As of April 1, 2025

For entrants in AY 2025

Attachment Form 1

Description of Major Program

Name of Faculty (Department) [School of Applied Biological Science (Department of Applied Biological Science)]

Name of Program	Integrative Hydrospheric Science Program

1.Degree to be obtained: Bachelor of Agriculture

2.Overview

The School of Applied Biological Science aims to educate students to acquire a wide range of knowledge and understanding in the realms of the natural and social sciences related to applied biology. Specifically, we provide education that allows students to ① acquire basic knowledge regarding food production, biotic resources, and biotechnology, ② gain experience in field science, ③ understand bioethics and engineering ethics, and ④ gain abilities in foreign languages, such as English, and in data processing.

In the Integrative Hydrospheric Science Program, the education is provided by faculties involved in areas represented by five keywords (marine ecosystem, biological environment, hydrosphere organisms, aquatic resources, and field work) to students to acquire basic knowledge and study skills for physiology, pathology, biochemistry, ecology, ethology, and use as a resource regarding hydrosphere organisms and techniques for cultivation of aquatic organism. Students are also educated to obtain basic knowledge regarding problems related to the themes mentioned above and a wide point of view for international challenges and development in these fields. In addition to that, they are educated to develop capability for planning and executing the study for a solution for problems that they may encounter in the field of fisheries oceanography on their own, analyzing and organizing material that they collect, and publishing and discussing the result orally and in writing.

This Program educates students to become experts who have acquired a higher level of expertise in the graduate school after this program or a research worker and a specialist with an international point of view in such as a public office for agriculture and fisheries or in business fields related to agriculture, foods, and chemical and pharmaceutical products.

3.Diploma policy (policy for degree conferment and target to be achieved in the program)

The Integrative Hydrospheric Science Program aims to develop human resources who are capable of working as a specialist in a company and corporation that is engaged in such as food production and recycling and effective use of resources in the hydrosphere. Therefore, in this program, the degree of Bachelor of Agriculture will be awarded to students who acquire the capabilities described below, earn the required credits and to satisfy the specified achievement level, and pass the examination that is administered by the School of Applied Biological Science.

● Through liberal arts education subjects:

(1) The ability to study autonomously; the ability to collect, analyze, and criticize data; and putting these abilities into practice;

(2) Insight, from a broad perspective, into the essentials and the background of phenomena, and the linguistic ability and concern about peace which are required for a citizen of the world;

(3) The ability to identify a problem based on broad knowledge, integrate findings to establish a "knowledge system"

that is really useful for problem solving, and examine phenomena from a top-down perspective based on this integrated knowledge; and

(4) General and basic knowledge of science that enables the student to develop the knowledge and skills required for application in any of the specialty fields of applied biological science.

● Through the specialized fundamental subjects for specialized education, the student is required to acquire:

(5) The ability to understand cutting-edge topics, as well as the basic ideas related to organisms and the biosphere;

(6) The ability to understand the value orientation and relevance to a globalized society of applied biology, and the importance of communication and consensus building in relation to the application of scientific results; and

(7) Understanding of problems regarding research misconduct and the importance of research and engineering ethics.

● Through the specialized education in this program, the student is required to acquire:

(8) Knowledge regarding the hydrosphere organisms, fishery, and hydrosphere environment and understanding how to manage aquatic resources and use aquatic products;

(9) Ability to understand theories required for compatibility between fishery and maintenance of hydrosphere environment and analyze and evaluate characteristics of a hydrosphere organism using methods of physiology, biochemistry, and ecology;

(10) Ability to handle a hydrosphere organism based on its characteristics and manage and use valuable aquatic resources for practical application from the multi-disciplinary point of view while respecting the ethics of engineers and researchers; and

(11) Ability to organize his/her own ideas for a specific phenomenon related to a hydrosphere organism, logically publish them orally and/or in writing, and discuss the topic.

4.Curriculum policy (policy for arranging and executing the educational courses)

To enable students to achieve the targets that are defined for the Integrative Hydrospheric Science Program, the educational courses are organized and executed according to the following policies:

(1) Courses in the liberal arts education aim to develop a wide-ranging and in-depth education and general intelligence, and to foster in students a depth of humanity and desire for peace. They also aim to develop practical foreign language abilities, an international perspective, the ability to understand different cultures, and the ability to utilize information and communication. In addition to this, courses in fundamental subjects are incorporated into the liberal arts education in order to develop professionals with the basic scientific knowledge and skills required for application in any of the specialty fields of applied biological science.

(2) Courses in special education develop basic capabilities related to biology and the biosphere through the "specialized fundamental subjects" that are common for all courses at the School of Applied Biological Science. The courses include exercises abroad, internships, field exercises, and lectures regarding scientific and engineering ethics in order to develop the ability to make a hypothesis and basic, practical capabilities required for activities undertaken in leading positions in the international and/or local community. The courses also aim to develop the ability to understand problems regarding research misconduct and the importance of research and engineering ethics.

(3) The courses in the specialized education for this Program provide the "specialized subjects" related to hydrosphere organisms and hydrosphere environment to allow students to acquire the ability for comprehensively understanding hydrosphere organisms. Also the courses of "exercise" and "experiment & practice" for the related area are

provided for students to acquire skills and attitudes that can be practically applied and used. In addition to that, students develop general capabilities for problem solving including skills for communication, presentation, and practical foreign language capability while preparing his/her "graduation thesis."

(4) Achievement in education is evaluated based on the grade scores for the subjects and the achievement level against the target defined for this program.

