For entrants in AY 2021

Appended Form 1

Specifications for Major Program

Name of School (Program) [School of Science (Department of Chemistry)〕

Program name (Japanese)	化学プログラム
(English)	Chemistry

1. Degree to be obtained: Bachelor of Science

2. Overview

Chemistry is a study of natural phenomena from the perspective of substances, in order to develop new methods for understanding natural phenomena and create materials with new and useful functions that will contribute to the progress of human beings. It is important for students to understand deeply a wide range of areas, from the basics of chemistry, i.e., physical chemistry, inorganic chemistry, and organic chemistry, to interdisciplinary fields.

This program is constituted of "liberal arts subjects" and "specialized education subjects." The "liberal arts subjects" consist of "peace subjects", "basic courses in university education", "common subjects", and "fundamental subjects". "Specialized education subjects" consist of "specialized fundamental subjects" and "specialized subjects." The "liberal arts subjects" are provided for students to develop general intelligence and their personality. Students can choose subjects according to their interests. Through the "common subjects", students acquire skills of foreign languages, which are fundamental means of conveying advanced knowledges internationally, computers, and presentations. Practice based on knowledge is important in chemistry, the subject in which students in this program will major, and students acquire knowledges and abilities for practice in a bottom-up manner. Therefore, students obtain the fundamental knowledge in the "basic subjects", "specialized basic subjects", and "specialized subjects" that is organized systematically, mainly based on physical chemistry, inorganic chemistry, and organic chemistry. In addition, the program allows students to take subjects provided by other departments of the School of Science, taking into consideration the importance of interdisciplinary fields. Based on the knowledge they have obtained in the above subjects, students learn basic skills for practice in the subjects "Chemical Experiments I" and "Chemical Experiments II", and in the "specialized subjects". Students also develop abilities required for scientists in society in their "graduation research". The graduate school provides substantial curricula and a research environment for students who have graduated from the School of Science. The graduate school is an ideal place where students can enhance their abilities as scientists and exercise these abilities through their research. The Chemistry Program is designed to have continuity with the education in the graduate school.

This program also provides sufficient education to meet requirements of students who wish to obtain the certification for science teachers of junior and senior high schools.

In this program, approximately three quarters of students, who graduate from the Department of Chemistry in the School of Science, go on to the Basic Chemistry Program in the Division of Advanced Science and Engineering in the Graduate School of Advanced Science and Engineering or to the Program of Mathematical and Life Sciences in the

Division of Integrated Sciences for Life in the Graduate School of Integrated Sciences for Life in our university. The remaining students are employed as teachers, public servants, or company workers in the areas of chemistry, computing, and pharmaceuticals, or advance to the graduate school of another university.

We truly hope that students who are interested in searching for the truth, and are ambitious to try new things, will join us.

3. Diploma policy (policy for awarding degrees and goal of the program)

This program aims to educate students to be scientists, with the background in chemistry and of international quality, who work in the cutting edge of areas related to chemistry, such as basic and applied researches, practical work in industry, and science education. In addition, the program aims to produce professionals who are capable of undertaking their work autonomously and with flexibility.

This program will award the degree of bachelor of science to students who, in addition to earning required credits defined for this educational course, have acquired capabilities and qualities described below:

- The qualities required for pioneering a new area of chemistry, based on profound knowledge of chemistry, expertise, thinking ability, judgment, and creative perspective;
- The abilities required for leading in modern society, based on an interest in an interdisciplinary field that has a relationship with more than one area, or a new area of chemistry that exceeds borders of previous frameworks;
- The ability to adapt oneself to a new situation and environment, based on constant, active, and voluntary academic interest in chemistry, and a comprehensive outlook; and
- The ability to constantly pursue one's endeavors, to logically exhibit and explain one's ideas in convincing manners, and to correct and improve one's understanding through discussion with others.

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

This program provides high quality education courses that were established based on the tradition inherited from Hiroshima Bunrika University, in order to enable students to achieve the targets listed in the diploma policy. The organization with which these programs are implemented is formed to provide education flexibly while taking the level of achievement of the students into consideration. These programs are reviewed and evaluated every academic year after they have been implemented, to constantly improve the methodology of the education. In addition, these educational programs are designed to provide smooth continuity to the advanced education and research in the graduate school. The achievement in education is evaluated based on grade scores for the subjects and the level of achievement against the targets defined for this program. The following lists the educational policy and courses that are provided for students in each year:

- In the first year, students study subjects related to outlines of mathematics, physics, biology, and earth and planetary system science as specialized education subjects, which enable students to obtain basic knowledges in a wide range of areas of natural science. Students acquire qualities necessary for pioneering interdisciplinary fields beyond previous frameworks. Students also develop basic abilities needed for presenting their own ideas and logic in foreign languages through class subjects in foreign languages, principally English. The liberal arts subjects are provided to enable students to develop a wide-ranging intelligence, judgment, and deep humanity. In the specialized fundamental subjects of chemistry, students learn again basic knowledges of chemistry, physics,

biology, and mathematics that they have studied in high school, in order to prepare for advanced chemistry. In addition, they study fundamentals of quantum chemistry that are required for understanding all other areas of chemistry.

