For entrants in FY 2025

Appended Form 1

Specifications for Major Program

Name of School (Program)〔School of Engineering Cluster 3(Applied Chemistry, Biotechnology and Chemical Engineering)〕

Program name (Japanese)	応用化学プログラム
(English)	Program of Applied Chemistry

1. Academic degree to be acquired

Bachelor's degree in engineering

2. Overview

(1) Overview of "English-based Bachelor's Degree Program"

This program aims to foster and produce future members of a global society who have the knowledge to be innovative, creative, take leadership, and possess language abilities that will help them play an important role in the international world.

This program focuses specifically on producing individuals who are capable of addressing various global issues from an engineering perspective and contribute to the creation of new and valuable solutions that are significant to both the industrial and academic societies.

Students enrolled in the program will begin the curriculum from the first semester of their first year.

In the second year, students will set off on their major programs and take the designated courses which are offered at each cluster. Major program overview is as (2).

(2)Program overview of "Program of Applied Chemistry".

While the purpose of science is "pursuit of truth," the purpose of Engineering lies in "pursuit of realization." Applied chemistry is an academic field that deals with systems to realize, by exploiting the power of chemical reactions, new substances with excellent properties and functions, that are desired to be created based on the dreams (ideas) of humankind and social needs.

In the Program of Applied Chemistry, the primary learning & educational goal is to surely acquire the basic sciences, involving chemistry, mathematics, physics, and biology, as well as to develop problem-solving abilities for creating new substances. The above mentioned problem-solving abilities include:

1) Ability to carry out molecular design (design of molecular structures) of new target substances, using full knowledge of chemical reactions, taking into account their influences on society and nature,

2) Ability to actually synthesize new target substances utilizing a knowledge of chemical reactions and experimental methods,

3) Ability to look into the structure of the acquired substances and to analyze their molecular structures, and

4) Ability to accurately assess the physical and chemical properties and influence on the environment of the acquired substances.

The learning & educational goals of this Program also include developing the ability to understand the social responsibilities of engineers, English ability, reading comprehension, the ability to write good texts, the ability to give a presentation, communication skills such as negotiating skills, the ability to consider things multilaterally from a global perspective, the ability to pursue self-development, and creative powers beyond

the above knowledge frameworks so that the graduates of this Program can play an full active role in the real world. With many graduates going on to the Pre-doctoral (Master's) Course, the connection of this Program to graduate school education is fully taken into account.

Graduates from this Program are employed mainly by chemicals manufacturers, in such fields as chemistry, fibers, and pharmaceuticals, as well as industrial fields related to electricity, machines, metal, and the environment, and are playing an active role inside and outside of Japan, utilizing the abilities they acquired in this Program.

3.Diploma policies (degree conferment policy & program attainment goals)

The Program of Applied Chemistry shall develop human resources who have acquired basic knowledge, skills, and attitude as professional chemical engineers, and who can demonstrate scientific thinking and creative power.

This Program shall confer a bachelor degree (engineering) on students who have acquired the standard number of credits prescribed in the curriculum and attained the goals described below.

This Program adopts (Ka) ~ (Ko) as attainment goal. The goal of this Program from program registration to graduation is for students to cultivate the basic essentials required of an engineer/researcher, including creative powers and communication skills, as well as expertise related to applied chemistry.

(Ka) To acquire reliable basic knowledge,
(Ki) To acquire the maturity to fulfill their social responsibilities as an engineer,
(Ku) To acquire creative power and design ability,
(Ke) To become independent as a researcher & engineer through continuous self-development, and
(Ko) To acquire communication skills and an international outlook.

Attainment goals from (Ka) to (Ko) shall be achieved by completing the class subjects set for each goal. The content of each attainment goal is as follows:

(Ka) To acquire reliable basic knowledge

Students will acquire a broad basic knowledge and basic specialized knowledge of chemistry in the Liberal Arts Education and Specialized Education as well as advanced expertise in applied chemistry, and will acquire conceptual skills based on logical thinking supported by their acquired knowledge.

(Ki) To acquire the maturity to fulfill their social responsibilities as an engineer

To contribute to society through research and technologies, students will acquire the maturity required to fulfill their responsibilities as a researcher/engineer. To do this, they should cultivate their understanding of technologies and the effect of these technologies on society, acquire knowledge of economy, safety, and reliability of technology, and judgment in utilizing the acquired knowledge from a global perspective.

(Ku) To acquire creative power and design ability

Students will acquire the creative power required to solve diverse problems related to applied chemistry using the acquired knowledge and technologies. They will also develop a sense of ethics as recognized by society, and design skills in research and development, so that they can demonstrate their problem-solving abilities as a researcher/engineer.

(Ke) To become independent as a researcher & engineer through continuous self-development

Students will devise their own methods of information collection, technological improvement, improvement of research methods, analysis and understanding of research results and achievements, in addition to developing their own ability to continue to learn, and actively engage as an independent researcher or engineer, developing the attitude required to make multidimensional approaches toward solving problems.

(Ko) To acquire communication skills and an international outlook

Students will cultivate the ability to make logical descriptions, give presentations, and hold discussions, as well as the ability to collect and convey information from an international perspective. They will simultaneously acquire the international outlook required to handle problems from a global perspective.

4.Curriculum policies (policies for organizing & providing curricula)

To achieve the goals of this Program, after acquiring basic academic abilities and knowledge in Liberal Arts Education Subjects, students are required to study specialized fields in engineering and chemistry. This Program offers a curriculum in which students will take Liberal Arts Education Subjects up to the first semester of the second year, and after being assigned to this Program at the second semester of the second year, they will take Specialized Subjects.

The distinguishing feature of this curriculum is that it classifies Specialized Basic Subjects as a common part in Cluster 3 as “Specialized Basic Subject,” and allows students to take them from the second semester of their first year, at an early time after admission. While allowing new students to take Specialized Basic Subjects, their awareness of their own specialized fields and motivation for study will be enhanced, and this curriculum can cultivate students’ knowledge of and interest in peripheral fields by enabling students to attend lectures by faculty members in programs other than Applied Chemistry (Chemical Engineering and Biotechnology).

The following describes the program system consisting of liberal arts education subjects and specialized education subjects which will enable students to achieve the targets from (Ka) to (Ko).

In the curriculum, teaching and learning will be implemented by utilizing active learning and online classes, depending on the delivery methods of the program, such as lectures, practical skill courses and seminars.

In addition to strict grading using the standards clearly outlined in the syllabus, learning outcomes are evaluated based on the degree to which the goals set by the educational program are achieved.

