# For entrants in AY 2019

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								
1. Degree to be obtained: Bachelor of Science										

#### 2. 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 specialism in this program, places importance on the concept of knowledge and practices. Students can acquire practical skills while taking experiments from the second year in addition to lectures and seminars. Therefore, students will acquire basic knowledge and skills in biology through fundamental subjects, basic specialized subjects, and specialized subjects which are systematically and organically constructed mainly around the four pillars of zoology, botany, biochemistry, and genetics. Furthermore, students will acquire the ability to summarize the knowledge they have acquired and their achievements into a report, and the skills needed to effectively 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.

3. 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 account the concept and methods of modern biology, inheriting the traditions of the Imperial University Teachers College, and offers a system of flexible education while taking into consideration students' proficiency levels.

Specifically, the four-year curriculum is structured so that students can complete their liberal arts education subjects in the first and second years, and take specialized class subjects in their second and third years. Most of these class subjects are selectively required, and students are recommended to study them independently.

- In the 1st academic year, students learn general knowledge by liberal arts education subjects and basic biological knowledge by some specialized subjects including "Basic Biological Science A and B".

- Specialized subjects in 2nd and 3rd years include contents related to various fields in biology ranging from molecular & cellular levels to individual & crowd levels. Most of the subjects are compulsory elective. The students learn special knowledge proactively.

- In the 2nd and 3rd year, students learn basic skills in practical biology by "Practice for Fundamental Biology I – IV". Students also learn how to summarize the results, to discuss on the results, and to make reports.

- In the final academic year, students will work on the latest research tasks in their laboratory. The resulting achievements will be presented in the presentation session for graduation theses, and students will receive an evaluation from faculty members of the Program in Biological Science.

5. Start time and acceptance conditions

The School of Science gives entrance examinations by Department. The Biology Program shall mainly target entrants to the Department of Biological Science, who select this Program at the time of admission. Therefore, students will receive an education in line with the Biology Program from the beginning of the first year. However, entrants to the Department of Biological Science are assumed to have mastered the subjects listed below by the end of their high school years. Those who have not taken or have not mastered any of these subjects must take 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	Converted
achievement	value
S (90 or more points)	4
A (80 – 89 points)	3
B (70 – 79 points)	2
C (60 – 69 points)	1

A codomio ochiovomont	Evaluation
Academic acmevement	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 class content will be modified by the Faculty Council in Charge of Major Program in Biology as required.

# Table of Registration Standards for Biology Program

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.

\* Students who have earned the required credits (refer to the Students Handbook for the details) can acquire the type 1 license for junior high school teacher (science), the type 1 license for senior high school teacher (science), and the curator license.