- In the second year, specialized education aimed at full-fledged study in chemistry is provided, in order for students to acquire advanced knowledges of chemistry. This enables students to improve basic abilities required for pioneering new areas of chemistry. Because faculty members consistently use the same textbook for physical chemistry, inorganic and analytical chemistry, and organic chemistry, students can systematically study each area.
- In the third year, students are trained for chemical experiments throughout the academic year. In this process, students improve their skills in chemistry and foster their ability to constantly expend effort until they achieve their aim. They also study chemistry subjects related to advanced application, and state-of-the-art chemistry that is being developed on the front lines around the world. Through this study, students learn the roles that chemistry plays in solving various problems that human beings are facing, and develop basic creativity and practical abilities for leading activities in the local community and the international society.
- In the fourth year, students carry out their graduation research in a study group in the Department of Chemistry, and present their results. Through this process, they acquire the ability to autonomously advance their research while cooperating with faculty members and other students, objectively observing unfamiliar properties and phenomena, and logically explaining their cause and mechanism, logically presenting and explaining their obtained chemical findings in a convincing manner, and correcting and improving their understanding through discussion with others. Furthermore, they reinforce the basics required for working in cutting edge areas of chemistry in such fields as industry, education, academia, and graduate school.

5. Start time and acceptance conditions

In School of Science, each department holds its entrance examinations. This program is organized primarily for students of the Department of Chemistry. Students are automatically registered in this program when they enter our university. Therefore, students will be educated according to this program from the start of the first year.

Students who enter the Department of Chemistry are expected to have mastered the subjects in high school listed below:

Subject name: Mathematics, Physics

This program also accepts all students at our university. When a student who does not belong to the Department of Chemistry chooses this program, requirements are stipulated separately, based on the provisions regarding transfer between schools / departments.

6. Obtainable qualifications

1: Educational personnel certification

(1) Type 1 License for Junior High School Teacher (Science)

(2) Type 1 License for High School Teacher (Science)

2: Curator license

3 Certification of Poisonous and Deleterious Substances Business Operator

4 License for which eligibility for examination is awarded to a person with a bachelor’s degree: 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 evaluation item of academic achievement, and the achievement level against the criteria is given 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 last semester, is determined by using these values and applying weightings. The evaluation standards consist of three levels, i.e., Excellent, Very Good, and Good.

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

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

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

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

* Refer to the curriculum map in Attachment 4.

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

1. Purpose

Students join state-of-the art research that is being performed in the research group to which they are allocated, based on the fundamental knowledge and skills in basic practices in chemistry that they have acquired in their studies up to and including the third year. They acquire the latest knowledge of the research area and connected areas, as well as advanced practical skills. In addition to this, they study how to advance their research and refine their personal qualities as cooperative, unique, ambitious, patient, and flexible scientists. Furthermore, they acquire skills that can be used for further study in the graduate school, research activities in a company, and educational and/or social activities in other fields.

2. Overview of Research

An overview of research is given on the website of each research group. Materials introducing the research groups will be delivered to students before we conduct a survey of their allocation preferences. Students are also permitted to visit each research group at any time in order to learn about the situation in the group directly from the faculty members and students. Additionally, the lecture in "Advanced Chemistry" that is given in the third year helps students understand various aspects of the research.

3. Student allocation timing and method

Students are allocated to their research group at the beginning of the fourth academic year. To be allocated to a laboratory, students must satisfy the conditions for starting graduation research. For details of this, refer to the "Criteria for Attending Specialized Education Subjects in Chemistry Program 2" found in the "Student Handbook" (received when the student enters the university).

Students are allocated to a research group based on their individual wishes, within the capacity constraints of each group that are defined by the faculty committee of the Department of Chemistry.

10. Responsibility

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

The faculty committee of the Chemistry Program (head: chair of the Department of Chemistry) is engaged in the "plan" and "do" processes.

For the process "check" process, the chair of Department of Chemistry consults with the committee responsible (the education affairs review committee in the Department of Chemistry) based on materials prepared by the faculty committee of the Chemistry Program. In the case of the "action" process, the required actions are carried out by the faculty committee of the Chemistry Program, taking the result of the consultation into consideration.

The faculty members who constitute the faculty committee for each major program are listed in Attachment 5.