5.Start time and acceptance conditions

The School of Applied Biological Science holds the entrance examination collectively for the Department of Applied Biological Science. Students mainly take the liberal arts curricula that are held for the whole of the university (seminar for developing intelligence, subject regarding peace, introduction to university education, foreign language study, data processing study, disciplinary subjects, and subject regarding health & sports) in the first and second semesters of the first year and the first semesters of the second year. Assignment of students to the Integrative Hydrospheric Science Program is actually conducted in the second semester of the second year.

Students study the fundamental subjects for one year after entering the university to acquire the basic knowledge required for studying the expertise. Then they mainly study the specialized fundamental subjects common for the all students of School of Applied Biological Science in the second semester of the second year. Particularly, they take the subjects of Laboratory Work in General Chemistry, Laboratory Work in General Physics, and Laboratory Work in General Biology I & II (including computer exercise) as those regarding experiments that are common for all students of the School of Applied Biological Science that consist of to get basic training for experiments in a wide area that is commonly required for the students of the School of Applied Biological Science. Students acquire a wide range of intelligence, capability in foreign languages such as English, data processing skills, basic knowledge common for the students of the School of Applied Biological Science, understanding for bioethics and ethics of science by the first semester of the second year to allow themselves to understand the aim and characteristics of each major program and select the most appropriate program.

Students are allocated either of four major programs (Integrative Hydrospheric Science, Applied Animal & Plant Science Program, Food Science Program, and Molecular Agricultural Biology Program) based on his/her wish and achievement level in the second semester of the second year. Students who enter the university in the fiscal year are equally divided into four programs in principle. The digits after a decimal point are rounded up.

The student must meet the specified "requirements for allocation to the program" if he/she wishes to be allocated to the program.

6.Available qualification

(1) Curator License

(2) Appointment qualification for food sanitation supervisor and food sanitation inspector

* For details of acquisition of those qualifications, refer to the "Students Handbook."

(3) Qualification for examination for Class A hazardous materials engineer

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

The evaluation criteria are specified for each academic achievement evaluation item, and the achievement level

Achievement evaluation	Numerical conversion
S (Excellent: 90 or more points)	4
A (Very good: 80 - 89 points)	3
B (Good: 70 - 79 points)	2
C (Passed: 60 - 69 points)	1

against the criteria is determined at the end of the semester.

The evaluation score for each evaluation item is converted to a numerical value (S = 4, A = 3, B = 2, and C = 1), and the evaluation standard for academic achievement, from when the student entered the university to the end of the semester, is determined using these values while applying weightings. The evaluation standards consist of three levels, i.e. Excellent, Very Good, and Good.

Study achievement	Evaluation standard
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

The graduation research in this program (Graduate Thesis) aims to allow the student to dedicate himself/herself to cutting-edge research in order to systematically gain understanding of problems and their background in the field of applied biological science, as well as to acquire comprehensive capabilities while analyzing and considering the obtained results and presenting the results in English both orally and in writing.

(2) Overview and meaning

Students conduct the graduate research under the guidance of their supervisor. Through their graduation research, students engage with the process consisting of understanding the situation (comprehension ability and intelligence), identification of problems (analysis ability and insight), and presentation of the results (proposal and execution ability), and, by doing so, they acquire the capability and skills required to work as experts after their graduation.

Students learn the basic concepts and attitude fundamentally required for research activities, establish a plan for their research, study methods for the research and experiments, and carry out the research under the instruction of their supervisor. Furthermore, students review the results obtained in the research and define targets for the further research. Students experience a series of research processes in order to have the chance to observe research activities at the cutting edge. They prepare a graduation thesis based on the study results and submit it before the specified date. Students are evaluated in the thesis examination.

(3) Timing and method for determining the supervisor

① The supervisor is determined in the 2nd semester of the 3rd academic year.

② The supervisor is determined under the guidance of the tutor. The tutor holds a guidance seminar for students to explain the specialties of each member of faculty. The tutor also instructs students to attend the presentation assembly for graduation theses and Masters theses in order to understand the details of research done by faculty members.

Students visit a faculty member who he/she wants to choose as supervisor, and learn about the details of the graduation thesis and environment of the laboratory. Supervisors are designated after the tutor considers students' wishes and makes adjustments. Then the faculty committee of the program approves the designated supervisors.

10. Responsibility

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

① The education affairs committee of school and the faculty members who provide the lectures are engaged in the processes of "plan" and "do"

② The faculty committee of the program plans and executes the major program on their own responsibility. A chief faculty member is designated as the supervisor of the program.

③ The education affairs committee of the school exercises control over the major programs provided in the school.

④ The education affairs committee of the department consists of members who are elected for each program, a chairman who is chosen by the school, and another member.

⑤ The education reform promotion committee is engaged in the process of "check."

⑥ The education reform promotion committee consists of members who are elected in each program, a chairman who is chosen by the school, the chairman of the education affairs committee of the school, an assistant chief of the graduate course, and the other member(s).

⑦ The education reform promotion committee reviews and evaluates the major programs provided in each program, reports the results to the education affairs committee of the school and the programs, and provides advice and recommendations.

⑧ The faculty committee of the program that takes the responsibility for execution of the major program is engaged in the process of "act."

⑨The faculty committee of the program and the education affairs committee of the school prepare and execute a plan for improvement taking the report, advice, and recommendations that are provided by the education reform promotion committee after the check process into consideration.

⑩ A tutor is designated for each program to provide direction regarding study and life.

⑪ A supervisor is designated in to each student in the program to provide guidance regarding the graduation thesis. The mentor guides the students through the process of the graduation research until they graduate.

