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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.

6.Available qualification

(1) Educational personnel certification: Type 1 License for High School Teacher (science)

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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	○							
	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		○	○	○	○	○	○		
	Common Subjects	Foreign Languages	English(Note2)	Basic English Usage	2	Communication Basic I	1	Required	◎							
						Communication Basic II	1			◎						
				Communication I	2	Communication I A	1	Required	◎							
						Communication I B	1		◎							
				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	○	○	○	○	○	○		
		社会連携科目 Eng? Social Cooperation Courses				(Note3)	0		○	○	○	○	○	○		
		Health and Sports Courses			2	(Note4)	1 or 2	Elective Required	○	○						
	Foundation Courses				6	Organic Chemistry	2			◎						
						Cell Science	2			◎						

			“Basic Laboratory Work in Chemistry” or “Experimental Methods and Laboratory Work in Chemistry I” (Note5)	1		◎	◎						
			“Experimental Methods and Laboratory Work in Biology I”	1	Required		◎						
	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 "Field Research in the English-speaking World" that is earned through such as a short-term study abroad and that 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.

(PP. 30 - 31, Liberal Arts)

Note 3: It is 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.

It is allowed to include up to 4 credits for society-related subjects as credits for the Human & Social Science Subjects.

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 Chemis

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	24	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

			Applied Extreme Environmental Life Science	2					○		
			Hydrospheric Biochemistry	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.								
			Elective Subjects 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.

capabili	nsive	(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.

					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																								

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 Applied Biological Sciences~~	~~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																												

Required

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							

Curriculum map for Integrated Hydrospheric Science Program

1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	7th semester	8th semester
Peace Science Courses ( ) Seminar for developing Introduction to University Education ( )							
	Organic Chemistry ( ) Cell Science ( )	Environmental Sciences for			Public Health( )		
		Laboratory Work in General Biology I & II ( )					
		Laboratory Work in General Chemistry ( )					
		Laboratory Work in General Physics ( )					
	"Experimental Methods and Laboratory Work in Biology I"	Introduction to Physiology ( )					
Introduction to Applied Biological Science( )	Agricultural Production Resources( )	Statistics in Biology ( )					
Introduction to Microbiology ( )	Physics for Applied Biological Science( )						

Study achievementStudy achievementStudy 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
Knowledge & understandingKnowledge & understandingKnowledge & understanding			Ethics of Science and Technology(　)						
			Seminar in Field Science (　)						
			Introduction to Molecular Biochemistry(　)						
			Research Front of Bioresource Science (○)						
			Research Front of Food and AgriLife Science(○)						
	Comprehensive understanding on characteristics regarding morphology, ecology, physiology, pathology, biochemistry, and genetics of various hydrosphere organisms								
	Understanding on economic trend regarding management, breeding, and use of aquatic resources and fishery								

Study achievementStudy achievementStudy 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
	Understanding on physiologic, pathologic, biochemical, and genetic mechanisms required for management and breeding of aquatic resources								
	Understanding on relation between form and ecology of hydrosphere organisms and hydrosphere environment								

Study achievementStudy achievementStudy 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
Ability & skillsAbility & skills	Basic ability for communication, information processing, and physical activities required for studying the expertise	Foreign Languages (　)(　)							
		Information and Data Sciece Courses (◎)							
			Fundamental Data Science (◎)						
		Health and Sports Courses (　)							
	Basic 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 (　)					
	Method for analyzing and evaluating various characteristics of hydrosphere organisms and environment							Specialized Practical Work in Marine Biology	
						Practical Work in Hydrospheric Field ScienceII			
	Basic skills and analysis methods for breeding and management of hydrosphere organisms								
						Practical Work in Hydrospheric Field ScienceII			

Study achievementStudy achievementStudy 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
	Method for analyzing and evaluating roles of fishery for human lives and the impact of it on hydrosphere environment							Specialized Practical Work in Marine Biology	
						Practical Work in Hydrospheric Field ScienceII			
	Ability for reading and communication in English regarding hydrosphere organisms						Graduate Thesis I ( )	Graduate Thesis II ( )	Graduate Thesis III ( )
						Exercises in Integrative Hydrospheric			
						Exercises in Integrative Hydrospheric			
Comprehensive capability	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						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 ( ) Elective required s ( ) Elective subjects

Attachment 5

List of Faculty Members of the Integrative Hydrospheric Science Program

Name of faculty	Name of program and position	Extension number	Laboratory	Mail address
Tetsuya Umino	Professor	7944	A308	umino@hiroshima-u.ac.jp
Susumu Ohtsuka	Professor	4116	Takehara Station	ohtsuka@hiroshima-u.ac.jp
Koichiro Kawai	Professor	7894	A210	kawagogi@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 Naganuma	Professor	7986	A408	takn@hiroshima-u.ac.jp
Satoshi Asaoka	Associate Professor	7945	A409	stasaoka@hiroshima-u.ac.jp
Aki Kato	Associate Professor	6377	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
Takeshi Tomiyama	Associate Professor	7941	A208	tomiyama@hiroshima-u.ac.jp
Toshiya Hashimoto	Associate Professor	7896	A410	thasimt@hiroshima-u.ac.jp
Lawrence M. LIAO	Associate Professor	4375	A305	lliao@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
Yusuke Kondo	Assistant Professor		Takehara Station	ykondo@hiroshima-u.ac.jp
Shizuka Ohara	Assistant Professor	7999	A407	oharashizu@hiroshima-u.ac.jp
Kentaro Kawai	Assistant Professor		A304	kawai-ken@hiroshima-u.ac.jp
Panakkool Thamban Aneesh	Assistant Professor		Takehara Station	aneesh@hiroshima-u.ac.jp

Kazumitsu

Masahiro Yamao	Guest Professor			

* To call a direct phone number, dial the extension number after "082-424". The numbers (4116, 4375 and 4114) are only for an extension.