(2) Evaluation of the program

○ Perspectives for the evaluation of program

1: Objective level of achievement of the students

2: Level of satisfaction of the students

3: Level of satisfaction of the faculty members

4: Results of graduation research

○ Evaluation method

1: An external evaluation is conducted by ex-students.

2: A questionnaire for evaluation of the whole program is distributed to students and ex-students of the program.

3: A questionnaire for evaluation of the whole program is distributed to members of faculty.

4: A questionnaire for the results of the graduation research is distributed to ex-students.

○ Policy and method for feedback to students

Based on the basic philosophy of "student-oriented education", an external evaluation by ex-students and questionnaires for students and ex-students are conducted each academic year, and the results are comprehensively reviewed to identify any problems in the program. Then, the faculty committee of the Chemistry Program revises the composition of the program and the contents of subjects as required.

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

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

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

＊Students who have earned required credits (refer to the Student Handbook for the details) can acquire the type 1 license for junior high school teachers (science), the type 1 license for senior high school teachers (science), the poisonous and deleterious substances business operator license, and the curator license.
In addition to this, students who graduate from this program acquire eligibility for the examination for Class A hazardous materials engineer.

(Liberal Arts Education)

Type	Subject type					Required No. of credits		Class subjects, etc.	No. of credits	Type of course registration	Year in which the subject is taken (*The lower figure means semester) (Note 1)							
											1st grade		2nd grade		3rd grade		4th grade	
											Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
											1	2	3	4	5	6	7	8
Liberal Arts Education Subjects	Peace Science Courses					2		From "Peace Science Courses"	Each 2	Elective/required	○							
	Common Subjects	Basic Courses in University	Introduction to University Education			2		Introduction to University Education	2	Required	②							
			Introductory Seminar for First-Year Students			2		Introductory Seminar for First-Year Students	2	Required	②							
			Area Courses			8		From "Area Courses" (Note 2)	1 or 2	Elective/required	○	○	○	○				
			Foreign Languages	English (Note 3)	Basic English Usage	10	2	Basic English Usage I	1	Required	①							
								Basic English Usage II	1			①						
					Communication Ⅰ		2	Communication IA	1	Required	①							
								Communication IB	1		①							
					Communication Ⅱ		2	Communication IIA	1	Required		①						
								Communication IIB	1			①						
				Non-English Foreign Languages (Select one language from German, French, Spanish, Russian, Chinese and Korean)			4	Foreign Languages: Basic Studies Ⅰ	1	Elective/required	○							
								Foreign Languages: Basic Studies Ⅱ	1		○							
								Foreign Languages: Basic Studies Ⅲ	1			○						
								Foreign Languages: Basic Studies Ⅳ	1			○						
								Ⅰ, Ⅱ, Ⅲ and Ⅳ must be the same language										
			Information and Data Science Courses			4	2	Introduction to Information and Data Sciences	2	Required	②							
							2	Ground zero programming	2	Elective/required		○						
								Fundamental Date Science	2			○						
			Health and Sports Courses			2		From "Health and Sports Courses"	1 or 2	Elective/required	○	○						
			Social Cooperation Courses			(0)		From "Social Cooperation Courses"	1 or 2	Free elective	○	○						
		Foundation Courses				14	12	Calculus I	2	Required	②							
								Calculus II	2			②						
								Linear Algebra I	2		②							
								Linear Algebra II	2			②						
								Experimental Methods and Laboratory Work in Physics I	1			①						
								Experimental Methods and Laboratory Work in Physics Ⅱ	1			①						
								Experimental Methods and Laboratory Work in Chemistry I	1					①				
								Experimental Methods and Laboratory Work in Chemistry Ⅱ	1					①				
							2	Experimental Methods and Laboratory Work in Biology Ⅰ	1	Elective/required	○							
								Experimental Methods and Laboratory Work in Biology Ⅱ	1		○							
								Experimental Methods and Laboratory Work in Earth Sciences I	1				○					
								Experimental Methods and Laboratory Work in Earth Sciences Ⅱ	1				○					
								I and II of the same subject (2 credits) from the 4 subjects above										
	Total(Liberal Arts Education Subjects)					44												

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

(Note 2) It is required to earn 4 credits in "Human & Social Science Subjects" and 4 credits in "Natural Science Subjects". Students who want to acquire an educational personnel certification must take the subject "Japanese Constitution" in the "Human & Social Science Subjects".
Credits earned through the subject "Advanced English for Communication", "Foreign Languages: Intensive Studies" and "Overseas Language Seminar (German, French, Spanish, Russian, Chinese, and Korean)" in "Foreign Languages" are accepted as the credits required for "Human & Social Science Subjects".