The faculty committee of the program, the education affairs committee of the school, and the education reform promotion committee cooperate with each other to execute their roles with responsibility in the cycle of "plan", "do", "check", and "act" to improve the education provided at the school.

(2) Evaluation of program

① Viewpoints for evaluation of program

The Fisheries Biology Program is evaluated from the viewpoints of "educational effectiveness" and "social effectiveness."

The "educational effectiveness" is evaluated by effects of the program execution on educational achievement in students.

The "social effectiveness" is evaluated by effects of the educational achievement in the program on the society.

② Evaluation method

In this program, the achievement in the program is evaluated from the viewpoints described above for students in the second semester of the fourth year. For the "educational effectiveness", the results and achievement of the students

who took the program are evaluated comprehensively by the group of faculty members who are engaged in the execution of the program. Also, the level of achievement of all the students is evaluated and reviewed. The "social effectiveness" is evaluated based on such things as the rate of employment in corporations that have a close connection with the contents of this program and the pass rate in public servant examinations. We regularly request a human resources staff member of a company that employs mainly students of this program to evaluate this program. In addition to that, we request graduates of this program to evaluate both their own achievement and that of the program. The staff in the company and graduates are requested to provide evaluation and advice regarding whether the class subjects and their contents in this program were effective for social activities, whether the contents of class appropriately corresponded to the changes in science, technology, and society, and any class subjects that would be required for the future.

③ Policy and method for feedback to students

The education reform promotion committee regularly conducts inquiries and interviews for students to review and evaluate the program, improve the contents of the program, and provide advice and recommendations for improvement.

Table of Registration Standards (Liberal Arts Education Subjects)

(Integrative Hydrospheric Science Program, Applied Animal and Plant Science Program, Food Science Program, Molecular Agro-Life Science Program)

Type	Subject type			Required No. of credits	Class subjects	No. of credits	Type of course registration	Year in which the subject is taken							
								1st grade		2nd grade		3rd grade		4th grade	
								Springs	Fall	Springs	Fall	Springs	Fall	Springs	Fall
Liberal Arts Education	Peace Science Courses			2		2	Required	○							
	Common Subjects	Basic Courses in University Education	Introductory Seminar for First-Year Students	2	Introductory Seminar for First-Year Students	2	Required	◎							
			Introduction to University Education	2	Introduction to University Education	2	Required	◎							
			Development Seminar	0	(Note3)	1		○	○	○	○	○	○		
		Foreign Languages	English(Note2) Basic English Usage	2	Communication Basic I	1	Required	◎							
					Communication Basic II	1			◎						
			English(Note2) Communication I	2	Communication I A	1	Required	◎							
					Communication I B	1		◎							
			English(Note2) Communication II	2	Communication II A	1	Required		◎						
					Communication II B	1			◎						
			Non-English Foreign Languages (Select one language) (Note2)	4	Basic Foreign Language I	1	Elective Required	◎							
					Basic Foreign Language II	1		◎							
					Basic Foreign Language III	1			◎						
					Basic Foreign Language IV	1			◎						
		Information and Data Science Courses		4	Introduction to Information and Data Sciences(Note3)	2	Required	◎							
					Fundamental Data Science(Note3)	2	Required		◎						
		Area Courses		12	(Note3)	1 or 2	Elective/ Required	○	○	○	○	○	○		
		Social Cooperation Courses		0	(Note3)			○	○	○	○	○	○		
		Health and Sports Courses		2	(Note4)	1 or 2	Elective Required	○	○						
	Foundation Courses			6	Organic Chemistry	2	Required		◎						
					Cell Science	2			◎						
					“Basic Laboratory Work	1		◎	◎						

			in Chemistry" or "Experimental Methods and Laboratory Work in Chemistry I" (Note5)											
			"Experimental Methods and Laboratory Work in Biology I"	1			◎							
	Total	40												

○ Instruction regarding credits

Note 1: The year indicated with a circle mark represents that in which students typically take the subject. The year with a double circle mark indicates the year in which students are highly recommended to take the subject. Students are allowed to take the subject in any year after that indicated with a circle or double circle mark. It is required to confirm the semester in which the subject is provided in the class schedule for liberal arts education subjects in the Students' Handbook because some subjects might be provided in different semester from that which is provided in this document.

Note 2: The credit for "Online English Seminar I," "Online English Seminar II," and "Online English Seminar III" that is earned through a self-study, are accepted as the credit for English required for graduation. Achievement in a foreign language skill test and language training might be accepted as a credit. For further information, refer to the description regarding English subjects in the liberal arts education and the item "Credit based on Achievement in Foreign Language Skill Test" in the Students Handbook.

Note 3: Area Courses are required to earn 4 credits or more for the natural science subjects and 4 credits or more for the human & social science subjects.

However, "Fundamentals of Biology" of the natural science subjects is a subject for which students are requested to take if he/she did not take biology subjects in the entrance exam (including the University Testing Center Examination).

For the other students, the credit for the subject "Fundamentals of Biology" is not accepted as that for graduation.

Credits earned in Information and Data Science Courses exceeding 4 credits may be included in Natural Sciences. Up to 4 credits of Social Cooperation Courses may be included in Humanities/Social Sciences. Development Seminars may be included in Area Courses.

Note 4: For health & sports subjects, it is recommended to take a practicum in sports.