○ Knowledge & understanding

・Broad basic knowledge of the liberal arts and specialized education subjects, together with basic expertise in chemistry (achievement target (Ka)). Students acquire this knowledge and expertise while taking liberal arts subjects provided in the 1st and 2nd years such as "Introduction to University Education" and "Introductory Seminar for First-Year Students", area courses and information subjects, Foundation Courses such as "Calculus I"; specialized basic subjects such as "Basic Organic Chemistry I " and "Basic Inorganic Chemistry ", and specialized subjects provided in the 3rd and 4th terms of the 2nd year; and in the 3rd year; such as "Advanced Organic Chemistry I" and "Inorganic Chemistry"

・Advanced expertise in applied chemistry (achievement target (Ka)). Students acquire this expertise while taking specialized basic subjects provided in the 1st year; and in the 1st and 2nd terms of the 2nd year; such

as "Physical Chemistry I" and "Analytical Chemistry", specialized subjects provided in the 3rd and 4th terms of the 2nd year; and in the 3rd year; such as "Synthetic Polymer Chemistry" and "Physical Chemistry II", and preparation of the "Graduation Thesis" in the 4th year.

・Creativity, based on logical thinking together with basic knowledge and expertise (achievement target (Ka)). Students acquire this ability while taking specialized basic subjects provided in the 1st year; and in the 1st and 2nd terms of the 2nd year; such as "Physical Chemistry I", specialized subjects provided in the 3rd and 4th terms of the 2nd year; and in the 3rd year; such as "Chemical Experiments I" and "Chemical Experiments II", and preparation of the "Graduation Thesis" in the 4th year.

◯ Abilities & skills

・The qualities required for understanding the effect of science and technology on society, and for taking responsibility for making a contribution to society as researchers or technicians (achievement target (Ki)). Students acquire these qualities while taking liberal arts education subjects such as "Introductory Seminar for First-Year Students" and area courses that are provided in the 1st year, "Basic Experiments in Chemistry" provided as a specialized basic subject in the 3rd and 4th terms of the 2nd year, "Engineering and Ethics" provided as a specialized subject in the 4th year, and preparation of the "Graduation Thesis"

・Knowledge of areas such as economics, and the safety and reliability of technology, as well as the ability to utilize this knowledge in making judgments from a global point of view (achievement target (Ki)). Students acquire these qualities while taking liberal arts education subjects such as " Introductory Seminar for First-Year Students" and area courses that are provided in the 1st year, " Basic Experiments in Chemistry" provided as a specialized basic subject in the 3rd and 4th terms of the 2nd year, "Engineering and Ethics" provided as a specialized subject in the 4th year, and preparation of the "Graduation Thesis."

・A creative way of thinking that makes it possible to use the acquired knowledge and skills to solve various problems related to applied chemistry (achievement target (Ku)). Students acquire this ability while taking liberal arts education subjects such as "Introductory Seminar for First-Year Students" and area courses that are provided in the 1st and 2nd year, specialized subjects provided in the 3rd year such as "Chemical Experiments I" and "Chemical Experiments II", and preparation of the "Graduation Thesis" in the 4th year.

・The ethics required for exercising problem-solving abilities as researchers or technicians, as well as a capability for designing research and development (achievement target (Ku)). Students acquire these qualities while taking area courses provided as liberal arts education subjects in the 1st year, "Engineering and Ethics" provided in the 4th year, and preparation of the "Graduation Thesis."

○ Comprehensive capabilities

・The ability to engage in autonomous and continuous study (achievement target (Ke)). Students acquire the ability while taking liberal arts education subjects in the 1st and 2nd years such as "Introduction to University Education", "Introductory Seminar for First-Year Students", peace science courses, area courses, "Experimental Methods and Laboratory Work in Physics" provided as a foundation course, "Basic Experiments in Chemistry" provided as a specialized basic subject in the 2nd semester of 2nd year, "Chemical Experiments I"; "Chemical Experiments II"; "Exercises in Organic Chemistry"; and "Exercises in Physical Chemistry"; which are all provided as specialized subjects in the 3rd year, and preparation of the "Graduation Thesis" in the 4th year.

・The attitude necessary for being actively and autonomously engaged, as independent researchers or

technicians, in problem-solving processes related to information gathering, the improvement of technology, the improvement of research methods, and the analysis and understanding of research results, in order to be able to identify versatile approaches (achievement target (Ke)). Students acquire this attitude while taking liberal arts education subjects in the 1st and 2nd years such as "Introductory Seminar for First-Year Students", peace science courses, area courses, "Experimental Methods and Laboratory Work in Physics" provided as a foundation course; "Basic Experiments in Chemistry " provided as a specialized basic subject in the 3rd and 4th terms of 2nd year; specialized subjects such as "Chemical Experiments I" and "Chemical Experiments II" provided in the 3rd year; and preparation of the "Graduation Thesis" in the 4th year.

・The ability to produce logical descriptions, presentations, and discussion in the Japanese language (achievement target (Ko)). Students acquire this ability while taking liberal arts education subjects such as " Introductory Seminar for First-Year Students", peace science courses, area courses provided in the 1st year, " Basic Experiments in Chemistry" provided as a specialized basic subject in the 3rd and 4th terms of 2nd year, specialized subjects such as "Chemical Experiments I" and "Chemical Experiments II" provided in the 3rd year, and preparation of the "Graduation Thesis" in the 4th year.

・The ability to collect and transmit information from an international perspective (achievement target (Ko)). Students acquire this ability while taking foreign language subjects provided as liberal arts education subjects such as "Communication IA" and "Basic Foreign Language", "Technical English" provided as a specialized basic subject in the 3rd and 4th terms of 2nd year, and preparation of the "Graduation Thesis" in the 4th year.

・The international awareness required for solving problems from a global point of view (achievement target (Ko)). Students acquire this awareness while taking liberal arts education subjects such as "Introductory Seminar for First-Year Students", peace science courses, area courses, and preparation of the "Graduation Thesis" in the 4th year.

5.Start of the program / Admission conditions

○ Start of the Program

The English-based Bachelor’s Degree programs begin in the first semester of the first year. Enrollment in Program of Applied Chemistry occurs in the second semester of the second year.