(Note 3) The credit for "Field Research in the English-speaking World" that is earned through such activities as a short-term study abroad, and that for "Online English Seminar A" and "Online English Seminar B", that is earned through self-study, are accepted as the credit for the subject "Communication I and II".
Achievement in a foreign language skill test might also be accepted as credit. For the details, refer to the description of English subjects in Liberal Arts Education and the item "Credit based on Achievement in Foreign Language Skill Tests" in the Student Handbook.

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

(Note 4) To achieve the 43 credits required for the "Specialized Subjects", it is required to earn 8 or more credits for elective required subjects and free elective subjects, as well as 18 credits for required subjects and 17 credits for elective required subjects.

(Note 5) "Special Lectures in Chemistry" shall be offered intensively in a certain period (in or after the fifth semester). For taking the subject, refer to the Study Guidance for the Chemistry Program.

(Note 6) This includes the subjects that the faculty committee of Chemistry Program accept. Consult with the tutor for the details.

(Specialized Education)

Type	Subject type	Required No. of credits		Class subjects, etc.	No. of credits	Type of course registration	Year in which the subject is taken (*The lower figure means semester) (Note 1)							
							1st grade		2nd grade		3rd grade		4th grade	
							Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
							1	2	3	4	5	6	7	8
Specialized Education Subjects	Basic Specialized Subjects	41	4	Introduction to Mathematics	2	Elective/required	○							
				Introduction to Information Mathematics	2			○						
				Introduction to Physics A	2		○							
				Introduction to Physics B	2			○						
				Introduction to Biological Sciences A	2		○							
				Introduction to Biological Sciences B	2			○						
				Introduction to Earth and Planetary Sciences A	2		○							
				Introduction to Earth and Planetary Sciences B	2			○						
				2 subjects (4 credits) including "Introduction to Physics A" or "Introduction to Physics B" from the eight subjects above										
			37	Basic Chemistry A	2	Required	②							
				Basic Chemistry B	2		②							
				Basic Physical Chemistry A	2			②						
				Basic Physical Chemistry B	2			②						
				Fundamental Inorganic Chemistry	2			②						
				Fundamental Organic Chemistry	2			②						
				Physical Chemistry IA	2				②					
				Physical Chemistry IB	2				②					
				Physical Chemistry IIA	2					②				
				Physical Chemistry IIB	2					②				
				Inorganic Chemistry Ⅰ	2				②					
				Inorganic Chemistry Ⅱ	2				②					
				Inorganic Chemistry Ⅲ	2					②				
				Organic Chemistry Ⅰ	2				②					
				Organic Chemistry Ⅱ	2				②					
				Organic Chemistry Ⅲ	2					②				
				Exercises in Inorganic Chemistry	1					①				
				Exercises in Physical Chemistry	1						①			
				Exercises in Organic Chemistry	1							①		
				English Seminar on Chemistry (2 subjects of the same name)	Each 1						①	①		
	Specialized Subjects	43 (note 4)	2 or more	Advanced Mathematics	2	Elective/required					○			
				Advanced Physics	2					○				
				Advanced Chemistry	2							○		
				Advanced Biology	2						○			
				Advanced Earth and Planetary Science	2							○		
				At least 1 subject (2credits) from the five subjects above										
			15 or more	Biological and Structural Chemistry	2	Elective/required				○				
				Chemistry of Biological Compounds	2					○				
				Analytical Organic Chemistry	2					○				
				Organic Main Group Chemistry	2					○				
				Reaction Dynamics	2						○			
				Molecular Structural Chemistry	2						○			
				Quantum Chemistry	2						○			
				Inorganic Chemistry Solid State Chemistry	2						○			
				Instrumental Analytical Chemistry	2						○			
				Structural Organic Chemistry	2						○			
				Organic Reaction Chemistry	2						○			
				Photochemistry of Condensed Matter	2						○			
				Systembiology	2						○			
				Biopolymer Chemistry	2							○		
				Molecular Photochemistry	2							○		
				Organometallic Chemistry	2							○		
				Radiochemistry	2							○		
				Biological Chemistry	2							○		
				Bioinformatics	2							○		
				Practical Computational Chemistry	2							○		
				Exercises in Chemistry	1								○	
				Chemistry Internship	1						○			
				"Special Lectures in Chemistry" (Note 5)							○	○	○	○
				At least 8 subjects (15 credits) from the twenty three subjects above										
			18	Chemical Experiments I	5	Required					⑤			
				Chemical Experiments II	5							⑤		
				Special Study for Graduation	Each 4								④	④
			0～8	"Basic Specialized Subjects" and "Specialized Subjects" offered by other programs of School of Science (Note 6)		Free elective	○	○	○	○	○	○	○	
	Total (Specialized Education Subjects)	84												
Total		128												