Note 5: It is required to take “Basic Laboratory Work in Chemistry” that is provided in the first semester in the first year. Only when failing to earn the credit for “Basic Laboratory Work in Chemistry”, it is allowed to take the subject “Experimental Methods and Laboratory Work in Chemistry I” that is provided in the second semester in the first year.

Table of Registration Standards(Specialized Fundamental Subjects)

(Integrative Hydrospheric Science Program, Applied Animal and Plant Science Program, Food Science Program, Molecular Agro-Life Science Program)

Type	Subject type	Required No. of credits	Class subjects	No. of credits	Year in which the subject is taken							
					1st grade		2nd grade		3rd grade		4th grade	
					Springs	Fall	Springs	Fall	Springs	Fall	Springs	Fall
Specialized Subjects	Specialized Fundamental Subjects	26	Introduction to Applied Biological Sciences	2	○							
			Introduction to Microbiology	2	○							
			Introduction to Molecular Biochemistry	2		○						
			Agricultural Production Resources	2		○						
			Physics for Applied Biological Science	2		○						
			Ethics of Science and Technology	2		○						
			Statistics in Biology	2			○					
			Environmental Sciences for Bioproduction	2			○					
			Laboratory Work in General Biology I	1			○					
			Laboratory Work in General Biology II	1			○					
			Laboratory Work in General Chemistry	1			○					
			Laboratory Work in General Physics	1			○					
			Required Subjects: Total 20 credits									

			Seminar in Field Science	2		○						
			Research Front of Bioresource Sciences	2		○						
			Research Front of Food and AgriLife Science	2		○						
			Introduction to Physiology	2			○					
			Public Health	2						○		
			Elective Required Subjects Take 6 credits from above subjects (Redundant credits over 6 credits move to Elective Subjects in each Program)									

Table of Registration Standards (Specialized Subjects)

(Integrative Hydrospheric Science Program)

Type	Subject type	Required No. of credits	Class subjects	No. of credits	Year in which the subject is taken							
					1st grade		2nd grade		3rd grade		4th grade	
					Springs	Fall	Springs	Fall	Springs	Fall	Springs	Fall
Specialized Subjects	Specialized Subjects	58	Field Work on Training Vessel	2					○			
			Reading of Foreign Literature in Hydrospheric Science	2					○			
			Graduation Thesis I	2						○		
			Graduation Thesis II	2							○	
			Graduation Thesis III	2								○
			Required Subjects: Total 10credits									
			Aquaculture I	2				○				
			Hydrospheric Zoology I	2				○				
			Hydrospheric Ecology I	2				○				
			Hydrospheric Environmental Science I	2				○				
			Hydrospheric Primary Production I	2				○				
			Introduction to Hydrospheric Biodiversity I	2				○				
			Laboratory Work in Hydrospheric Biology I	1				○				
			Laboratory Work in Hydrospheric Biology II	1				○				
			Control of the Fish and Shellfish Disease in Aquaculture	2				○				
			Aquaculture II	2					○			
			Hydrospheric Zoology II	2					○			
			Hydrospheric Ecology II	2					○			
			Hydrospheric Environmental Science II	2					○			
			Hydrospheric Primary Production II	2					○			
			Introduction to Hydrospheric Biodiversity II	2					○			
			Laboratory Work in Hydrospheric Biology III	1					○			
			Practical Work in Hydrospheric Field Science I	1					○			
			Practical Work in Hydrospheric Field Science II	1					○			
			Exercises in Integrative Hydrospheric Science I	1					○			
			Exercises in Integrative Hydrospheric Science II	1					○			
			Aquatic Biogeochemical Cycles	1					○			
			International Fishery I	1					○			
			International Fishery II	1					○			
			Fisheries Socioeconomics	1					○			

			Hydrospheric Biochemistry	2					○		
			Applied Extreme Environmental Life Science	2						○	
			Specialized Practical Work in Marine Biology	1							○
			Elective Required Subjects: Take 25 credits from above subjects (Redundant credits over 25 credits move to Elective Subjects) At least 3 credits must be obtained from following five subjects, Hydrospheric Environmental Science I, II, III and Exercises in Integrative Hydrospheric Science I, II. Student who wish to take International Fisheries Science I or II should, in principle, take both International Fisheries Science I and II.								
			Elective Subjects: At least 23 credits must be obtained. ・Specialized subjects from other Applied Biological Science programs can be included in the elective subjects. ・Up to 12 credits obtained from specialized subjects at another School and from subjects offered by the AIMS Program completed at the dispatch destination can be included in the credits required for graduation. ・Credits obtained from Liberal Arts Education Subjects and subjects related to the teaching procession cannot be included in the credits required for graduation.								
		124									

[Credits required for graduation] 124 credits (40 credits for liberal arts education subjects + 26 credits for specialized fundamental subjects + 58 credits for specialized subjects)

