2					
	Photosynthesis	2					
	Genetics	2					
	Molecular Biology	2					
	Evolutionary Biology	2					
	Ecology	2					
	Behavioral Biology	2					
	Systematics	2					

Academic achievements of Biology Program

Relationships between the evaluation items and evaluation criteria

Academic achievements		Evaluation criteria		
Evaluation items		Excellent	Very Good	Good
Knowledge and Understanding	(1) Studying to understand liberal arts, peace, foreign languages, culture and society.	Superbly being able to understand.	Being able to understand well.	Being able to understand.
	(2) Understanding and learning basic knowledge in scientific fields.	Superbly being able to understand and learn.	Being able to understand and acquire.	Being able to understand and acquire.
	(3) To understand and acquire advanced knowledge on specialties in biology.	Superbly being able to understand and learn.	Being able to understand and acquire.	Being able to understand and acquire.
Abilities and Skills	(1) To acquire abilities to understand information security compliance, to collect and evaluate data.	Superbly being able to understand the information security compliance, collect data, and assess them.	Being able to understand well about information security compliance and collect data and evaluate it.	To be able to collect and evaluate data by understanding Information Security Compliance.
	(2) Acquiring ability to apply basic knowledge to biological issues and reading comprehension of English theses.	Superbly being able to solve several biological issues and read English theses.	Being able to sufficiently solve various biology issues, read english avademic articles.	To be able to solve physiological problems and to understand English academic papers.
	(3) Based on basic knowledge which is already acquired, to obtain the following experimental skills in order to practice research: 1) Basic observation skills and skills to manage experiments. 2) Ability to record observed natural phenomena. 3) Ability to collect and assess data.	Superbly being able to acquire the ability of experiment	Being able to acquire experimental capability	To acquire skills for experiments.
Comprehensive Abilities	(1) Understanding rudimentary matters for biological research such as observation of animals•plants and ways of experiments and writing reports through observation of research objects, collection, consideration, discussion and presentation.	To sufficiently understand elementary items needed to handle biological research, and to be able to proactively work on it.	To understand elementary items needed to handle biological research, and to be able to proactively work on it.	To understand elementary items needed to handle biological research, and to be able to proactively work on it.
	(2) To absorb cutting-edge knowledge, acquire high-level skills, learn how to conduct research, improve presentation ability through discussion, summarize research results as a graduation thesis.	Superbly being able to tackle with research, integrate and announce it.	Being able to sufficiently address a research and summarize it and make a presentation	Being able to tackle with research, summarize, and make a presentation.

Placement of Liberal Arts Education in the Major Program

For an understanding of the advanced and specialized content in the Major Program, it is important to acquire broad and basic knowledge. To this end, we must give students guidance according to their needs so that they will be able to respond to specialized programs by choosing from liberal arts education subjects.

Relationships between the evaluation items and class subjects

Subject Classification	Subject Name	Credits	Type of course registration	Grade	Evaluation items																		Total weighted values of evaluation items in the subject
					Knowledge and Understanding						Abilities and Skills						Comprehensive Abilities						
					(1)		(2)		(3)		(1)		(2)		(3)		(1)		(2)				
					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject		
Liberal Arts Education	Peace Science Courses	2	Elective/required	1-2T	100	1																100	
Liberal Arts Education	Introduction to University Education	2	Required	1-1T	100	1																100	
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	1-2T													100	2				100	
Liberal Arts Education	Area Courses	12	Elective/required	1-2	100	1																100	
Liberal Arts Education	Basic English Usage I	1	Required	1	100	1																100	
Liberal Arts Education	Basic English Usage II	1	Required	2	100	1																100	
Liberal Arts Education	Communication I	2	Required	1	100	2																100	
Liberal Arts Education	Communication II	2	Required	2	100	2																100	
Liberal Arts Education	Foreign Languages: Basic Studies I	1	Free elective	1	100	1																100	
Liberal Arts Education	Foreign Languages: Basic Studies II	1	Free elective	1	100	1																100	
Liberal Arts Education	Foreign Languages: Basic Studies III	1	Free elective	2	100	1																100	
Liberal Arts Education	Foreign Languages: Basic Studies IV	1	Free elective	2	100	1																100	
Liberal Arts Education	Introduction to Information and Data Sciences	2	Required	1-2T							100	2										100	
Liberal Arts Education	Ground zero programming	2	Elective/required	2-3T							100	2										100	
Liberal Arts Education	Fundamental Date Science	2	Elective/required	2-4T							100	2										100	
Liberal Arts Education	Social Cooperation Courses	0	Free elective	1-2	100	1																100	
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology I	2	Required	2-3T											100	2						100	
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology II	2	Required	2-4T											100	2						100	
Liberal Arts Education	General Chemistry	2	Elective/required	1-1T			100	1														100	
Liberal Arts Education	Fundamental Physical Chemistry	2	Elective/required	2-3T			100	1														100	
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I	2	Elective/required	2-3T											100	1						100	