Academic achievements of Chemistry Program

Relationships between the evaluation items and evaluation criteria

Academic achievements			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
Knowledge and Understanding	(1)	To thoroughly understand and learn knowledge of physical chemistry, inorganic chemistry and organic chemistry.	Being able to fully understand basic information on chemistry and make it bases to understand advanced contents.	Being able to fully understand basic information on chemistry.	Being able to understand basic information on chemistry.
	(2)	Understanding and learning advanced expertise in several chemical and interdisciplinary areas.	Being able to fully understand chemical expertise and make it bases to conduct the latest research.	Being able to fully understand chemical expertise.	Being able to understand chemical expertise.
	(3)	Understanding and acquiring logical frameworks and structure of basic studying and knowledge and skills necessary for learning construction.	To understand the basics of physical science perfectly; also, to make the knowledge a foundation for learning cutting-edge information.	To be able to understand the basics of physical science perfectly.	To be able to understand the basics of physical science.
	(4)	To learn abilities to express oneself by considering problems that human and society are facing from multiple perspectives.	By understanding problems that human and society are facing from multiple viewpoints, to consider specific solutions and express one's idea	To be able to understand problems that human and society are facing from multiple perspectives.	To be able to understand problems that human and society are facing from multiple perspectives.
	(5)	Getting ability to explain the process of construction and development in each academic discipline.	Being able to fully understand the construction and development process of each studying and explain the relationship between the necessity and modern learning.	Being able to fully understand the construction and development process of each studying.	Being able to understand the construction and development process of each studying.
	(6)	To learn skills to explain certain academic and comprehensive topics from various perspectives.	Being able to fully understand interdisciplinary and general topics on chemistry and other areas and explain them.	Being able to fully understand interdisciplinary and general topics on chemistry and other areas.	Being able to understand interdisciplinary and general topics on chemistry and other areas.
Abilities and Skills	(1)	To acquire ability to apply chemical knowledge, witch is already acquired, into chemical issues.	To be able to apply chemical knowledge, which is already acquired, into chemical problems, and solve them.	To be able to apply learned chemical basic knowledge into chemical problems.	To be able to understand relations between basic chemical knowledge, which is already acquired, and chemical issues.
	(2)	To learn basic knowledge, skills, and attitudes related to information, also to acquire skills to process, output and input information appropriately.	Being able to fully understand information on closely related to chemistry and appropriately deal, send and receive them.	Being able to understand information on closely related to chemistry and deal, send and receive them.	Being able to use chemistry related information.
	(3)	To acquire the ability to explain the importance of fitness and health promotion from scientific perspectives.	To appropriately understand explain relations among human body, health and science.	To appropriately understand relations among human body, health and science.	To understand explain relations among human body, health and science.
	(4)	To obtain skills to conduct experiments based on basic knowledge, which is learned.	Based on basic knowledge of natural science, to be able to handle experiments in accordance with appropriate steps, also to understand the results deeply.	Based on basic knowledge about natural science, to be able to conduce research and understand research results.	Based on acquired basic knowledge about natural science, to be able to conduct research.

Academic achievements			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
Comprehensive Abilities	(1)	Acquiring the ability of research planning.	Being able to completely understand the current research issues and consider the mays of solution and specific measures by themselves.	Being able to completely understand the current research issues and consider the mays of solution.	Being able to understand the research plan made by research instructors.
	(2)	Acquiring the ability of research exercising・analyzing.	Being able to carry out research, treat appropriately the results and appropriately interpret and understand them.	Being able to carry out research, treat appropriately the results and understand them.	Being able to carry out research, treat appropriately the results.
	(3)	Acquiring communication ability	To be able to have discussions with researchers based in Japan about research contents. Also, to be able to improve research based on the discussions.	To be able to have discussions about research contents with researchers based in Japan	To be able to understand research conducted by researchers based in Japan
	(4)	Personal capability	Being able to tackle with research voluntarily, solve the issues by themselves with patient efforts and proceed it.	Being able to tackle with research voluntarily and proceed it.	To accomplish one's own research.
	(5)	Acquiring communication ability using foreign languages.	Being able to freely make communication in foreign languages with foreigners and make discussion on various issues.	Being able to make communication in foreign languages with foreigners.	Being able to collect foreign information using foreign languages.

Placement of Liberal Arts Education in the Major Program

The liberal arts education in this program aims to build the foundation required for the specialized education. It develops abilities for data collection and analysis, thinking skills for considering problems in natural science while critically examining the opinions of others, and the ability to examine the essence and background of a phenomenon and identify and solve problems from a comprehensive perspective. In addition to this, students are educated to acquire autonomy and become people of talent, who have the language communication skills required of professionals who are able to work actively in a global setting and discuss issues related to peace.