Attachment 2

Results of study in Integrative Hydrospheric Science Program

Relation between evaluation items and evaluation criteria

Study achievement			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
Knowledge & understanding	(1)	Ability for comprehensive and cross-disciplinary thinking and knowledge / understanding required to see a phenomenon from a wide bird's eye view to take an action for solving problems regarding the specialized area.	Has superior ability for comprehensive and cross-disciplinary thinking and capability to see a phenomenon from a wide bird's eye view to take an action for solving problems regarding the specialized area.	Has sufficient ability for comprehensive and cross-disciplinary thinking and capability to see a phenomenon from a wide bird's eye view to take an action for solving problems regarding the specialized area.	Has basic ability for comprehensive and cross-disciplinary thinking and capability to see a phenomenon from a wide bird's eye view to take an action for solving problems regarding the specialized area.
	(2)	Basic knowledge and understanding required for studying the expertise	Has fundamental knowledge and profound understanding required for studying the expertise and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge required for studying the expertise and is capable of sufficiently understanding issues in the specialized area and explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and general understanding required for studying the expertise and is capable of providing basic explanation regarding the knowledge and understandings.
	(3)	Comprehensive understanding on characteristics regarding morphology, ecology, physiology, pathology, biochemistry, and genetics of various hydrosphere organisms	Has fundamental knowledge and profound understanding and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and sufficient understanding and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and general understanding is capable of providing basic explanation regarding the knowledge and understandings.
	(4)	Understanding on economic trend regarding management, breeding, and use of aquatic resources and fishery	Has fundamental knowledge and profound understanding and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and sufficient understanding and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and general understanding is capable of providing basic explanation regarding the knowledge and understandings.
	(5)	Understanding on physiologic, pathologic, biochemical, and genetic mechanisms required for management and breeding of aquatic resources	Has fundamental knowledge and profound understanding and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and sufficient understanding and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and general understanding is capable of providing basic explanation regarding the knowledge and understandings.
	(6)	Understanding on relation between form and ecology of hydrosphere organisms and hydrosphere environment	Has fundamental knowledge and profound understanding and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and sufficient understanding and is capable of explaining the knowledge while associating it with items regarding any other area.	Has fundamental knowledge and general understanding is capable of providing basic explanation regarding the knowledge and understandings.

Abilities & skills	(1)	Basic ability for communication, information processing, and physical activities required for studying the expertise	Has superior ability for all the elements regarding communication, information processing, and physical activities required for studying the expertise.	Has sufficient ability for all the elements regarding communication, information processing, and physical activities required for studying the expertise.	Has basic ability for all the elements regarding communication, information processing, and physical activities required for studying the expertise.
	(2)	Basic experiment abilities and skills required for studying the expertise	Has sufficient basic experiment abilities and skills required for studying the expertise and is capable of autonomously applying it.	Has sufficient basic experiment abilities and skills required for studying the expertise and is capable of applying it according to instruction.	Generally has basic experiment abilities and skills required for studying the expertise and is capable of giving support to execution.
	(3)	Method for analyzing and evaluating various characteristics of hydrosphere organisms and environment	Capable of autonomously analyzing and evaluating characteristics of hydrosphere organisms and hydrosphere environment.	Capable of analyzing and evaluating characteristics of hydrosphere organisms and hydrosphere environment according to instruction.	Capable of substantially analyzing and evaluating characteristics of hydrosphere organisms and hydrosphere environment.
	(4)	Basic skills and analysis methods for breeding and management of hydrosphere organisms	Has sufficiently acquired basic skills and analysis methods for breeding and management of hydrosphere organisms and is capable of autonomously applying the skills and methods.	Has acquired basic skills and analysis methods for breeding and management of hydrosphere organisms and is capable of applying the skills and methods according to instruction.	Has substantially acquired basic skills and analysis methods for breeding and management of hydrosphere organisms and is capable of assisting the breeding and management
	(5)	Method for analyzing and evaluating roles of fishery for human lives and the impact of it on hydrosphere environment	Capable of autonomously analyzing and evaluating roles of fishery for human lives and the impact of it on hydrosphere environment.	Capable of analyzing and evaluating roles of fishery for human lives and the impact of it on hydrosphere environment according to instruction.	Capable of substantially analyzing and evaluating roles of fishery for human lives and the impact of it on hydrosphere environment.
	(6)	Ability for reading and communication in English regarding hydrosphere organisms	Has very advanced ability for reading English texts, is capable of understanding technical manuals, and has acquired sufficient and profound capability for international communication.	Has advanced ability for reading English texts, is capable of understanding technical manuals for some extent, and has acquired sufficient and profound capability for international communication.	Has ability for reading English texts, is capable of partly understanding technical manuals, and has acquired sufficient and profound capability for international communication.

Comprehensive capability	(1)	Ability to identify issues that he/she should pursue for a specific phenomenon related to hydrosphere organisms, organize his/her own opinion, logically publish them orally and/or in writing, and discuss the topic	Has advanced capabilities regarding elements of comprehensive ability and skills for such as identification of targeted issues, information processing, statistical analysis, and responsive communication.	Has capabilities regarding elements of comprehensive ability and skills for such as identification of targeted issues, information processing, statistical analysis, and responsive communication.	Has basic capabilities regarding elements of comprehensive ability and skills for such as identification of targeted issues, information processing, statistical organization, and responsive communication.

Role of liberal arts education in this program

The liberal arts education in this program aims to build both the language skills and the academic foundation required for the specialized education. It develops not only a capability for studying autonomously and a scientific intelligence based on the ability to collect, analyze and criticize data, but also language skills that allow the student to exchange ideas with others in English. Also, it enhances insight from a broad perspective for the essentials and the background of phenomena, and the linguistic ability and concern for peace which are required for a citizen of the world. It enables students to acquire the ability to integrate findings and establish a "knowledge system" that is really useful for problem solving, and to examine phenomena using a top-down perspective based on this integrated knowledge.

