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- (8) Has acquired professional knowledge regarding production management and distribution of food and be capable of generally considering measures for ensuring stable supply of safe food.
- (9) Has acquired professional knowledge and general skills regarding manufacture and processing of food and be capable of understanding practical measures for converting food material to safe food with high quality and functionality.
- (10) Has acquired basic and professional knowledge and skills regarding evaluation and regulation of safety, nutrition, palatability, living body control function, and physical characteristics and new effective use and be capable of exercising them.
- (11) Has comprehensively learned the flow from the production of food to the consumption by consumers to understand it as a unified system. The student is also acquired to become capable of applying such as the knowledge, skills, and attitude that he/she has obtained in an integrated manner to solve problems that he/she identifies and logically present the conclusion orally or in writing and discuss with other persons.

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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.

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## 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									
								1 <sup>st</sup> grade		2 <sup>nd</sup> grade		3 <sup>rd</sup> grade		4 <sup>th</sup> 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	Required	◎	◎						
			“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 "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

(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								
					1 <sup>st</sup> grade		2 <sup>nd</sup> grade		3 <sup>rd</sup> grade		4 <sup>th</sup> 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		<input type="radio"/>						
		Research Front of Bioresource Sciences	2		<input type="radio"/>						
		Research Front of Food and AgriLife Science	2		<input type="radio"/>						
		Introduction to Physiology	2			<input type="radio"/>					
		Public Health	2						<input type="radio"/>		
Elective Required Subjects											
Take 6 credits from above subjects											
(Redundant credits over 6 credits move to Elective Subjects in each Program)											

(Food Science Program)

### Specialized Subjects

### Specialized Subjects

			Genome Science I	2					<input type="radio"/>		
			Genome Science II	2					<input type="radio"/>		
			Molecular Cell Biology	2					<input type="radio"/>		
			Animal Nutrition	2					<input type="radio"/>		
			Plant Nutritional Physiology	2					<input type="radio"/>		
			<p>Elective Subjects: At least 16 credits must be obtained.</p> <ul style="list-style-type: none"> <li>• Specialized subjects from other Applied Biological Science programs can be included in the elective subjects.</li> <li>• 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.</li> <li>• Credits obtained from Liberal Arts Education Subjects and subjects related to the teaching profession cannot be included in the credits required for graduation.</li> </ul>								
		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)

## Results of study in Food Science Program

## Relation between evaluation items and evaluation criteria

Study achievement			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
K n o w l e d g e  & u n d e r s t a n d i n g	(1)	Ability for comprehensive and cross-disciplinary thinking and knowledge / understandings required to see a phenomena from a broad, top-down perspective and to take 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 broad, top-down perspective and to take 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 broad, top-down perspective and to take 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 broad, top-down perspective and to take action for solving problems regarding the specialized area.
	(2)	Basic knowledge and understanding required for acquiring expertise	Has fundamental knowledge and profound understanding required for acquiring expertise, and is capable of explaining this knowledge while associating it with items related to other areas.	Has fundamental knowledge and profound understanding required for acquiring expertise, and is capable of sufficiently explaining this knowledge while associating it with items related to other areas.	Has fundamental knowledge and profound understanding required for acquiring expertise, and is capable of providing basic explanation of this knowledge while associating it with items related to other areas.
	(3)	Basic knowledge of such as chemistry, biology, biochemistry, microbiology, physics, and mathematics required for understanding food science.	Capable of sufficiently applying the basic knowledge of such as chemistry, biology, biochemistry, microbiology, physics, and mathematics required for understanding food science.	Capable of applying the basic knowledge of such as chemistry, biology, biochemistry, microbiology, physics, and mathematics required for understanding food science.	Capable of generally applying the basic knowledge of such as chemistry, biology, biochemistry, microbiology, physics, and mathematics required for understanding food science.
	(4)	Expertise regarding methods for identifying the mechanism of function expression in food and food material and for application of the function.	Capable of providing practical explanation regarding methods for identifying the mechanism of function expression in food and food material and application of the function while associating it with knowledge of the other items.	Capable of providing explanation regarding methods for identifying the mechanism of function expression in food and food material and application of the function while associating it with knowledge of the other items.	Capable of providing basic explanation regarding methods for identifying the mechanism of function expression in food and food material and application of the function.
	(5)	Expertise and ethics of science and technology regarding analysis and evaluation methods for safety of food and food material.	Capable of providing practical explanation regarding expertise and ethics of science and technology on analysis and evaluation methods for safety of foods and food materials while associating it with knowledge of the other items.	Capable of providing explanation regarding expertise and ethics of science and technology on analysis and evaluation methods for safety of foods and food materials while associating it with knowledge of the other items.	Capable of providing basic explanation regarding expertise and ethics of science and technology on analysis and evaluation methods for safety of foods and food materials.