## (Liberal Arts Education)

											Year (*Th	r in wh	ich th	e subje ans seme	ect is t	aken	
Tuno			ç	Jubicat trme	Requ	uired	Class subjects at a	No. of	Type of	1st g	rade	2nd	grade	3rd g	grade	4th g	grade
rype			ĸ	subject type	cre	dits	Class subjects, etc.	credits	registration	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
									-	1	2	3	4	5	6	7	8
			Peace	e Science Courses		2	From "Peace Science Courses"	Each 2	Elective/required	0							
	ourses ersity ation	Intro	oducti	on to University Education		2	Introduction to University Education	2	Required	2							
	Basic C in Univ Educe	Intro	ductor	y Seminar for First-Year Students		2	Introductory Seminar for First-Year Students (Note 2)	2	Required	2							
				Area Courses	1	12	From "Area Courses" (Note 3)	1  or  2	Elective/required	0	0	0	0				
				Basia English Usago		2	Basic English Usage I	1	Paguirod	1							
			e 4)	Dasic English Osage		2	Basic English Usage II	1	Kequireu		1						
			(Not	Communication I		2	Communication IA	1	Required	1							
	ts	lage:	dish	Communication 1		2	Communication IB	1	Required	1							
	ıbjec	angı	Eng	Communication II	c	2	Communication IIA	1	Required		1						
	on Sı	gn L		Communication	6	2	Communication IIB	1	Required		1						
	mm(	orei					Foreign Languages: Basic Studies I	1		0							
ects	ŭ	ш	۱ Selec)	Von-English Foreign Languages t one language from German, French,		(0)	Foreign Languages: Basic Studies II	1	Free elective	0							
Subj			Spani	sh, Russian, Chinese, South Korean, and Arabic) (Note 5)		(0)	Foreign Languages: Basic Studies III	1	The elective		0						
ion							Foreign Languages: Basic Studies IV	1			0						
lucat			Ir	nformation Courses		2	Exercise in Information Literacy	2	Required	2							
ts Ec		Soci	al Co	operation Courses(Note 6)	(	0)	From "Social Cooperation Courses"	1  or  2	Free elective	0	0						
Ar						2	Experimental Methods and Laboratory Work in Biology I	1	Required		1						
bera.						2	Experimental Methods and Laboratory Work in Biology $II$	1	Required		1						
Lil							General Chemistry	2		0							
						4	Fundamental Physical Chemistry	2	Elective/required		0						
							Statistical Data Analysis	2		0							
							2 subjects (4 credits) from the three subjects abo	ove	1				1		1		1
			Fou	ndation Courses	8		Experimental Methods and Laboratory Work in Physics I	1			0						
							Experimental Methods and Laboratory Work in Physics ${\rm I\!I}$	1			0						
							Experimental Methods and Laboratory Work in Chemistry I	1	Elective/required		0						
						2	Experimental Methods and Laboratory Work in Chemistry $II$	1	-		0						
							Experimental Methods and Laboratory Work in Earth Sciences I	1	-			0					
							Experimental Methods and Laboratory Work in Earth Sciences II	1				0					
							I and II of the same subject (2 credits) from the 6	i subject	s above								
1	Tot	al (L	8     8     Experimental Met       2     Experimental Met       1     and II of the state														

The indicated semester represents that in which students typically take the subject. It is permitted to take the subject in the same (first or second) semester in the following (Note 1) ear, however, it is required to confirm the details in syllabus for that academic year, because the subject might be provided in a different semester or term

Choose one of the courses: "Field of Animal & Life & Science" or "Field of Plants." In the case of taking the two courses, only two credits per course shall be conferred. (Note 2) It is required to earn 12 credits in "Area Courses", and they must consist of at least 6 credits in "Human & Social Science Subjects" and at least 4 credits in "Natural Science Subjects". Students who want to acquire an educational personnel certification must take the subject "Japanese Constitution" in the "Human & Social Science Subjects". Credits earned through the subject "Advanced English for Communication", "Foreign Languages: Intensive Studies", and "Overseas Language Seminar (German, French, Spanish, Russian, Chinese, and South Korean)" in "Foreign Languages" are accepted as the credits required for "Human & Social Science Subjects". (Note 3)

The credit for "Field Research in the English-speaking World" that is earned through such activities as a short-term study abroad, and that for "Online English Seminar A" and "Online English Seminar B", that is earned through self-study, are accepted as the credit for the subject "Communication I and II". Achievement in a foreign language skill test might also be accepted as credit. For the details, refer to the description of English subjects in liberal arts education and the item "Credit based on Achievement in Foreign Language Skill Tests" in the Student Handbook. (Note 4)

The credit for "Foreign Languages: Basic Studies I, II, III and IV" is accepted as credits for the category of "Any subject". (Note 5)

The credit of the subject "Social Cooperation Courses" is accepted as credit for the category of "Any subject". (Note 6)

\* Note for the "Specialized Education Subjects" listed in the next page and after

To achieve the 71 credits required for the "Specialized Subjects", it is required to earn 10 or more credits for elective required subjects and free elective subjects, as well as 26 credits for required subjects and 35 credits for elective required subjects. (Note 7)

"Summer Course for Marine Biology A", "Practice for Phytogeography", and "Practice for Ecology" shall be offered intensively in a certain period, and each can accept only a (Note 8) limited number of students.

'Practice for Phytogeography" and "Practice for Ecology" shall be offered alternately for second-year and third-year students every other year.

(Note 9) "Marine Biological Course" shall be offered intensively in a certain period, and can only accept a limited number of students. (Note 10) "Special Lectures in Biological Science" shall be offered intensively in a certain period (in or after the fifth semester).