Attachment 3

Relation between evaluation items and class subjects

Subject category	Name of class subject	Number of credits	Required or Electivee	Semester when the class is provided	Core subject	Evaluation item																								Total of weightings for evaluation items for the subject
						Knowledge & understanding												Ability & skills												Comprehensive capability		
						(1)		(2)		(3)		(4)		(5)		(6)		(1)		(2)		(3)		(4)		(5)		(6)		(1)		
						Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	Weighting for evaluation item for the subject	Weighting for evaluation item	
Liberal arts education subjects	Peace Science Courses	2	Required	1st semester		100	1																							100
Liberal arts education subjects	Introductory Seminar for First-Year Students	2	Required	1st semester	○	100	1																							100
Liberal arts education subjects	Introduction to University Education	2	Required	1st semester		100	1																							100
Liberal arts education subjects	Development Seminar	1		1st - 6th semesters		100	1																							100
Liberal arts education subjects	Foreign Languages	10	Required / Elective required	1st - 2nd semesters														100	1											100
Liberal arts education subjects	Introduction to Information and Data Sciences	2	Required	1st semesters														100	1											100
Liberal arts education subjects	Fundamental Data Science	2	Required	2nd semesters														100	1											100
Liberal arts education subjects	Area Courses	12	Elective required	1st - 6th semesters		100	1																							100
Liberal arts education subjects	Social Cooperation Courses	0		1st - 6th semesters		100	1																							100
Liberal arts education subjects	Health and Sports Courses	2	Elective required	1st - 2nd semesters														100	1											100
Liberal arts education subjects	Organic Chemistry	2	Required	2nd semester				100	1																					100
Liberal arts education subjects	Cell Science	2	Required	2nd semester				100	1																					100
Liberal arts education subjects	Basic Laboratory Work in Chemistry	1	Required	1st -2nd semesters																100	1									100
Liberal arts education subjectsLiberal arts education subjects	"Experimental Methods and Laboratory Work in Biology I"	1	Required	2nd semesters																100	1									100
Specialized subjects	Introduction to Applied Biological Science	2	Required	1st semester	○			100	1																					100
Specialized subjects	Introduction to Microbiology	2	Required	1st semester	○			100	1																					100

Specialized subjects	Introduction to Molecular Biochemistry	2	Required	2nd semester	○			100	1																									100
Specialized subjects	Agricultural Production Resources	2	Required	2nd semester\	○			100	1																									100
Specialized subjects	Physics for Applied Biological Science	2	Required	2nd semester	○			100	1																									100
Specialized subjects	Ethics of Science and Technology	2	Required	2nd semester	○			100	1																									100
Specialized subjects	Statistics in Biology	2	Required	3rd semester	○			100	1																									100
Specialized subjects	Environmental Sciences for Bioproduction	2	Required	3rd semester	○			100	1																									100
Specialized subjects	Laboratory Work in General Biology I	1	Required	3rd semester	○			50	1											50	1													100
Specialized subjects	Laboratory Work in General Biology II	1	Required	3rd semester	○			50	1											50	1													100
Specialized subjects	Laboratory Work in General Chemistry	1	Required	3rd semester	○			50	1											50	1													100
Specialized subjects	Laboratory Work in General Physics	1	Required	3rd semester	○			50	1											50	1													100
Specialized subjects	Seminar in Field Science	2	Elective required	2nd semester				100	1																									100
Specialized subjects	Research Front of Bioresource Science	2	Elective required	2nd semester				100	1																									100
Specialized subjects	Research Front ofFood and AgriLife Science	2	Elective required	2nd semester				100	1																									100
Specialized subjects	Introduction to Physiology	2	Elective required	3rd semester				100	1																									100
Specialized subjects	Public Health	2	Elective required	6th semester				100	1																									100
Specialized subjects	Aquaculture I	2	Elective required	4th semester						50	1	25	1	25	1																			100
Specialized subjects	Hydrospheric Zoology I	2	Elective required	4th semester						50	1			50	1																			100
Specialized subjects	Hydrospheric Ecology I	2	Elective required	4th semester						50	1					50	1																	100
Specialized subjects	Hydrospheric Environmental Science I	2	Elective required	4th semester						50	1			25	1	25	1																	100
Specialized subjects	Hydrospheric Primary Production I	2	Elective required	4th semester						50	1					50	1																	100
Specialized subjects	Introduction to Hydrospheric Biodiversity I	2	Elective required	4th semester								50	1			50	1																	100
Specialized subjects	Laboratory Work in Hydrospheric Biology I	1	Elective required	4th semester																				50	1	50	1							100
Specialized subjects	Laboratory Work in Hydrospheric Biology II	1	Elective required	4th semester																				50	1	50	1							100
Specialized subjects	Control of the fish and shellfish disease in aquacure	2	Elective required	5th semester						50	1					50	1																	100
Specialized subjects	Aquaculture II	2	Elective required	5th semester						50	1	25	1	25	1																			100
Specialized subjects	Hydrospheric Zoology II	2	Elective required	5th semester						50	1			50	1																			100
Specialized subjects	Hydrospheric Ecology II	2	Elective required	5th semester						50	1					50	1																	100