Relationships between the evaluation items and class subjects

Subject Classification	Subject Name	Credits	Type of course registration	Grade	Evaluation items																												Total weighted values of evaluation items in
					Knowledge and Understanding												Abilities and Skills								総合的な力										
					(1)		(2)		(3)		(4)		(5)		(6)		(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)		(5)		
					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	
Liberal Arts Education	Peace Science Courses	2	Elective/required	1							100	1																					100
Liberal Arts Education	Introduction to University Education	2	Required	1																									100	1			100
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	1																									100	1			100
Liberal Arts Education	Area Courses	8	Elective/required	1-4									100	1																			100
Liberal Arts Education	Basic English Usage I	1	Required	1																											100	1	100
Liberal Arts Education	Basic English Usage II	1	Required	2																											100	1	100
Liberal Arts Education	Communication I	2	Required	1																											100	1	100
Liberal Arts Education	Communication II	2	Required	2																											100	1	100
Liberal Arts Education	Foreign Languages: Basic Studies I	1	Elective/required	1																											100	1	100
Liberal Arts Education	Foreign Languages: Basic Studies II	1	Elective/required	1																											100	1	100
Liberal Arts Education	Foreign Languages: Basic Studies III	1	Elective/required	2																											100	1	100
Liberal Arts Education	Foreign Languages: Basic Studies IV	1	Elective/required	2																											100	1	100
Liberal Arts Education	Introduction to Information and Data Sciences	2	Required	1															100	1													100
Liberal Arts Education	Ground zero programming	2	Elective/required	2															100	1													100
Liberal Arts Education	Fundamental Date Science	2	Elective/required	2															100	1													100
Liberal Arts Education	Health and Sports Courses	2	Elective/required	1-2																	100	1											100
Liberal Arts Education	Social Cooperation Courses	0	Free elective	1～2							100	1																					100
Liberal Arts Education	Calculus I	2	Required	1	50	1			50	1																							100
Liberal Arts Education	Calculus II	2	Required	2	50	1			50	1																							100
Liberal Arts Education	Linear Algebra I	2	Required	1	50	1			50	1																							100
Liberal Arts Education	Linear Algebra II	2	Required	2	50	1			50	1																							100
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I	2	Required	2																			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics II	2	Required	2																			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Chemistry I	2	Required	4																			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Chemistry II	2	Required	4																			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology I	2	Elective/required	1																			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology II	2	Elective/required	1																			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Earth Sciences I	2	Elective/required	3																			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Earth Sciences II	2	Elective/required	3																			100	1									100
Specialized Education	Introduction to Mathematics	2	Elective/required	1	50	1			50	1																							100
Specialized Education	Introduction to Information Mathematics	2	Elective/required	2	50	1			50	1																							100
Specialized Education	Introduction to Physics A	2	Elective/required	1	50	1			50	1																							100
Specialized Education	Introduction to Physics B	2	Elective/required	2	50	1			50	1																							100
Specialized Education	Introduction to Biological Sciences A	2	Elective/required	1	50	1			50	1																							100
Specialized Education	Introduction to Biological Sciences B	2	Elective/required	2	50	1			50	1																							100
Specialized Education	Introduction to Earth and Planetary Sciences A	2	Elective/required	1	50	1			50	1																							100