(Note 11) Because 128 credits are required for graduation, it is required to earn 10 or more credits regardless of the categorization of Liberal Arts Education Subjects and Specialized Education Subjects, in addition to the required credits for each subject category (118 credits in total that consist of 34 credits for Liberal Arts Education Subjects and 71 credits for Specialized Education Subjects).

However, the credit for the subjects).
However, the credit for the subjects described below is not accepted as the required credit for graduation: For the details of subjects related to educational personnel certification, refer to the list of required credits in "Acquisition of Educational Personnel Certification" in the Student Handbook.
Any credit that exceeds 12 credits for "Area Courses"
"Health and Sports Courses"

Any credit for subjects only related to educational personnel certification
Credits for "Experiments in General Physics A", "Experiments in Chemistry A", "Laboratory Work in Biology A" and "Experiments in General Geology A"
"Basic Specialized Subjects" and "Specialized Subjects" provided in another program in anther school (except those that are admitted by the faculty committee of Biology Program)

# (Specialized Education)

								Year	in wh	ich th	e subje	et is t	aken	
		Requ	uired		No. of	Type of	1st e	rade	2nd s	rade	3rd g	rade	4th g	rade
Type	Subject type	No	. of dite	Class subjects, etc.	credits	course	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
		cre	uns			registration	1	1 an 9	3	1 41	5	r an	7	8
				Introduction to Mathematics	2		0	4	J	4	5	0	'	0
				Introduction to Information Mathematics	2		0	0						
				Introduction to Physics A	2		0							
				Introduction to Physics B	2		0	0						
			6	Introduction to Chemistry A	2	Elective/required	0	0						
				Introduction to Biological Sciences A	2		0	0						
	Basic Specialized Subjects	13		Introduction to Biological Sciences B	2			0						
				Introduction to Earth and Planetary Sciences A	2		0	0						
				Introduction to Earth and Planetary Sciences B 3 subjects (6 credits) from the ten subjects above	2			0						
				Basic Biological Science A	2		2							
			7	Basic Biological Science B	2	Required	2	-						
				English Seminar on Biological Science	1			(1)	0					
				Practice for Fundamental Biology I	4				(4)					
				Practice for Fundamental Biology II	4					4				
			26	Practice for Fundamental Biology III	6	Required					6			
				Practice for Fundamental Biology IV	4					-		4	0	0
				Advanced Mathematics	Each 4						0		(4)	(4)
				Advanced Physics	2					0	0			
			At	Advanced Chemistry	2	Elective/required						0		
			2	Advanced Biology	2						0	0		
				Advanced Earth and Planetary Science	2 ts above							0		
				Biochemistry A	2			0						
				Genetics A	2			Ō						
				Microbiology	2				0					
				Plant Ecology A	2				0	-				
				Cell Biology A	2				0					
				Plant Taxonomy	2				Õ					
				Animal Physiology A	2					0				
ects				Regulation of Animal Morphology	2					0				
òubje				Plant Physiology A	2					0				
on S				Biological Informatics	2					Õ				
Icati			At	Molecular Genetics B	2	Elective/required				0				
Edu			30	Plant Physiology B	2					0				
ized				Plant Ecology B Biochemistry B	2					0	0			
ciali				Genetics B	2						0			
Spe				Molecular Cell Biology	2						0			
		71		Comparative Embryology	2						0			
	Specialized Subjects	(Note		Cell Biology B	2						0			
		7)		Developmental Biology B	2						Õ			
				Animal Physiology B	2						0			
				Endocrinology • Immunology	2						0			
				At least 15 subjects (20	4	iooto ch	l	1		1	U			
				At least 15 subjects (30 credits) from the twenty	iive sub	jects above								
				Seminar for Developmental Biology Seminar for Cell Biology	2									0
				Seminar for Molecular Physiology	2	1								0
				Seminar for Plant Taxonomy and Ecology	2	1								0
				Seminar for Plant Physiological Chemistry	2									0
				seminar for Plant and Microbial Molecular Genomics Seminar for Molecular Genetics	2	Elective/required								0
			2	Seminar for Molecular Plant Biology	2	Elective/ required								0
				Seminar for Gene Chemistry	2									Ō
				Seminar for Evolution and Development	2									0
				Seminar for Island Biology Seminar for Plant Constic Resources	2									0
				Seminar for Amphibian Biology	2	1								Õ
				1 subject (2credits) from the thirteen subjects ab	ove									
			Δ+	Summer Course for Marine Biology A	1				0					
			least	Practice for Phytogeography Practice for Ecology	1	Elective/required			0	$\cap$				
			1	At least 1 subject (1 credit) from the three subject	ts abov	e (Note 8)	l			U				
				Summer Course for Marine Biology B	1	/					0			
				Marine Biological Course (Note 9)	2				0			_		_
				"Special Lectures in Biological Science" (Note 10) Biology Internship	Each 1	Free elective					0	0	0	0
				"Basic Specialized Subjects" and "Specialized	1						0			
				Subjects" offered by other programs of School of			0	0	0	0	0	$\circ$	$\circ$	$\circ$
	Total (Specialized Education Subjects)	R	4	Science		I				<u> </u>				
	Any subject	1	.0	(Note 11)			0	0	0	0	0	0	0	0
	Total	12	28											