Specialized subjects	Hydrospheric Environmental Science II	2	Elective required	5th semester						50	1			25	1	25	1																100
Specialized subjects	Hydrospheric Primary Production II	2	Elective required	5th semester						50	1					50	1																100
Specialized subjects	Introduction to Hydrospheric Biodiversity II	2	Elective required	5th semester								50	1			50	1																100
Specialized subjects	Laboratory Work in Hydrospheric Biology III	1	Elective required	5th semester																		50	1	50	1								100
Specialized subjects	Practical Work in Hydrospheric Field Science I	1	Elective required	5th semester																		50	1	25	1	25	1						100
Specialized subjects	Practical Work in Hydrospheric Field Science II	1	Elective required	5th semester																		50	1	25	1	25	1						100
Specialized subjects	Exercises in Integrative Hydrospheric Science I	1	Elective required	5th semester																								20	1	80	1	100
Specialized subjects	Exercises in Integrative Hydrospheric Science II	1	Elective required	5th semester																								20	1	80	1	100
Specialized subjects	Aquatic Biogeochemical Cycles	1	Elective required	5th semester										50	1	50	1																100
Specialized subjects	International FisheryI	1	Elective required	5th semester								100	1																				100
Specialized subjects	International Fishery II	1	Elective required	5th semester								100	1																				100
Specialized subjects	Fisheries Socioeconomics	1	Elective required	5th semester								100	1																				100
Specialized subjects	Hydrospheric Biochemistry	2	Elective required	5th semester						50	1			50	1																		100
Specialized subjects	Applied Extreme Environmental Life Science	2	Elective required	6th semester						50	1					50	1																100
Specialized subjects	Specialized Practical Work in Marine Biology	1	Elective required	7th semester																		50	1			50	1						100
Specialized subjects	Field Work on Training Vessel	2	Required	5th semester	○																	50	1			50	1						100
Specialized subjects	Reading of Foreign Literature in Hydrospheric Science	2	Required	5th semester	○																							80	1	20	1	100
Specialized subjects	Graduation Thesis I	2	Required	6th semester	○																							20	1	80	1	100
Specialized subjects	Graduation Thesis II	2	Required	7th semester	○																							20	1	80	1	100
Specialized subjects	Graduation Thesis III	2	Required	8th semester	○																							20	1	80	1	100

Attachment 4

Curriculum map for Integrated Hydrospheric Science Program

Study achievement / Evaluation items	1st year		2nd year		3rd year		4th year	
	1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	7th semester	8th semester
①Knowledge and understanding required to see a phenomenon from a broad, top-down perspective and for action based on comprehensive and cross-disciplinary thinking	Peace Science Courses (◎)							
	Seminar for developing intelligence (◎)							
	Introduction to University Education (◎)							
	Advanced Seminar							
	Area Courses subjects (○)							
	Social Cooperation Courses							
②Basic knowledge and understandings required for acquiring expertise		Organic Chemistry (◎)	Environmental Sciences for Bioproduction(◎)			Public Health(○)		
		Cell Science (◎)						
			Laboratory Work in General Biology I & II (◎)					
			Laboratory Work in General Chemistry (◎)					
	"Basic Laboratory Work in Chemistry" (◎)		Laboratory Work in General Physics (◎)					
		"Experimental Methods and Laboratory Work in Biology I" (◎)	Introduction to Physiology (○)					

Study achievement		1st year		2nd year		3rd year		4th year	
Evaluation items		1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	7th semester	8th semester
Knowledge & understandingKnowledge & understandingKnowledge & understanding		Introduction to Applied Biological Science(◎)	Agricultural Production Resources(◎)	Statistics in Biology (◎)					
		Introduction to Microbiology (◎)	Physics for Applied Biological Science(◎)						
			Ethics of Science and Technology(◎)						
			Seminar in Field Science (〇)						
			Introduction to Molecular Biochemistry(◎)						
			Research Front of Bioresource Science (〇)						
			Research Front of Food and AgriLife Science(〇)						
	③Comprehensive understanding on characteristics regarding morphology, ecology, physiology, pathology, biochemistry, and genetics of various hydrosphere organisms				AquacultureⅠ（〇）	AquacultureⅡ（〇）	Applied Extreme Environmental Life Science (〇)		
					Hydrospheric ZoologyⅠ（〇）	Hydrospheric ZoologyII（〇）			
					Hydrospheric EcologyⅠ（◯）	Hydrospheric EcologyII（◯）			
					Hydrospheric Primary ProductionⅠ（〇）	Hydrospheric Primary ProductionII（〇）			
					Hydrospheric Environmental ScienceⅠ（〇）	Hydrospheric Environmental ScienceII（〇）			
					Control of the fish and shellfish disease in aquacure (〇)	Hydrospheric Biochemistry (〇)			

Study achievement Evaluation items	1st year		2nd year		3rd year		4th year	
	1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	7th semester	8th semester
④Understanding on economic trend regarding management, breeding, and use of aquatic resources and fishery				AquacultureⅠ(〇)	AquacultureII(〇)			
				Introduction to Hydrospheric Biodiversity Ⅰ(◯)	Introduction to Hydrospheric BiodiversityII(◯)			
					International Fishery Ⅰ(〇)			
					International Fishery Ⅱ(〇)			
					Fisheries Socioeconomics(◯)			
⑤Understanding on physiologic, pathologic, biochemical, and genetic mechanisms required for management and breeding of aquatic resources				AquacultureⅠ(〇)	AquacultureII(〇)			
				Hydrospheric Zoology Ⅰ(〇)	Hydrospheric ZoologyII(〇)			
				Hydrospheric Environmental Science Ⅰ(〇)	Hydrospheric EcologyII(◯)			
					Aquatic Biogeochemical Cycles(◯)			
					Hydrospheric Biochemistry (〇)			
⑥Understanding on relation between form and ecology of hydrosphere organisms and hydrosphere environment				Hydrospheric Ecology Ⅰ(◯)	Hydrospheric EcologyII(◯)	Applied Extreme Environmental Life Science (〇)		
				Hydrospheric Primary Production Ⅰ(〇)	Hydrospheric Primary ProductionII(〇)			
				Hydrospheric Environmental Science Ⅰ(〇)	Hydrospheric Environmental Science II(◯)			
				Introduction to Hydrospheric Biodiversity Ⅰ(◯)	Introduction to Hydrospheric BiodiversityII(◯)			
				Control of the fish and shellfish disease in aquacure (〇)	Aquatic Biogeochemical Cycles(◯)			