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Subject Classification	Subject Name	Credits	Type of course registration	Grade	Evaluation items																Total weighted values of evaluation items in the subject	
					Knowledge and Understanding						Abilities and Skills						Comprehensive Abilities					
					(1)		(2)		(3)		(1)		(2)		(3)		(1)		(2)			
					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items		Weighted values of evaluation items in the subject
Specialized Education	Developmental Biology B	2	Elective/required	5-2T						100	2											100
Specialized Education	Animal Physiology B	2	Elective/required	5-2T						100	2											100
Specialized Education	Plant Physiology B	2	Elective/required	4-4T						100	2											100
Specialized Education	Plant Ecology B	2	Elective/required	4-3T						100	2											100
Specialized Education	Endocrinology・Immunology	2	Elective/required	5-1T						100	2											100
Specialized Education	Genome Biology	2	Elective/required	5-2T						100	2											100
Specialized Education	Systems Biology	2	Elective/required	5-1T						100	2											100
Specialized Education	Regeneration Biology	2	Elective/required	5-1T						100	2											100
Specialized Education	Seminar for Developmental Biology	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Cell Biology	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Molecular Physiology	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Plant Taxonomy and Ecology	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Plant Physiological Chemistry	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Plant and Microbial Molecular Genetics	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Molecular Genetics	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Molecular Plant Biology	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Gene Chemistry	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Evolution and Development	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Island Biology	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Plant Genetic Resources	2	Elective/required	8										100	2							100
Specialized Education	Seminar for Amphibian Biology	2	Elective/required	8										100	2							100
Specialized Education	Summer Course for Marine Biology A	1	Elective/required	3												100	2					100
Specialized Education	Practice for Phytogeography	1	Elective/required	3												100	2					100
Specialized Education	Practice for Ecology	1	Elective/required	4												100	2					100

Subject Classification	Subject Name	Credits	Type of course registration	Grade	Evaluation items																Total weighted values of evaluation items in the subject
					Knowledge and Understanding						Abilities and Skills						Comprehensive Abilities				
					(1)		(2)		(3)		(1)		(2)		(3)		(1)		(2)		
					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	
Specialized Education	Summer Course for Marine Biology B	1	Free elective	5												100	2				100
Specialized Education	Marine Biological Course	2	Free elective	3												100	2				100
Specialized Education	Marine course for marine biological education	1	Free elective	1-2												100	2				100
Specialized Education	Biology Internship	1	Free elective	5												100	2				100

Curriculum Map of Biology Program

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	Academic achievements Evaluation items	1st grade		2nd grade		3rd grade		4th grade		
		Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	
Comprehensive Abilities	To acquire abilities to understand information security compliance, to collect and evaluate data.	Introduction to Information and Data Sciences (◎)	Ground zero programming (○)							
	Fundamental Date Science (○)									
	Acquiring ability to apply basic knowledge to biological issues and reading comprehension of English theses.	English Seminar on Biological Science (◎)	Seminar on Biological Science (◎)	Biology Internship (△)		Seminar for Developmental Biology (○) Seminar for Cell Biology (○) Seminar for Molecular Physiology (○) Seminar for Plant Taxonomy and Ecology (○) Seminar for Plant Physiological Chemistry (○) Seminar for Plant and Microbial Molecular Genomics (○) Seminar for Molecular Genetics (○) Seminar for Molecular Plant Biology (○) Seminar for Gene Chemistry (○) Seminar for Evolution and Development (○) Seminar for Island Biology (○) Seminar for Plant Genetic Resources (○) Seminar for Amphibian Biology (○)				
	Based on basic knowledge which is already acquired, to obtain the following experimental skills in order to practice research: 1) Basic observation skills and skills to manage experiments. 2) Ability to record observed natural phenomena. 3) Ability to collect and assess data.		Experimental Methods and Laboratory Work in Biology I (◎) Experimental Methods and Laboratory Work in Biology II (◎) Experimental Methods and Laboratory Work in Physics I (○) Experimental Methods and Laboratory Work in Physics II (○) Experimental Methods and Laboratory Work in Chemistry I (○) Experimental Methods and Laboratory Work in Chemistry II (○)	Experimental Methods and Laboratory Work in Earth Sciences I (○) Experimental Methods and Laboratory Work in Earth Sciences II (○) Practice for Fundamental Biology I (◎) Summer Course for Marine Biology A (○) Practice for Phytogeography (○) Marine Biological Course (△)	Practice for Fundamental Biology II (◎) Practice for Ecology (○)	Practice for Fundamental Biology III (◎) Summer Course for Marine Biology B (△)	Practice for Fundamental Biology IV (◎)			
	Understanding rudimentary matters for biological research such as observation of animals・plants and ways of experiments and writing reports through observation of research objects, collection, consideration, discussion and presentation.	Marine course for marine biological education (△) Introductory Seminar for First-Year Students (◎)								
	To absorb cutting-edge knowledge, acquire high-level skills, learn how to conduct research, improve presentation ability through discussion, summarize research results as a graduation thesis, and deliver presentations.	Special Study for Graduation (◎) Special Study for Graduation (◎)								
		Liberal Arts Education Subjects	Basic Specialized Subjects	Specialized Education Subjects	Graduation Thesis	(◎) Required	(○) Elective/required	(△) Free elective		