## Academic achievements of Biology Program

### Relationships between the evaluation items and evaluation criteria

		Academic achievements		Evaluation criteria	
		Evaluation items	Excellent	Very Good	Good
edge	upug (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.
and and	Erst (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.
, Kr	(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.
S	(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.
nd Skill	(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.
Abilities and Skill	(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 experiments	Being able to acquire experimental capability	To acquire skills for experiments.
ısive 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.
Comprehen	(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, and deliver presentations.	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.

# Sheet3

## Relationships between the evaluation items and class subjects

											E	valuati	on iter	ns							
					Kı	nowled	ge and	l Unde	rstandi	ing		Ab	ilities	and Sk	ills		Comp	rehens	sive Al	oilities	Total
Subject		a 11	Type of course		(	1)	()	2)	(:	3)	()	1)	(2	2)	(	3)	()	1)	()	2)	weighted values of
Classification	Subject Name	Credits	registratio	Grade	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	evaluation								
			n		evaluation	values of	evaluation	values of	evaluation	values of	evaluation	values of	items in the subject								
					the	evaluation items	ttems in the	evaluation items	the	evaluation items	ttems in the	evaluation items	-								
Liberal Arts			Elective/reg		subject		subiect		subject		subiect		100								
Education	Peace Science Courses	2	uired	1	100	1															100
Liberal Arts Education	Introduction to University Education	2	Required	1	100	1															100
Liberal Arts	Introductory Seminar for	2	Required	1													100	2			100
Education	First-Year Students	-	Floative /reg	1													100	2			100
Education	Area Courses	12	uired	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 ${\rm I\!I}$	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	Foreign Languages:	1	Free	2	100	1															100
Liberal Arts	Exercise in Information	0	Paguinod	1							100	0									100
Education	Literacy	2	Requireu	1							100	2									100
Education	Courses	0	Free elective	1-2	100	1															100
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology I	2	Required	2											100	2					100
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology II	2	Required	2											100	2					100
Liberal Arts Education	General Chemistry	2	Elective/req uired	1			100	1													100
Liberal Arts Education	Fundamental Physical Chemistry	2	Elective/req uired	2			100	1													100
Liberal Arts Education	Statistical Data Analysis	2	Elective/req uired	1			100	1													100
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I	2	Elective/req uired	2											100	1					100