Cluster 3 provides a distinctive education into which fields related to Chemistry, Biotechnology and Process Engineering are organically integrated. Specifically, the educational purpose of Cluster 3 is to develop human resources who have acquired a broad integrated basic knowledge in the development of new functional substances and materials, biotechnology of animals, plants, and microorganisms, design and control of chemical processes, environmental conservation and purification, and the development of resources and energy, as well as advanced expertise and technologies. To achieve this, three programs in Applied Chemistry, Biotechnology, and Chemical Engineering are offered in addition to the common-subject basic specialized education to offer Specialized Education related to Chemistry, Biotechnology and Process Engineering, respectively. In Cluster 3, in registering these three programs at the second semester of the second year, students are allowed to choose specialized fields or programs that suit them, in addition to acquiring extensive specialized basic knowledge.

○ Requirements of the number of credits to be obtained

To be assigned to each program, students must obtain more than 16 credits out of a total of 18 credits from required subjects in the Specialized Basic Subjects (excluding Basic Experiments in Chemistry and Technical English), and a total of at least 60 credits (including Liberal Arts Education Subjects).

○ Admission quota for the Program

The Program has an upper limit on the number of students to be accepted. Assignment to the Programs in Applied Chemistry, Biotechnology, and Chemical Engineering shall be decided after considering the applicant's request and academic achievements.

6.Qualification(s)

- A Type-1 High School Teaching License (industry) (Students can obtain the Type-1 High School Teaching License (industry) at the time of graduation, if they complete the "Vocational Guidance" , prescribed "Liberal Arts Education Subjects" and "Specialized Education subjects")
- Safety Supervisors (The graduates of the School of Engineering with at least three-year practical experience of industrial safety)
- Boiler Handling Supervisors (Graduates of Faculty of Engineering who successfully studied subjects related to boilers at the university, and who have received at least one year or two years of on-the-job training for handling boilers after graduation can take the license examination for class-1 boiler experts, or license examination for special class boiler experts, respectively.)
- Hazardous Materials Engineers (Graduates of this Program who have at least six months' practical experience after graduation can take the class A hazardous materials engineer's qualification examination.)
- Poisonous Substances Handling Supervisors (All graduates of this Program qualify.)
- Educational personnel certification (Science) is awarded to the student who earns the required credits.(※Now applying)

7.Class subjects and class content

* See the Table of Registration Standards on Attached Sheet 1 for class subjects.
* See the syllabus announced in each fiscal year for class contents.
* All courses are taught in Japanese. Course materials may be written in both Japanese and English or only English.

8.Academic achievements

At the end of each semester, evaluation criteria will be shown with a clear indication of attainment levels according to the evaluation items for academic achievements.

Students' learning outcomes from admission to the current semester will be indicated as one of three levels: "Excellent," "Very Good," and "Good," based on evaluation criteria calculated by adding the weighted values to numerically converted evaluations of their academic achievements (S = 4, A = 3, B = 2, and C= 1) in each subject being evaluated.

Academic achievement	Evaluation criteria
Excellent	3.00 – 4.00

Evaluation of academic achievement	Converted values
S (Excellent: 90 points or higher)	4
A (Superior: 80 – 89 points)	3
B (Good: 70 – 79 points)	2
C (Fair: 60 – 69 points)	1

Very Good	2.00 – 2.99
Good	1.00 – 1.99

* See the relationships between evaluation items and evaluation criteria on Attached Sheet 2.

* See the relationships between evaluation items and class subjects on Attached Sheet 3.

* See the Curriculum Map on Attached Sheet 4.

9.Graduation thesis (graduation research) (position and method & time of assignment, etc.)

○ Position

The Graduation Thesis is positioned as one of the major subjects in the attainment goals of this educational program listed below.

(Ka) To acquire reliable basic knowledge,

(Ki) To acquire the maturity to fulfill their social responsibilities as an engineer,

(Ku) To acquire creative power and design ability,

(Ke) To become independent as a researcher & engineer through continuous self-development, and

(Ko) To acquire communication skills and an international outlook.

Details of the goals are as follows:

(1) Collect and analyze literature and materials (including those in English) related to the given research theme, and understand the purpose and significance of the research. (Ka), (Ki), and (Ko)

(2) Set concrete goals, and design a research plan. (Ka) and (Ku)

(3) Analyze and consider data obtained in the research process based on a knowledge of basic chemistry and specialized technologies. (Ka)

(4) Understand problems in attaining the goal, and set an appropriate new goal and plan. (Ka), (Ku), and (Ke)

(5) Consider the effect and importance of research results on society, nature, and learning from a multifaceted perspective. (Ki)

(6) Organize and logically describe research results. (Ka) and (Ko)

(7) Give an easy-to-understand oral presentation on research results, and express one’s own opinions in a discussion. (Ko)

○ Time and method of assignment

Time of assignment: Start of the fourth year (Targeting students who meet the “conditions for starting graduation research.”)

Conditions for starting a graduation thesis

(1) To have taken all the required Experimental Subjects (including experiments in fundamental subjects) and have acquired eight credits in foreign language subjects,

(2) To have taken at least 115 credits, and at least 69 of those credits to be obtained in Specialized Basic Subjects and Specialized Subjects.

○ Method of assignment

The research details of the laboratories will be introduced to students in the “Introduction to Applied Chemistry, Chemical Engineering and Biotechnology” lectures and the orientation concerning assignment. After the number of acceptable students by each laboratory is shown, students, who can begin their graduation thesis, will be assigned according to their requests. However, since only a limited number of students can be accepted, the assignment may be adjusted.

○ Guidance on preparing a graduation thesis

Although different academic advisors have different methods of giving academic guidance, the process is generally as follows:

(1) Set a research theme, and frame a research plan after exploring the literature and materials related to the theme.

(2) Carry out the research. During the research period, students will receive individual guidance from faculty members as required and research report sessions will be held periodically.

(3) Prepare a graduation thesis.

(4) Give a presentation on the graduation thesis.

(5) Read an English book in turn with other students and exchange opinions, and introduce the abstract of related articles in the form of seminar.

10.Responsibility system

(1) PDCA responsibility system (“Plan,” “Do,” “Check,” and “Act”)

The Program of Applied Chemistry Reviewing Committee (hereinafter, “Program Reviewing Committee”), which is composed of faculty members in charge, shall organize the Liaison Conference among Subjects as its subsidiary organization. These entities engage in planning, implementation, assessing/reviewing, and dealing with matters under their respective jurisdictions. For instance, the Program Reviewing Committee establishes a loop of improvement in the PDCA cycle—For smooth progress of the educational programs (Do), the Committee inspects and assesses the degree of attainment of the learning & educational goals and educational systems (such as methods of education and educational environment) (Check), proposes educational improvements (Act), and establishes learning & educational goals that includes the amount of study and education (Plan). The Committee establishes PD and CA Groups under it so that the PDCA cycle can function smoothly through cooperation between these Groups, and assigns a leader and subleader for each Group to make the responsibility system clearer. The Program has a system in which all faculty members in charge contribute to the Committee in corporation with each other, with the Chair of the Educational Program Reviewing Committee as its main member.