(6)

(6)	Ability to read and understand technical explanations and basic reading capabilities of scientific English	Capable of reading English texts and understanding technical explanations	Has a basic ability for reading English texts and capable of understanding technical explanations to some extent.	Has a basic ability for reading English texts and capable of partly understanding technical explanations
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c a p a b i l i t y	(1)	Capability of collecting information of the peripheral disciplines and organizing his/her own idea based on the information, validating the idea based on the information, logically presenting the conclusion orally or in a document, and exchanging opinions with others in the area that studies scientific issues regarding foods and food materials	Capable of collecting information of the peripheral disciplines and organizing his/her own idea based on the information, validating the idea based on the information, logically presenting the conclusion orally or in a document, and exchanging opinions with others in the area that studies scientific issues regarding foods and food materials.	Capable of collecting information of the peripheral disciplines and organizing his/her own idea based on the information, validating the idea based on the information, presenting the conclusion orally or in a document, and exchanging opinions with others in the area that studies scientific issues regarding foods and food materials.	Capable of collecting information of the peripheral disciplines and organizing his/her own idea based on the information, validating the idea based on the information, and presenting the conclusion orally or in a document in the area that studies scientific issues regarding foods and food materials.
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## Role of liberal arts education in this program

## Evaluation item

[illegible]

[illegible]

Specialized subjects	Bioresource Utilization Science	2	Elective required	5th semester						40	1					40	1								20	1								100
Specialized subjects	Food System	2	Elective required	5th semester										80	1												20	1						100
Specialized subjects	Agricultural Products and Food Processing	2	Elective required	5th semester					40	1	20	1	20	1											20	1								100
Specialized subjects	Training for Marine Food Processing	1	Elective required	5th semester												20	1								60	1	20	1						100
Specialized subjects	Training for Animal Food Processing	1	Elective required	5th semester												20	1								60	1	20	1						100
Specialized subjects	Food Factory Inspection	1	Elective required	5th semester																							100	1						100
Specialized subjects	Food Information Management	1	Elective required	5th semester										100	1																			100
Specialized subjects	Genome Science I	2	Elective	6th semester	50	1			50	1																								100
Specialized subjects	Genome Science II	2	Elective	6th semester	50	1			50	1																								100
Specialized subjects	Molecular Cell Biology	2	Elective	6th semester	50	1			50	1																								100
Specialized subjects	Animal Nutrition	2	Elective	6th semester	50	1			50	1																								100
Specialized subjects	Plant Nutritional Physiology	2	Elective	6th semester	50	1			50	1																								100
Specialized subjects	Graduation Thesis I-III	6	Required	6th-8th semester																											100	1		100

# Attachment 4

1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	7th semester	8th semester
Seminar for developing intelligence (◎)	Ethics of Science and Technology(◎)						
Introduction to University Education (◎)							
Peace Science Courses (◎)							
	Organic Chemistry (◎)	Environmental Sciences for Bioproduction(◎)			Public Health(○)		
	Cell Science (◎)	Statistics in Biology (◎)					
Introduction to Applied Biological Science(◎)							
Introduction to Microbiology (◎)	Agricultural Production Resources(◎)	Introduction to Physiology (○)					
	Physics for Applied Biological Science(◎)						
	Ethics of Science and Technology(◎)						

e & u n d e r s t a n d i n g		Research Front of Food and AgriLife Science (○)						
	③Basic knowledge of such as chemistry, biology, biochemistry, microbiology, physics, and mathematics required for understanding food science.				Food Biochemistry(◎)	Nutrition(◎)		
					Applied Biophysics(◎)	Food Microbiology(○)		
					Seafood Chemistry and Biochemistry (◎)	Agricultural Products and Food Processing(○)		
					Food Hygiene(◎)	Food Physical Property Science(○)		
	④Expertise regarding methods for identifying the mechanism of function expression in food and food material and for application of the function.				Food Biochemistry(◎)	Nutrition(◎)		
					Applied Biophysics(◎)	Food Function (Functional Food Science)(○)		
						Agricultural Products and Food Processing(○)		
						Bioresource Utilization Science(○)		
						Food Physical Property Science(○)		
					Food Hygiene(◎)	Food Microbiology(○)		