				Evaluation items       Evaluation items         Knowledge and Understanding       Abilities and Skills       Comprehensive Abilities																	
				Knowledge and Understanding Abilities and Skills Comprehens											sive Al	oilities	Total				
Subject			Type of		(	1)	(	2)	(	3)	(	1)	(	2)	()	3)	(	1)	()	2)	weighted values of
Classification	Subject Name	Credits	registratio	Grade	Weighted values of	Weighted	evaluation														
			n		evaluation	values of	items in the subject														
					items in the	evaluation items	the	evaluation items	items in the	evaluation items											
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics II	2	Elective/req uired	2	subiect		subiect 100	1	subiect		subiect		100								
Liberal Arts Education	Experimental Methods and Laboratory Work in Chemistry I	2	Elective/req uired	2											100	1					100
Liberal Arts Education	Experimental Methods and Laboratory Work in Chemistry II	2	Elective/req uired	2											100	1					100
Liberal Arts Education	Experimental Methods and Laboratory Work in Earth Sciences	2	Elective/req uired	3											100	1					100
Liberal Arts Education	Experimental Methods and Laboratory Work in Earth Sciences II	2	Elective/req uired	3											100	1					100
Specialized Education	Introduction to Mathematics	2	Elective/req uired	1			100	1													100
Specialized Education	Introduction to Information Mathematics	2	Elective/req uired	2			100	1													100
Specialized Education	Introduction to Physics A	2	Elective/req uired	1			100	1													100
Specialized Education	Introduction to Physics B	2	Elective/req uired	2			100	1													100
Specialized Education	Introduction to Chemistry A	2	Elective/req uired	1			100	1													100
Specialized Education	Introduction to Chemistry B	2	Elective/req uired	2			100	1													100
Specialized Education	Introduction to Biological Sciences A	2	Elective/req uired	1			100	1													100
Specialized Education	Introduction to Biological Sciences B	2	Elective/req uired	2			100	1													100
Specialized Education	Introduction to Earth and Planetary Sciences A	2	Elective/req uired	1			100	1													100
Specialized Education	Introduction to Earth and Planetary Sciences B	2	Elective/req uired	2			100	1													100
Specialized Education	English Seminar on Biological Science	1	Required	2									100	2							100
Specialized Education	Basic Biological Science A	2	Required	1					100	2											100
Specialized Education	Basic Biological Science B	2	Required	1					100	2											100
Specialized Education	Seminar on Biological Science	2	Required	3									100	2							100
Specialized Education	Practice for Fundamental Biology I	4	Required	3											100	2					100
Specialized Education	Practice for Fundamental Biology II	4	Required	4											100	2					100
Specialized Education	Practice for Fundamental Biology III	6	Required	5											100	2					100
Specialized Education	Practice for Fundamental Biology IV	4	Required	6											100	2					100

				Evaluation items       Knowledge and Understanding     Abilities and Skills     Comprehensive Abilities																	
					Kr	nowled	ge and	l Unde	rstand	ing		Ab	oilities	and Sk	ills		Comp	prehen	sive A	bilities	Total
Subject		0 1	Type of course	<b>C</b> 1	()	1)	(	2)	(	3)	(	1)	()	2)	()	3)	(	1)	(	2)	weighted values of
Classification	Subject Name	Credits	registratio	Grade	Weighted values of	Weighted	evaluation														
			п		evaluation	values of	the subject														
					the	items															
Specialized Education	Special Study for Graduation	各4	Required	7-8	sublect		sublect		sublect		SUDIECT		sublect		sublect		sublect		100	3	100
Specialized Education	Advanced Mathematics	2	Elective/req uired	5					100	1											100
Specialized Education	Advanced Physics	2	Elective/req uired	4					100	1											100
Specialized Education	Advanced Chemistry	2	Elective/req uired	6					100	1											100
Specialized Education	Advanced Biology	2	Elective/req uired	5					100	1											100
Specialized Education	Advanced Earth and Planetary Science	2	Elective/req uired	6					100	1											100
Specialized Education	Microbiology	2	Elective/req uired	3					100	2											100
Specialized Education	Plant Ecology A	2	Elective/req uired	3					100	2											100
Specialized Education	Biochemistry A	2	Elective/req uired	2					100	2											100
Specialized Education	Genetics A	2	Elective/req uired	2					100	2											100
Specialized Education	Molecular Genetics A	2	Elective/req uired	3					100	2											100
Specialized Education	Cell Biology A	2	Elective/req uired	3					100	2											100
Specialized Education	Animal Physiology A	2	Elective/req uired	4					100	2											100
Specialized Education	Regulation of Animal Morphology	2	Elective/req uired	4					100	2											100
Specialized Education	Plant Taxonomy	2	Elective/req uired	3					100	2											100
Specialized Education	Developmental Biology A	2	Elective/req uired	4					100	2											100
Specialized Education	Plant Physiology A	2	Elective/req uired	4					100	2											100
Specialized Education	Biochemistry B	2	Elective/req uired	5					100	2											100
Specialized Education	Genetics B	2	Elective/req uired	5					100	2											100
Specialized Education	Molecular Cell Biology	2	Elective/req uired	5					100	2											100
Specialized Education	Biological Informatics	2	Elective/req uired	4					100	2											100
Specialized Education	Comparative Embryology	2	Elective/req uired	5					100	2											100
Specialized Education	Plant Morphology	2	Elective/req uired	5					100	2											100