(2) Program assessment

○ Criteria for Program assessment

- Whether there is an educational checking system for the Program based on an assessment of the degree to which it has attained the learning & educational goals, whether the system's mechanism has been disclosed, and whether all activities related to the system have been conducted,
- Whether the educational checking system contains a mechanism to take into account social demands and requests from students, and is able to monitor the functions of the educational checking system itself,
- Whether the faculty members who are involved in the Program have access to records of meetings of the committees that comprise the educational checking system, and
- Whether there is any system to continuously improve the Program based on the results of the educational checks, and whether the related activities are being carried out.

○ Implementing the assessment

The Program Reviewing Committee plays a leading role in assessing and improving the Program. As assessment of this Program, external assessment is made by graduates of the Program of Applied Chemistry and questionnaires on classes and the educational environment are answered by students.

Specific organizations for assessment and improvement of the Program and improvement flows are explained below. The Program Reviewing Committee examines the validity of the Program's learning & educational goals, and evaluates the achievement levels for the learning & educational goals. This Committee requests graduates of the Program of Applied Chemistry to conduct external assessments and for students to answer questionnaires on classes and the educational environment, and then checks the overall education by the Program based on the questionnaires. After checking the validity of the learning & educational goals and the educational environment, the Committee further proposes methods of improving class subjects and class contents when deemed necessary. Cluster 3 is composed of three programs: Applied Chemistry, Chemical Engineering, and Biotechnology. Some subjects offered are shared by the three programs. Requests for checks and improvements to these shared subjects, when deemed necessary, will be proposed to the Cluster 3 Curriculum Reviewing Committee, and will be checked and discussed.

Part-time lecturers and former faculty members conduct external assessment of class subjects and their contents, and using the assessment results as a reference, the committee perform basic checks on whether the class subjects and the class contents are appropriate or not, and draft improvement plans. If further adjustments between subjects and examinations and improvements to contents, the committee will request discussions by the respective Specialized Subject Group Liaison Conferences on organic chemistry related subjects, inorganic & physical chemistry related subjects, experiments related subjects, and liberal arts education related subjects. In each Specialized Subject Group Liaison Conference, concrete measures to improve class subjects and class content will be taken. Detailed improvement plans drafted in the Specialized Subject Group Liaison Conference will be proposed to the Program Reviewing Committee. The Program Reviewing Committee, based on these improvement plans, will formulate comprehensive improvement measures that include the learning & educational goals. The decision on the improvement measures will be taken in the Applied Chemistry Classroom Meeting, and a system to implement the measures has been established. In the School of Engineering, the Self-checking and Evaluation Committee

has distributed questionnaires on the assessment of classes by students regularly since fiscal 1993, the assessment results of classes have been notified to each faculty member in charge, and improvements to the class content and methods have been implemented by all faculty members.

○ Idea and method of feedback to students

In this Program, in further developing the Tutor System adopted at this university, requests from students obtained from their tutors are used to improve the Program. To improve classes based on requests from students, faculty members in charge of the relevant classes are asked to improve by devising ways to give their classes based on the results of the questionnaire on classes answered by students.

Cluster 3 (Applied Chemistry, Biotechnology and Chemical Engineering)

◎ Required subject (period of registration specified)
○ Compulsory elective subject (any of these subjects shall be registered
△ Free elective subject (any of these subjects shall be registered)

Subject Type				Required No. of credits	Class subjects	No. of credits	Type of course registration	Year in which the subject is taken (Note 1)															
								1st grade				2nd grade				3rd grade				4th grade			
								Spring		Fall		Spring		Fall		Spring		Fall		Spring		Fall	
								1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T
Liberal Arts Education Subjects	Peace Science Courses			2		2	Compulsory elective		○														
	Basic Courses in University Education	Introduction to University Education		2	Introduction to University Education	2	Required	◎															
		Introductory Seminar for First-Year Students		2	Introductory Seminar for First-Year Students	2	Required	◎															
		Advanced Seminar		0		1	Free elective			△	△												
	Common Subjects	Area Courses		4	Courses in Arts and Humanities/Social Sc	2	Compulsory elective	○		○													
				4	Courses in Natural Sciences	2			○		○												
		Foreign Languages	English (Note2・3) Basic English Usage	2	Basic English Usage I	1	Required	◎	◎														
					Basic English Usage II	1				◎	◎												
			English (Note2・3) Communication I	2	Communication IA	1	Required	◎	◎														
					Communication IB	1		◎	◎														
			English (Note2・3) Communication II	2	Communication IIA	1	Required			◎	◎												
					Communication IIB	1				◎	◎												
			Initial Foreign Languages (Select one language from German, French, Spanish, Russian, Chinese, Korean and Arabic)	2	1 subjects from Basic language I	1	Compulsory elective	○															
					1 subjects from Basic language II	1			○														
		Information and Data Science Courses		2	Introduction to Information and Data Sciencies	2	Required		◎														
		Health and Sports Courses		2		1or2	Compulsory elective	○	○	○	○												
	Basic Subjects			15	Calculus I	2	Required	◎															
					Calculus II	2				◎													
					Linear Algebra I	2			◎														
					Linear Algebra II	2					◎												
					General Mechanics I	2			◎														
					General Mechanics II	2					◎												
					Experimental Methods and Laboratory Work in Physics I	1						◎											
					Experimental Methods and Laboratory Work in Physics II	1							◎										
					Seminar in Basic Mathematics I	1			◎														
				1	Seminar in Basic Mathematics II	1	Compulsory elective				○												
					Experimental Methods and Laboratory Work in Biology I (Note 5)	1				○													
					Experimental Methods and Laboratory Work in Biology II	1					○												
					Basic Electromagnetism	2					○												
	Free elective subjects			2	From all Subject Type		Free elective	△	△	△	△	△	△	△	△								
	No. of credits required for graduation			44																			

Note 1: When students fail to acquire the credit during the term or semester marked with ◎, ○, △ in the boxes for the year in which the course is taken, they can take the course in subsequent terms or semesters. Depending on class subject, courses may be offered in semesters or terms different from those scheduled. Please be sure to check the time schedule for Liberal Arts Education subjects to be issued every school year.