Subject Classification	Subject Name	Credits	Type of course registration	Grade	Evaluation items																												Total weighted values of evaluation items in
					Knowledge and Understanding												Abilities and Skills								総合的な力										
					(1)		(2)		(3)		(4)		(5)		(6)		(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)		(5)		
					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	
Specialized Education	Introduction to Earth and Planetary Sciences B	2	Elective/required	2	50	1			50	1																							100
Specialized Education	English Seminar on Chemistry	Each 1	Required	5-6	50	1			50	1																							100
Specialized Education	Basic Chemistry A	2	Required	1	50	1			50	1																							100
Specialized Education	Basic Chemistry B	2	Required	1	50	1			50	1																							100
Specialized Education	Basic Physical Chemistry A	2	Required	2	50	1			50	1																							100
Specialized Education	Basic Physical Chemistry B	2	Required	2	50	1			50	1																							100
Specialized Education	Fundamental Inorganic Chemistry	2	Required	2	50	1			50	1																							100
Specialized Education	Fundamental Organic Chemistry	2	Required	2	50	1			50	1																							100
Specialized Education	Physical Chemistry IA	2	Required	3	50	1			50	1																							100
Specialized Education	Physical Chemistry IB	2	Required	3	50	1			50	1																							100
Specialized Education	Physical Chemistry IIA	2	Required	4	50	1			50	1																							100
Specialized Education	Physical Chemistry IIB	2	Required	4	50	1			50	1																							100
Specialized Education	Inorganic Chemistry Ⅰ	2	Required	3	50	1			50	1																							100
Specialized Education	Inorganic Chemistry Ⅱ	2	Required	3	50	1			50	1																							100
Specialized Education	Inorganic Chemistry Ⅲ	2	Required	4	50	1			50	1																							100
Specialized Education	Organic Chemistry Ⅰ	2	Required	3	50	1			50	1																							100
Specialized Education	Organic Chemistry Ⅱ	2	Required	3	50	1			50	1																							100
Specialized Education	Organic Chemistry Ⅲ	2	Required	4	50	1			50	1																							100
Specialized Education	Exercises in Inorganic Chemistry	1	Required	4													100	1															100
Specialized Education	Exercises in Physical Chemistry	1	Required	5													100	1															100
Specialized Education	Exercises in Organic Chemistry	1	Required	6													100	1															100
Specialized Education	Advanced Chemistry	2	Elective/required	6			100	1																									100
Specialized Education	Biological and Structural Chemistry	2	Elective/required	4			100	1																									100
Specialized Education	Chemistry of Biological Compounds	2	Elective/required	4			100	1																									100
Specialized Education	Analytical Organic Chemistry	2	Elective/required	4			100	1																									100
Specialized Education	Organic Main Group Chemistry	2	Elective/required	4			100	1																									100
Specialized Education	Reaction Dynamics	2	Elective/required	5			100	1																									100
Specialized Education	Molecular Structural Chemistry	2	Elective/required	5			100	1																									100
Specialized Education	Quantum Chemistry	2	Elective/required	5			100	1																									100
Specialized Education	Inorganic Chemistry Solid State Chemistry	2	Elective/required	5			100	1																									100
Specialized Education	Instrumental Analytical Chemistry	2	Elective/required	5			100	1																									100
Specialized Education	Structural Organic Chemistry	2	Elective/required	5			100	1																									100
Specialized Education	Organic Reaction Chemistry	2	Elective/required	5			100	1																									100
Specialized Education	Photochemistry of Condensed Matter	2	Elective/required	5			100	1																									100
Specialized Education	Systembiology	2	Elective/required	5			100	1																									100
Specialized Education	Biopolymer Chemistry	2	Elective/required	6			100	1																									100
Specialized Education	Molecular Photochemistry	2	Elective/required	6			100	1																									100
Specialized Education	Organometallic Chemistry	2	Elective/required	6			100	1																									100
Specialized Education	Radiochemistry	2	Elective/required	6			100	1																									100

Subject Classification	Subject Name	Credits	Type of course registration	Grade	Evaluation items																												Total weighted values of evaluation items in
					Knowledge and Understanding												Abilities and Skills								総合的な力										
					(1)		(2)		(3)		(4)		(5)		(6)		(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)		(5)		
					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	
Specialized Education	Biological Chemistry	2	Elective/required	6			100	1																									100
Specialized Education	Bioinformatics	2	Elective/required	6			100	1																									100
Specialized Education	Practical Computational Chemistry	2	Elective/required	6													100	1															100
Specialized Education	Exercises in Chemistry	1	Elective/required	7													100	1															100
Specialized Education	Chemistry Internship	1	Elective/required	5																			100	1									100
Specialized Education	Chemical Experiments I	5	Required	5																			100	1									100
Specialized Education	Chemical Experiments II	5	Required	6																			100	1									100
Specialized Education	Special Study for Graduation	Each 4	Required	7–8																					25	1	25	1	25	1	25	1			100