											E	valuati	ion ite	ns							
				Knowledge and Understanding Abilities and Skills Comprehensive Abilities													Total				
Subject			Type of		(	1)	(	2)	(	3)	(	1)	(	2)	(:	3)	(	1)	()	2)	weighted values of
Classification	Subject Name	Credits	registratio	Grade	Weighted values of	Weighted	evaluation														
			n		evaluation	values of	items in the subject														
					items in the	evaluation items	the	evaluation items	the the	evaluation items	items in the	evaluation items									
Specialized	Molecular Genetics B	2	Elective/req	4	subiect		subject		subject 100	2	subiect		100								
Specialized	Cell Biology B	2	Elective/req uired	5					100	2											100
Specialized Education	Developmental Biology B	2	Elective/req uired	5					100	2											100
Specialized Education	Animal Physiology B	2	Elective/req uired	5					100	2											100
Specialized Education	Plant Physiology B	2	Elective/req uired	4					100	2											100
Specialized Education	Plant Ecology B	2	Elective/req uired	4					100	2											100
Specialized Education	Endocrinology• Immunology	2	Elective/req uired	5					100	2											100
Specialized Education	Genome Biology	2	Elective/req uired	5					100	2											100
Specialized Education	Seminar for Developmental Biology	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Cell Biology	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Molecular Physiology	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Plant Taxonomy and Ecology	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Plant Physiological Chemistry	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Plant and Microbial Molecular	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Molecular Genetics	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Molecular Plant Biology	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Gene Chemistry	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Evolution and Development	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Island Biology	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Plant Genetic Resources	2	Elective/req uired	8									100	2							100
Specialized Education	Seminar for Amphibian Biology	2	Elective/req uired	8									100	2							100
Specialized Education	Summer Course for Marine Biology A	1	Elective/req uired	3											100	2					100
Specialized Education	Practice for Phytogeography	1	Elective/req uired	3											100	2					100

											E	valuati	on ite	ns							
					Kr	nowled	lge and	l Unde	rstand	ing		Ab	oilities	and Sk	kills		Comp	rehens	sive Ał	oilities	Total
Subject			Type of course		(	1)	(	2)	(	3)	(	1)	(	2)	()	3)	(	1)	()	2)	weighted values of
Classification	Subject Name	Credits	registratio n	Grade	Weighted values of evaluation items in the	Weighted values of evaluation items	Weighted values of evaluation items in the	Weighted values of evaluation items	Weighted values of evaluatior items in the	Weighted values of evaluation items	Weighted values of evaluation items in the	Weighted values of evaluation items	evaluation items in the subject								
					subiect		subject		subject		subiect		subiect		subiect		subiect		subject		
Specialized Education	Practice for Ecology	1	Elective/req uired	4											100	2					100
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	Biology Internship	1	Free	5									100	2							100