Study achievement		1st year		2nd year		3rd year		4th year	
Evaluation items		1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	7th semester	8th semester
Ability & skills	①Basic ability for communication, information processing, and physical activities required for studying the expertise	Foreign Languages (◎)							
		Introcuction to Information and Data Scieces (◎)	Fundamental Data Science (◎)						
		Health and Sports Courses (〇)							
	②Basic experiment abilities and skills required for studying the expertise	"Basic Laboratory Work in Chemistry" (◎)							
			"Experimental Methods and Laboratory Work in Biology I" (◎)						
				Laboratory Work in General Biology I & II (◎)					
				Laboratory Work in General Chemistry (◎)					
				Laboratory Work in General Physics (◎)					
	③Method for analyzing and evaluating various characteristics of hydrosphere organisms and environment				Laboratory Work in Hydrospheric Biology Ⅰ(〇)	Laboratory Work in Hydrospheric Biology Ⅲ(〇)		Specialized Practical Work in Marine Biology (〇)	
					Laboratory Work in Hydrospheric Biology II(〇)	Practical Work in Hydrospheric Field Science Ⅰ(〇)			
						Practical Work in Hydrospheric Field ScienceII(〇)			
						Field Work on Training Vessel(◎)			
	④Basic skills and analysis methods for breeding and management of hydrosphere organisms				Laboratory Work in Hydrospheric Biology Ⅰ(〇)	Laboratory Work in Hydrospheric Biology Ⅲ(〇)			
					Laboratory Work in Hydrospheric Biology II(〇)	Practical Work in Hydrospheric Field Science Ⅰ(〇)			
						Practical Work in Hydrospheric Field ScienceII(〇)			

Study achievement		1st year		2nd year		3rd year		4th year	
Evaluation items		1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	7th semester	8th semester
	⑤Method for analyzing and evaluating roles of fishery for human lives and the impact of it on hydrosphere environment					Practical Work in Hydrospheric Field Science Ⅰ（◯）		Specialized Practical Work in Marine Biology（〇）	
						Practical Work in Hydrospheric Field ScienceII（◯）			
						Field Work on Training Vessel（◎）			
	⑥Ability for reading and communication in English regarding hydrosphere organisms					Reading of Foreign Literature in Integrative Hydrospheric Science（◎）	Graduate Thesis I (◎)	Graduate Thesis II (◎)	Graduate Thesis III (◎)
						Exercises in Integrative Hydrospheric			
						Exercises in Integrative Hydrospheric			
Comprehensive capability	①Ability to identify issues that he/she should pursue for a specific phenomenon related to hydrosphere organisms, organize his/her own opinion, logically publish them orally and/or in writing, and discuss the topic					Reading of Foreign Literature in Integrative Hydrospheric Science（◎）	Graduate Thesis I (◎)	Graduate Thesis II (◎)	Graduate Thesis III (◎)
						Exercises in Integrative Hydrospheric ScienceI（◯）			
						Exercises in Integrative Hydrospheric ScienceII（◯）			

(Example) Liberal arts subjects | Specialized fundament | Specialized subjects | Graduation thesis

(◎) Required subjects (〇) Elective required subjects (△) Elective subjects

Attachment 5

List of Faculty Members of the Integrative Hydrospheric Science Program

Name of faculty Member	Name of program and position	Extension number	Laboratory	Mail address
Tetsuya Umino	Professor	7944	A308	umino@hiroshima-u.ac.jp
Kazuhiko Koike	Professor	7996	A407	kazkoike@hiroshima-u.ac.jp
Yoichi Sakai	Professor	7975	A209	sakai41@hiroshima-u.ac.jp
Takeshi Tomiyama	Professor	7941	A208	tomiyama@hiroshima-u.ac.jp
Shigeki Wada	Professor	6821	C310	swadasbm@hiroshima-u.ac.jp
Satoshi Asaoka	Associate Professor	7945	A409	stasaoka@hiroshima-u.ac.jp
Aki Kato	Associate Professor	6377	A204 ／ Takehara Station	katoa@hiroshima-u.ac.jp
Hisato Kuniyoshi	Associate Professor	7948	A606	hkuni@hiroshima-u.ac.jp
Hidetoshi Saito	Associate Professor	7895	A211	saito@hiroshima-u.ac.jp
Toshiya Hashimoto	Associate Professor	7896	A410	thasimt@hiroshima-u.ac.jp
Masayuki Yoshida	Associate Professor	7982	A306	yosidam@hiroshima-u.ac.jp
Kaori Wakabayashi	Associate Professor	7989	A307	kaoriw@hiroshima-u.ac.jp
Kentaro Kawai	Assistant Professor	7256	A406	kawai-ken@hiroshima-u.ac.jp
Kenji Toyota	Assistant Professor	7894	A210	toyotak@hiroshima-u.ac.jp
Kazumitsu Nakaguchi	Associate Professor	4114	Training and Research Vessel TOYOSHIO MARU	nakaguchi-kazu3@hiroshima-u.ac.jp
Seiji Oshimo	Guest Professor			
Yasuhiko Kawato	Guest Professor			
Takashi Torii	Guest Associate Professor			
Lawrence M. LIAO	Guest Associate Professor			

* To call a direct phone number, dial the extension number after "082-424". The numbers (4114) are only for an extension.