Note 2: The credit obtained by mastery of self-directed study of "Online Seminar in English A・B" cannot be counted towards the credit necessary for graduation. The credit obtained by Overseas Language Training can be recognized as Communication Ⅰ or Ⅱ if application is made in advance. For more details, please refer to the article on English in Liberal Arts Education in the student handbook.

Note 3: We have a recognition of credit system for foreign language proficiency tests. For more details, please refer to the article on Foreign Language in Liberal Arts Education in the student handbook.

Note 4: Students must take both「Experimental Methods and Laboratory WorkI **in Physics I**(1credit)」and「Experimental Methods and Laboratory WorkII in **Physics II**(1credit)」.

Note 5: Experimental Methods and Laboratory Work in Biology I should basically be taken together with Experimental Methods and Laboratory Work in Biology II. Person who took Methods and Laboratory Work in Biology I can take Experimental Methods and Laboratory Work in Biology II.

Cluster 3　Specialized Basic Subjects

◎Required

Class Subjects	Credits	Type of course registration			Class Hours/ Week																note
		Applied Chemistry	Biotechnology	Chemical engneering	1st grade				2nd grade				3rd grade				4th grade				
					Spring		Fall		Spring		Fall		Spring		Fall		Spring		Fall		
					1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	
Applied Mathematics I	2	◎	◎	◎			4														
Applied Mathematics II	2	◎	◎	◎					4												
Applied Mathematics III	2													4							
Basic Engineering Computer Programming	2	◎	◎	◎					4												
Probability and Statistics	2												4								
Technical English	1	◎	◎	◎								4									
Basic Environmental Sciences	2						4														
Chemical Stoichiometry	2	◎	◎	◎						4											
Basic Organic Chemistry I	2	◎	◎	◎			4														
Basic Organic Chemistry II	2							4													
Physical Chemistry I	2	◎	◎	◎						4											
Biochemistry I	2	◎	◎	◎						4											
Basic Experiments in Chemistry	4	◎	◎	◎							12	12									
Basic Inorganic Chemistry	2	◎	◎	◎			4														
Analytical Chemistry	2	◎	◎	◎					4												
Basic life science	2							4													
Introduction to Applied Chemistry, Chemical Engineering and Biotechnology	2									4											
Introduction to Fundamental Industry	2									4											

Cluster 3 Specialized subjects
(Program of Applied Chemistry)

◎Required subjects
○Compulsory Elective subjects

Class Subjects	Credits	Type of course registration	Class Hours/ Week																Note
			1st grade				2nd grade				3rd grade				4th grade				
			Spring		Fall		Spring		Fall		Spring		Fall		Spring		Fall		
			1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	
Inorganic Chemistry	2	◎										4							
Advanced Organic Chemistry I	2	◎							4										
Exercises in Organic Chemistry	1	◎												4					
Exercises in Physical Chemistry	1	◎												4					
Advanced Organic Chemistry II	2	◎								4									
Physical Chemistry II	2	◎							4										
Chemical Experiments I	4	◎									12	12							
Chemical Experiments II	4	◎											12	12					
Advanced Organic Chemistry III	2	◎									4								
Quantum Chemistry I	2	◎								4									
Quantum Chemistry II	2	◎									4								
Advanced Organic Chemistry IV	2	○											4						
Materials Analysis	2	○											4						
Chemical Kinetics	2	○										4							
Organometallic Chemistry	2	○									4								
Organic Structural Analysis	2	○								4									
Catalysis Chemistry	2	○											4						
Synthetic Polymer Chemistry	2	◎											4						
Computaional Chemistry	2	○										4							
Electrochemistry	2	○											4						
Solid State Chemistry	2	○							4										
Applied Inorganic Chemistry	1												2						
Industrial Polymer Chemistry	2													4					
Bioorganic Chemistry	2										4								
Chemical Engineering Exercise I	2								4	4									
Chemical Engineering Fundamentals	2								2	2									
Green Technology	2												4						
Recycling engineering	2													4					
Engineering and ethics	2	◎															4		※1
Graduation Thesis	5	◎																	