⑤Expertise and ethics of science and technology regarding analysis and evaluation methods for safety of food and food material.				Seafood Chemistry and Biochemistry (◎)	Agricultural Products and Food Processing(O)			
				Food Production Management (◎)	Food Function (Functional Food Science)(O)			
				Food Engineering(◎)				
⑥Expertise regarding production management and distribution of foods				Food Production Management (◎)	Food System(O)			
					Food Information Management(O)			
⑦Expertise regarding food processing technologies and development of useful materials.				Food Engineering(◎)	Bioresource Utilization Science(O)			
				Science and Technology for Food Development(O)	Food Physical Property Science(O)			
				Applied Biophysics(◎)	Training for Marine Food Processing (O)			
					Training for Animal Food Processing (O)			

A b i l i	①Basic ability in communication, information processing, and physical activities required for acquiring expertise	Foreign Languages (○)(◎)							
		Information and Data Science Courses (◎)							
		Health and Sports Courses (○)							
		"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 (◎)					
	③Basic techniques and methodologies for handling foods and food materials, ability to understand various phenomena regarding foods from scientific points of view, and capability of organizing the study result in a report				Laboratory Works in Food Engineering(◎)	Laboratory Work in Marine Bioresources Chemistry(◎)			
					Laboratory Work in Food Hygiene(◎)	Laboratory Work in Food Chemistry(◎)			
					Laboratory Work in Applied Biophysics (◎)	Laboratory work in nutritional biochemistry(◎)			
						Field Works of Food Production Management(◎)			



t i e s  &  s k i l l s	④Acquisition of techniques for production of foods from marine and animal resources and capability of consideration of practical measures for conversion to safe and highly functional foods				Food Biochemistry(◎)	Nutrition(◎)			
					Seafood Chemistry and Biochemistry (◎)	Laboratory Work in Marine Bioresources Chemistry(◎)			
					Food Hygiene(◎)	Laboratory Work in Food Chemistry(◎)			
					Laboratory Works in Food Engineering(◎)	Laboratory work in nutritional biochemistry(◎)			
					Laboratory Work in Food Hygiene(◎)	Training for Marine Food Processing (○)			
					Laboratory Work in Applied Biophysics (◎)	Training for Animal Food Processing (○)			
						Agricultural Products and Food Processing(○)			
						Bioresource Utilization Science(○)			
	⑤Capable of organizing and considering own issues to explore in the fields of food science from a social point of view based on experience of such as observation of a food manufacturing scene		Agricultural Production Resources(◎)		Laboratory Works in Food Engineering(◎)	Food System(○)			
					Laboratory Work in Food Hygiene(◎)	Food factory inspection (○)			
					Laboratory Work in Applied Biophysics (◎)	Laboratory Work in Food Chemistry(◎)			
					Food Engineering(◎)	Laboratory work in nutritional biochemistry(◎)			
					Science and Technology for Food Development(○)	Laboratory Work in Marine Bioresources Chemistry(◎)			

e n s i v e c a p						Field Works of Food Production Management(◎)			
						Training for Marine Food Processing (○)			
						Training for Animal Food Processing (○)			
	⑥Ability to read and understand technical explanations and basic reading capabilities of scientific English				Reading of Foreign Literature in Food Science(◎)				
	①Capability of collecting information of the peripheral disciplines and organizing his/her own idea based on the information, validating the idea based on the information, logically presenting the conclusion orally or in a document, and exchanging opinions with others in the						Graduation Thesis I (◎)	Graduation Thesis II (◎)	Graduation Thesis III (◎)

・ ○

(Example) Liberal arts subjects Specialized fundamental Specialized subjects Graduation thesis (◎) Required subjects (○) Elective required (△) Elective subjects

List of Faculty Members of the Food Science Program

Name of faculty	Name of program and position	Extension number	Laboratory	Mail address
Satoru Ueno	Professor	7934	A106	sueno hiroshima-u.ac.jp
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Yakabe Takafumi	Visiting Professor			Class Science and Technology for Food Development
Akinobu Ono	Visiting Professor			Class Science and Technology for Food Development
Kazuyoshi Matsumura	Visiting Professor			Class Food Information Management,
Tsurunaga Yoko	Visiting Professor			Class Agricultural Food