Curriculum Map of Chemistry

	Academic achievements Evaluation items	1st grade		2nd grade		3rd grade		4th grade	
		Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
Knowledge and Understanding	・(1)To thoroughly understand and learn knowledge of physical chemistry, inorganic chemistry and organic chemistry. ・(3)Understanding and acquiring logical frameworks and structure of basic studying and knowledge and skills necessary for learning construction.	Calculus I(◎)	Calculus II(◎)	Physical Chemistry IA(◎)	Physical Chemistry IIA(◎)	English Seminar on Chemistry(◎)	English Seminar on Chemistry(◎)		
		Linear Algebra I(◎)	Linear Algebra II(◎)	Physical Chemistry IB(◎)	Physical Chemistry IIB(◎)				
		Introduction to Mathematics(○)	Introduction to Information Mathematics(○)	Inorganic Chemistry I(◎)	Inorganic Chemistry III(◎)				
		Introduction to Physics A(○)	Introduction to Physics B(○)	Inorganic Chemistry II(◎)	Organic Chemistry III(◎)				
		Introduction to Biological Sciences A(○)	Introduction to Biological Sciences B(○)	Organic Chemistry I(◎)					
		Introduction to Earth and Planetary Sciences A(○)	Introduction to Earth and Planetary Sciences B(○)	Organic Chemistry II(◎)					
		Basic Chemistry A(◎)	Basic Physical Chemistry A(◎)						
		Basic Chemistry B(◎)	Basic Physical Chemistry B(◎)						
			Fundamental Inorganic Chemistry(◎)						
			Fundamental Organic Chemistry(◎)						
	(2)Understanding and learning advanced expertise in several chemical and interdisciplinary areas.				Biological and Structural Chemistry(○)	Reaction Dynamics(○)	Advanced Chemistry(○)		
					Chemistry of Biological Compounds(○)	Molecular Structural Chemistry(○)	Biopolymer Chemistry(○)		
					Analytical Organic Chemistry(○)	Quantum Chemistry(○)	Molecular Photochemistry(○)		
					Organic Main Group Chemistry(○)	Inorganic Chemistry Solid State Chemistry(○)	Organometallic Chemistry(○)		
						Instrumental Analytical Chemistry(○)	Radiochemistry(○)		
						Structural Organic Chemistry(○)	Biological Chemistry(○)		
						Organic Reaction Chemistry(○)	Bioinformatics(○)		
						Photochemistry of Condensed Matter(○)			
						Systembiology(○)			
	(4)To learn abilities to express oneself by considering problems that human and society are facing from multiple perspectives.	Peace Science Courses(○)	Social Cooperation Courses(△)						
		Social Cooperation Courses(△)							
	(5)Getting ability to explain the process of construction and development in each academic discipline.	Area Courses(○)	Area Courses(○)	Area Courses(○)	Area Courses(○)				
Abilities and Skills	(1)To acquire ability to apply chemical knowledge, witch is already acquired, into chemical issues.				Exercises in Inorganic Chemistry(◎)	Exercises in Physical Chemistry(◎)	Exercises in Organic Chemistry(◎)	Exercises in Chemistry(○)	
							Practical Computational Chemistry(○)		
	(2)To learn basic knowledge, skills, and attitudes related to information, also to acquire skills to process, output and input information appropriately.	Introduction to Information and Data Sciences(○)	Ground zero programming(○)						
			Fundamental Date Science(○)						
	(3)To acquire the ability to explain the importance of fitness and health promotion from scientific perspectives.	Health and Sports Courses(○)	Health and Sports Courses(○)						
	(4)To obtain skills to conduct experiments based on basic knowledge, which is learned.	Experimental Methods and Laboratory Work in Biology Ⅰ(○)	Experimental Methods and Laboratory Work in Physics Ⅰ(◎)	Experimental Methods and Laboratory Work in Earth Sciences Ⅰ(○)	Experimental Methods and Laboratory Work in Chemistry Ⅰ(◎)	Chemical Experiments Ⅰ(◎)	Chemical Experiments Ⅱ(◎)		
		Experimental Methods and Laboratory Work in Biology Ⅱ(○)	Experimental Methods and Laboratory Work in Physics Ⅱ(◎)	Experimental Methods and Laboratory Work in Earth Sciences Ⅱ(○)	Experimental Methods and Laboratory Work in Chemistry Ⅱ(◎)	Chemistry Internship(○)			

	Academic achievements Evaluation items	1st grade		2nd grade		3rd grade		4th grade	
		Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
Comprehensive Abilities	(1)Acquiring the ability of research planning.							Special Study for Graduation(◎)	Special Study for Graduation(◎)
	(2)Acquiring the ability of research exercising･analyzing.							Special Study for Graduation(◎)	Special Study for Graduation(◎)
	(3)Acquiring communication ability	Introductory Seminar for First-Year Students(◎)						Special Study for Graduation(◎)	Special Study for Graduation(◎)
		Introduction to University Education(◎)							
	(5)Acquiring communication ability using foreign languages.	Communication ⅠA(◎)	Communication ⅡA(◎)						
		Communication ⅠB(◎)	Communication ⅡB(◎)						
		Basic English Usage Ⅰ(◎)	Basic English Usage Ⅱ(◎)						
		Foreign Languages: Basic Studies Ⅰ(○)	Foreign Languages: Basic Studies Ⅲ(○)						
		Foreign Languages: Basic Studies Ⅱ(○)	Foreign Languages: Basic Studies Ⅳ(○)						
	(4)Personal capability							Special Study for Graduation(◎)	Special Study for Graduation(◎)

(例) Liberal Arts Education Subjects | Basic Specialized Subjects | Specialized Education Subjects | Graduation Thesis | (◎)Required | (○)Elective/required | (△)Free elective