※1 Intensive courses

Academic Achievements in Applied Chemistry

The Relationship between Evaluation Items and Evaluation Criteria

Academic achievements		Evaluation items	Evaluation criteria		
			Excellent	Very Good	Good
Knowledge and Understanding	(1)	Wide range of basic knowledge on liberal arts and specialized education, and professional basic knowledge on chemistry.	Acquiring the wide range of basic knowledge on liberal arts and specialized education, and professional basic knowledge on chemistry, and being able to explain them.	Acquiring the wide range of basic knowledge on liberal arts and specialized education, and professional basic knowledge on chemistry.	Acquiring the outline of wide range of basic knowledge on liberal arts and specialized education, and professional basic knowledge on chemistry.
	(2)	Advanced technical knowledge of applied chemistry.	Acquiring the advanced technical knowledge of applied chemistry and being able to explain it.	Acquiring advanced technical knowledge of applied chemistry.	Acquiring the outlines of advanced technical knowledge of applied chemistry.
	(3)	The conception ability based on logical thinking supported by basic and technical knowledge.	Acquiring the conception ability based on logical thinking supported by basic and technical knowledge and being able to explain them.	Acquiring the conception ability based on logical thinking supported by basic and technical knowledge.	Acquiring the outline of conception ability based on logical thinking supported by basic and technical knowledge.
Abilities and Skills	(1)	The quality to be able to understand technologies and their social effects, and to fullfill the resopnsibility as researchers ・engineers to contribute	Acquring the quality to be able to understand technologies and their social effects, and fullfill the resopnsibility as researchers ・engineers to contribute to society. Being able to explain them.	Acquring the quality to be able to understand technologies and their social effects, and fullfill the resopnsibility as researchers ・engineers to contribute to society.	Acquring the outline of the quality to be able to understand technologies and their social effects, and fullfill the resopnsibility as researchers ・engineers to contribute to society.
	(2)	The knowledge on economy, safety and reliability of technologies, and the judgment ability to utilize them from global point of view.	Acquiring the knowledge on economy, safety and reliability of technologies and the judgment ability to utilize them from global point of view, and being able to explain them.	Acquiring the knowledge on economy, safety and reliability of technologies and the judgment ability to utilize them from global point of view.	Acquiring the outline of the knowledge on economy, safety and reliability of technologies and the judgment ability to utilize them from global point of view.
	(3)	Creativity to solve various problems related to applied chemistry utilizing acquired knowledge and skills	Acquiring the creativity to solve various problems related to applied chemistry utilizing acquired knowledge and skills, and to be able to explain it.	Acquiring the creativity to solve various problems related to applied chemistry utilizing acquired knowledge and skills.	Acquiring the outline of the creativity to solve various problems related to applied chemistry utilizing acquired knowledge and skills.
	(4)	Socially acceptable sense of moral and designing ability of research and development, which allow demonstrating the ability to solve issues as a researcher ・engineer	Acquiring the socially acceptable sense of moral and designing ability of research and development, which allow demonstrating the ability to solve issues as a researcher ・engineer, and to be able to explain them.	Acquiring the socially acceptable sense of moral and designing ability of research and development, which allow demonstrating the ability to solve issues as a researcher ・engineer.	Acquiring the outline of the socially acceptable sense of moral and designing ability of research and development, which allow demonstrating the ability to solve issues as a researcher ・engineer.
Comprehensive Abilities	(1)	Self-motivating and continuous learning ability	Acquiring self-motivating and continuous learning ability and to be able to explain it.	Acquiring self-motivating and continuous learning ability.	Acquiring the outline of self-motivating and continuous learning ability.
	(2)	Attitudes actively trying to take multiple approaches for solving problems as an independent researcher or engineer utilizing the following items: information collection, skill improvement, development of research methods, analysis and understanding of	Aquireing attitudes actively trying to take multiple approaches for solving problems as an independent researcher or engineer utilizing the following items: information collection, skill improvement, development of research methods, analysis and understanding of research outcomes and results. Also, to be able to explain these items.	Aquireing attitudes actively trying to take multiple approaches for solving problems as an independent researcher or engineer utilizing the following items: information collection, skill improvement, development of research methods, analysis and understanding of research outcomes and results.	Aquireing the outline of attitudes actively trying to take multiple approaches for solving problems as an independent researcher or engineer utilizing the following items: information collection, skill improvement, development of research methods, analysis and understanding of research outcomes and results.
	(3)	Abilities for logical description, presentation, and discussion in Japanese language.	Aquiring the abilities for logical description, presentation, and discussion in Japanese language, and to be able to explain these abilities.	Aquiring the abilities for logical description, presentation, and discussion in Japanese language.	Aquiring the outline of abilities for logical description, presentation, and discussion in Japanese language.
	(4)	Ability to collect and send information from international views.	Acquiring the ability to collect and send information from international views and being able to explain that	Acquiring the ability to collect and send information from international views.	Acquiring the outline of ability to collect and send information from international views.
	(5)	International sense to deal with problems from global perspectives.	Acquiring the international sence to deal with problems from global perspectives and being able to explain it	Acquiring the international sence to deal with problems from global perspectives.	Acquiring the outline of international sence to deal with problems from global perspectives.

Placement of the Liberal Arts Education in the Major Program

Liberal arts education in this Program creates the academic foundations for a specialized education, encourages a self-motivating and independent attitude, cultivates scientific thinking based on the ability to gather information ·analytical capacity ·critical thinking, establishes a viewpoint to give a deep insight into the nature and background of things from a broad perspective, strengthens students' language skills and their interest in peace suitable for living as an international person, integrates students' extensive knowledge into a