## Sheet4

### Curriculum Map of Biology Program

	Academic achievements	1st	grade	2nd	grade	3rd	grade	4th	grade
	Evaluation items	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
		Communication IA(©)	Communication IIA(©)						
		Communication IB(©)	Communication IIB(©)						
		Foreign Languages: Basic Studies	Foreign Languages: Basic Studies						
		I(△) Foreign Languages: Basic Studies	Ⅲ (△) Foreign Languages: Basic Studies						
	Studying to understand liberal arts, peace, foreign	II (△) Basic English Usage I(◎)	IV (△) Basic English Usage II (◎)						
	languages, culture and society.								
		Deces Colored Courses(A)	Social Cooperation Courses (Δ)						
		Introduction to University							
		Education(@)	Fundamental Physical Chemistry						
		General Chemistry(O)	(O)						
ding		Statistical Data Analysis(O)	Introduction to Information						
stan	Independent and location basis to such days in	Introduction to Mathematics(O)	Mathematics(O)						
ders	scientific fields.	Introduction to Physics A(O)	Introduction to Physics B(O)						
Ľ		Introduction to Chemistry $A(O)$	Introduction to Chemistry $B(O)$						
and		Introduction to Biological Sciences A(O)	Introduction to Biological Sciences B(O)						
dge		Introduction to Earth and	Introduction to Earth and						
wle		Basic Biological Science A(©)	Genetics A(O)	Microbiology(O)	Developmental Biology A(O)	Cell Biology B(O)	Advanced Chemistry(O)		
Kho		Basic Biological Science B(©)	Biochemistry A(O)	Plant Ecology A(O)	Plant Physiology A(O)	Developmental Biology B(O)	Advanced Earth and Planetary Science (O)		
				Cell Biology A(O)	Biological Informatics(O)	Biochemistry B(O)			
				Molecular Genetics A(O)	Molecular Genetics B(O)	Genetics B(O)			
				Plant Taxonomy(O)	Animal Physiology A(O)	Molecular Cell Biology(O)			
	To understand and acquire advanced knowledge on				Regulation of Animal Morphology(O)	Animal Physiology B(O)			
	specialties in biology.				Plant Physiology B(O)	Comparative Embryology(Q)			
					Plant Ecology B(Q)	Plant Morphology(Q)			
						Advanced Mathematics (O)			
						Endocrinology			
						Advanced Dislam(Q)			
						Advanced Biology(O)			
		Exercise in Information Literacy				Genome Biology (O)			
	To acquire abilities to understand information security compliance to collect and evaluate data	(@)							
			English Seminar on Biological						Sominar for Developmental
			Science(@)	Seminar on Biological Science(  Ø)		Biology Internship $(\Delta)$			Biology(O)
									Seminar for Cell Biology(O)
									(O)
									Seminar for Plant Taxonomy and Ecology(O)
									Seminar for Plant Physiological Chemistry(O)
	Acquiring ability to apply basic knowledge to								Seminar for Plant and Microbial Molecular Genomics(O)
slli	biological issues and reading comprehension of								Seminar for Molecular Genetics
Ť Š	English theses.								Seminar for Molecular Plant
and									Seminar for Gene Chemistry(O)
ities									Seminar for Evolution and
Abili									Seminar for Island Biology (O)
									Seminar for Plant Genetic
									Seminar for Amphibian Biology
1						1			(O)

Academic achievements	1st grade		2nd grade		3rd grade		4th grade	
Evaluation items	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
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 Earth Sciences I (O)					
		Experimental Methods and Laboratory Work in Biology $II(\bigcirc)$	Experimental Methods and Laboratory Work in Earth Sciences ${\rm I\!I}({\rm O})$					
	6	Experimental Methods and Laboratory Work in Physics I (O)	Practice for Fundamental Biology I (@)	Practice for Fundamental Biology Ⅲ(◎)	Practice for Fundamental Biology Ⅲ (◎)	Practice for Fundamental Biology Ⅳ (◎)		
		Experimental Methods and Laboratory Work in Physics II (O)	Summer Course for Marine Biology A(O)	Practice for $Ecology(O)$	Summer Course for Marine Biology $B(\Delta)$			
		Experimental Methods and Laboratory Work in Chemistry I (O)	Practice for Phytogeography(O)					
		Experimental Methods and Laboratory Work in Chemistry II $(O)$	Marine Biological Course $(\Delta)$					
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.	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 ( $\bigcirc$ )
	9							
	r							
		Liberal Arts Education Subjects	Basic Specialized Subjects	Specialized Education Subjects	Graduation Thesis	(©)Required	(O)Elective/required	$(\Delta)$ Free elective