Relationships between the evaluation items and class subjects

Subject type	Class subjects	credits	Type of course registration 区分	Period	Evaluation items																								Total weighted values of evaluation items in
					Knowledge and Understanding						Abilities and Skills								Comprehensive Abilities											
					(1)		(2)		(3)		(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)		(5)			
					Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	
Liberal Arts Education	Introduction to University Education	2	Required	1semester	20	1											20	1	30	1	30	1							100
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	1semester	5	1	5	1	5	1	10	1	10	1	10	1			15	1	10	1	10	1	10	1	10	1	100
Liberal Arts Education	Advanced Seminar	1	Elective	2semester	5	1	5	1	5	1	10	1	10	1	10	1			15	1	10	1	10	1	10	1	10	1	100
Liberal Arts Education	Peace Science Courses	2	Elective	1semester															20	1	20	1	20	1	20	1	20	1	100
Liberal Arts Education	Area Courses	8	Elective	1,2semester	10	1			5	1	10	1	5	1	5	1	5	1	10	1	10	1	15	1	15	1	10	1	100
Liberal Arts Education	Basic English Usage I	1	Required	1semester																					50	1	50	1	100
Liberal Arts Education	Basic English Usage II	1	Required	2semester																					50	1	50	1	100
Liberal Arts Education	CommunicationIA	1	Required	1semester																					50	1	50	1	100
Liberal Arts Education	Communication IB	1	Required	1semester																					50	1	50	1	100
Liberal Arts Education	Communication IIA	1	Required	2semester																					50	1	50	1	100
Liberal Arts Education	Communication IIB	1	Required	2semester																					50	1	50	1	100
Liberal Arts Education	Basic language I	1	Elective	1semester																					50	1	50	1	100
Liberal Arts Education	Basic language II	1	Elective	1semester																					50	1	50	1	100
Liberal Arts Education	Information and Data Science Courses	2	Required	1semester	100	1																							100
Liberal Arts Education	Health and Sports Courses	2	Elective	1,2semester	100	1																							100
Liberal Arts Education	CalculusI	2	Required	1semester	100	1																							100
Liberal Arts Education	CalculusII	2	Required	2semester	100	1																							100
Liberal Arts Education	Linear AlgebraI	2	Required	1semester	100	1																							100
Liberal Arts Education	Linear AlgebraII	2	Required	2semester	100	1																							100
Liberal Arts Education	General Mechanics I	2	Required	1semester	100	1																							100
Liberal Arts Education	General Mechanics II	2	Required	2semester	100	1																							100
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I-2	2	Required	3semester	80	1													10	1	10	1							100
Liberal Arts Education	Seminar in Basic Mathematics I	1	Required	1semester	100	1																							100
Liberal Arts Education	Seminar in Basic Mathematics II	1	Elective	2semester	100	1																							100
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology I-2	2	Elective	2semester	100	1																							100
Liberal Arts Education	Basic Electromagnetism	2	Elective	2semester	100	1																							100
Specialized Education	Applied Mathematics I	2	Required	2semester	100	1																							100
Specialized Education	Applied Mathematics II	2	Required	3semester	100	1																							100
Specialized Education	Applied Mathematics III	2	Elective	5semester	100	1																							100
Specialized Education	Basic Engineering Computer Programming	2	Required	3semester	40	1	40	1	20	1																			100
Specialized Education	Probability and Statistics	2	Elective	5semester	100	1																							100
Specialized Education	Technical English	1	Required	6semester																					100	1			100
Specialized Education	Basic Environmental Sciences	2	Elective	2semester	40	1	40	1	20	1																			100
Specialized Education	Chemical Stoichiometry	2	Required	3semester	40	1	40	1	20	1																			100
Specialized Education	Basic Organic Chemistry I	2	Required	2semester	40	1	40	1	20	1																			100
Specialized Education	Basic Organic Chemistry II	2	Elective	2semester	40	1	40	1	20	1																			100
Specialized Education	Physical Chemistry I	2	Required	3semester	40	1	40	1	20	1																			100
Specialized Education	Biochemistry I	2	Required	3semester	40	1	40	1	20	1																			100
Specialized Education	Basic Experiments in Chemistry	4	Required	4semester	20	1	10	1	20	1	10	1	10	1					10	1	10	1	10	1					100
Specialized Education	Basic Inorganic Chemistry	2	Required	2semester	40	1	40	1	20	1																			100
Specialized Education	Analytical Chemistry	2	Required	3semester	40	1	40	1	20	1																			100
Specialized Education	Basic life science	2	Elective	2semester	40	1	20	1	40	1																			100
Specialized Education	Introductory Applied Chemistry, Chemical Engineering and Biotechnology	2	Elective	3semester	40	1	40	1	20	1																			100
Specialized Education	Introduction to Fundamental Industry	2	Elective	3semester	40	1	20	1	40	1																			100
Specialized Education	Inorganic Chemistry	2	Required	5semester	40	1	40	1	20	1																			100
Specialized Education	Advanced Organic Chemistry I	2	Required	4semester	40	1	40	1	20	1																			100
Specialized Education	Exercises in Organic Chemistry	1	Required	6semester	20	1	20	1	20	1					10	1	10	1	10	1	10	1							100
Specialized Education	Exercises in Physical Chemistry	1	Required	6semester	20	1	20	1	20	1					10	1	10	1	10	1	10	1							100
Specialized Education	Advanced Organic Chemistry II	2	Required	6semester	40	1	40	1	20	1																			100
Specialized Education	Physical Chemistry II	2	Required	6semester	40	1	40	1	20	1																			100
Specialized Education	Chemical Experiments I	4	Required	5semester	20	1	20	1	10	1					10	1	10	1	10	1	10	1	10	1					100
Specialized Education	Chemical Experiments II	4	Required	6semester	20	1	20	1	10	1					10	1	10	1	10	1	10	1	10	1					100
Specialized Education	Advanced Organic Chemistry III	2	Required	5semester	40	1	40	1	20	1																			100
Specialized Education	Quantum Chemistry I	2	Required	4semester	40	1	40	1	20	1																			100
Specialized Education	Quantum Chemistry II	2	Required	5semester	40	1	40	1	20	1																			100
Specialized Education	Advanced Organic Chemistry IV	2	Elective	6semester	40	1	40	1	20	1																			100
Specialized Education	Materials Analysis	2	Elective	6semester	40	1	40	1	20	1																			100
Specialized Education	Chemical Kinetics	2	Elective	5semester	40	1	40	1	20	1																			100
Specialized Education	Organometallic Chemistry	2	Elective	5semester	40	1	40	1	20	1																			100
Specialized Education	Organic Structural Analysis	2	Elective	6semester	40	1	40	1	20	1																			100
Specialized Education	Catalysis Chemistry	2	Elective	6semester	40	1	40	1	20	1																			100
Specialized Education	Synthetic Polymer Chemistry	2	Required	6semester	40	1	40	1	20	1																			100
Specialized Education	Computational Chemistry	2	Elective	5semester	40	1	40	1	20	1																			100
Specialized Education	Electrochemistry	2	Elective	6semester	40	1	40	1	20	1																			100
Specialized Education	Solid State Chemistry	2	Elective	4semester	40	1	40	1	20	1																			100
Specialized Education	Applied Inorganic Chemistry	1	Elective	6semester	40	1	40	1	20	1																			100
Specialized Education	Industrial Polymer Chemistry	2	Elective	6semester	40	1	40	1	20	1																			100
Specialized Education	Bioorganic Chemistry	2	Elective	5semester	40	1	20	1	40	1																			100
Specialized Education	Chemical Engineering Exercise I	2	Elective	4semester	40	1	20	1	40	1																			100
Specialized Education	Chemical Engineering Fundamentals	2	Elective	4semester	40	1	20	1	40	1																			100
Specialized Education	Green Technology	2	Elective	6semester	40	1	20	1	40	1																			100
Specialized Education	Recycling engineering	2	Elective	6semester	40	1	20	1	40	1																			100
Specialized Education	Engineering and ethics	2	Required	7semester							40	1	30	1			30	1											100
Specialized Education	Graduation Thesis	5	Required	7,8semester			10	1	5	1	10	1	5	1	20	1	20	1	10	1	5	1	5	1	5	1	5	1	100

Curriculum Map of Applied Chemistry

Academic Achievement Evaluation Items		1st grade		2nd grade		3rd grade		4th grade	
		Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Knowledge and Understading	Wide range of basic knowledge on liberal arts and specialized education, and professional basic knowledge on chemistry.	Introduction to University Education(◎)	CalculusII(◎)	Experimental Methods and Laboratory Work in Physics I・II(◎)	Basic Experiments in Chemistry(◎)	Inorganic Chemistry(◎)	Exercises in Organic Chemistry(◎)		
		Introductory Seminar for First-Year Students(◎)	Linear AlgebraII(◎)	Applied Mathematics II(◎)	Advanced Organic Chemistry I(◎)	Chemical Experiments I(◎)	Exercises in Physical Chemistry(◎)		
		Area Courses(△)	General Mechanics II(◎)	Basic Engineering Computer Programming（◎）	Advanced Organic Chemistry II(◎)	Advanced Organic Chemistry III(◎)	Chemical Experiments II(◎)		
		Information and Data Science Courses（◎）	Seminar in Basic Mathematics II(○)	Chemical Stoichiometry(◎)	Physical Chemistry II(◎)	Quantum Chemistry II(◎)	Synthetic Polymer Chemistry(◎)		
		CalculusI(◎)	Experimental Methods and Laboratory Work in Biology I・II(◎)	Physical Chemistry I(◎)	Quantum Chemistry I(◎)	Chemical Kinetics(○)	Advanced Organic Chemistry IV(○)		
		Linear AlgebraI(◎)	Basic Electromagnetism(○)	Biochemistry I(◎)	Organic Structural Analysis(○)	Organometallic Chemistry(○)	Materials Analysis(○)		
		General Mechanics I(◎)	Applied Mathematics I(◎)	Analytical Chemistry(◎)	Solid State Chemistry(○)	Computational Chemistry(○)	Catalysis Chemistry(○)		
		Seminar in Basic Mathematics I(◎)	Basic Organic Chemistry I(◎)	Introduction to Applied Chemistry, Chemical Engineering and Biotechnology(◎)			Electrochemistry(○)		
			Basic Inorganic Chemistry(◎)	Introduction to Fundamental Industry(○)					
			Basic Environmental Sciences(○)						
			Basic life science(○)						
			Basic Organic Chemistry II（○）						
	Advanced technical knowledge of applied chemistry.		Basic Organic Chemistry I(◎)	Physical Chemistry I(◎)	Advanced Organic Chemistry I(◎)	Inorganic Chemistry(◎)	Synthetic Polymer Chemistry(◎)	Graduation Thesis（◎）	Graduation Thesis（◎）
			Basic Inorganic Chemistry(◎)	Analytical Chemistry(◎)	Advanced Organic Chemistry II(◎)	Advanced Organic Chemistry III(◎)			
				Basic Organic Chemistry II(○)	Physical Chemistry II(◎)	Quantum Chemistry II(◎)			
				Introduction to Applied Chemistry, Chemical Engineering and Biotechnology(◎)					
				Introduction to Fundamental Industry(○)	Quantum Chemistry I(◎)				
	The conception ability based on logical thinking supported by basic and technical knowledge.	Introductory Seminar for First-Year Students（◎）	Basic Organic Chemistry I(◎)	Physical Chemistry I(◎)	Advanced Organic Chemistry I(◎)	Inorganic Chemistry(◎)	Exercises in Organic Chemistry(◎)	Graduation Thesis（◎）	Graduation Thesis（◎）
		Area Courses(△)	Basic Inorganic Chemistry(◎)	Biochemistry I(◎)	Advanced Organic Chemistry II(◎)	Advanced Organic Chemistry III(◎)	Exercises in Physical Chemistry(◎)		
				Chemical Stoichiometry(◎)	Physical Chemistry II(◎)	Quantum Chemistry II(◎)	Chemical Experiments II(◎)		
				Analytical Chemistry(◎)	Quantum Chemistry I(◎)	Chemical Experiments I(◎)	Synthetic Polymer Chemistry(◎)		
				Basic Organic Chemistry II(○)					
Abilities and Skills	The quality to be able to understand technologies and their social effects, and to fullfill the resopnsibility as researchers・engineers to contribute to society.	Introductory Seminar for First-Year Students(◎)	Area Courses(△)		Basic Experiments in Chemistry(◎)			Graduation Thesis（◎）	Graduation Thesis（◎）
		Area Courses(△)						Engineering and ethics(◎)	
	The knowledge on economy, safety and reliability of technologies, and the judgment ability to utilize them from global point of view.	Introductory Seminar for First-Year Students(◎)	Area Courses(△)		Basic Experiments in Chemistry(◎)			Graduation Thesis（◎）	Graduation Thesis（◎）
		Area Courses(△)						Engineering and ethics(◎)	
	Creativity to solve various problems related to applied chemistry utilizing acquired knowledge and skills.	Introductory Seminar for First-Year Students(◎)	Area Courses(△)			Chemical Experiments I(◎)	Chemical Experiments II(◎)	Graduation Thesis（◎）	Graduation Thesis（◎）
		Area Courses(△)					Exercises in Organic Chemistry(◎)		
							Exercises in Physical Chemistry(◎)		
	Socially acceptable sense of moral and designing ability of research and development, which allow demonstrating the ability to solve issues as a researcher・engineer.	Introduction to University Education(◎)	Area Courses(△)					Graduation Thesis（◎）	Graduation Thesis（◎）
		Area Courses(△)						Engineering and ethics(◎)	
Comprehensive Abilities	Self-motivating and continuous learning ability	Introduction to University Education(◎)	Area Courses(△)	Experimental Methods and Laboratory Work in Physics I・II(◎)	Basic Experiments in Chemistry(◎)	Chemical Experiments I(◎)	Chemical Experiments II(◎)	Graduation Thesis（◎）	Graduation Thesis（◎）
		Introductory Seminar for First-Year Students（◎）					Exercises in Organic Chemistry(◎)		
		Peace Science Courses(◎)					Exercises in Physical Chemistry(◎)		
		Area Courses(△)							
	Attitudes actively trying to take multiple approaches for solving problems as an independent researcher or engineer utilizing the following items: information collection, skill improvement, development of research methods, analysis and understanding of research outcomes and results.	Introduction to University Education(◎)	Area Courses(△)	Experimental Methods and Laboratory Work in Physics I・II(◎)	Basic Experiments in Chemistry(◎)	Chemical Experiments I(◎)	Chemical Experiments II(◎)	Graduation Thesis（◎）	Graduation Thesis（◎）
		Introductory Seminar for First-Year Students（◎）					Exercises in Organic Chemistry(◎)		
		Peace Science Courses(◎)					Exercises in Physical Chemistry(◎)		
		Area Courses(△)							
	Abilities for logical description, presentation, and discussion in Japanese language.	Introductory Seminar for First-Year Students(◎)	Area Courses(△)		Basic Experiments in Chemistry(◎)	Chemical Experiments I(◎)	Chemical Experiments II(◎)	Graduation Thesis（◎）	Graduation Thesis（◎）
		Peace Science Courses(◎)							
		Area Courses(△)							
	Ability to collect and send information from international views.	Basic English Usage I(◎)							
		Basic English Usage II(◎)							
		Communication IA(◎)	Communication IIA(◎)		Technical English(◎)			Graduation Thesis（◎）	Graduation Thesis（◎）
		Communication IB(◎)	Communication IIB(◎)						
		Basic language I(○)							
		Basic language II(○)							
	International sense to deal with problems from global perspectives.	Introductory Seminar for First-Year Students(◎)	Area Courses(△)					Graduation Thesis（◎）	Graduation Thesis（◎）
		Peace Science Courses(◎)							
		Area Courses(△)							

(Ex) Liberal Arts Education　Basic Specialized Subjects　Specialized Subjects　Graduation Thesi　(◎) Required　(○) Compulsory elective　(△) Free electi