For entrants in FY 2022

Appended Form

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

Program name (Japanese)	
(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　　young individuals who are capable of addressing various global issues from an engineering perspective and contribute to the creation of new and valuable technologies 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 join their major program 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," the purpose of Engineering lies in "realization."

Applied chemistry is an academic field that deals with synthesize, by employ　　ing 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 solidly acquire the basic sciences, including 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 the molecular design (design of characteristics) 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 kn　　owledge of chemical reactions and experimental methods,

3) Ability to identify the structure of the acquired substances and to analyze their characteristics, and

4) Ability to accurately assess the physical and chemical properties and influence on th　　e 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 tex　　ts, the ability to give a presentation, communication skills such as negotiating skills, the ability to consider things the naturally from a global perspective, the ability to pursue self　　-development, and creative work ethic and persevery

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To be assigned to each group, students must obtain more than 16 credits but less than 18 credits

from the subjects in the Specialized Basic Subjects (excluding Basic Experiment Chemistry and

A (Superior: 80 – 89 points)	3
B (Good: 70 – 79 points)	2
C (Fair: 60 – 69 points)	1

* See the relationship between evaluations and evaluation criteria on Attached Sheet 2.

* See the relationship between evaluations and class subjects on Attached Sheet 3.

* See the Curriculum Map on Attached Sheet 4.

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

○ Position

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

(Ka) To acquire reliable basic knowledge,

(Ki) To acquire the ability 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 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 opinion 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 the credits to be obtained in Specialized Basic Subjects and Specialized Subjects

○ Method of assignment

The research details of the graduation thesis will be introduced to students in the 4th department of Applied Chemistry, Chemical Engineering and Biotechnology's 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 generally as follows:

(1) Set a research theme, and frame a research plan after reading 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 reports 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 jurisdiction. For instance, the Program Reviewing Committee establishes a loop of improvement in the PDCA cycle—From the 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 evaluation) (Check), proposes educational improvements (Act), and establishes learning & educational goals that include the activities of study and education (Plan). The Committee establishes PD and CA Groups to ensure that the PDCA cycle can function through cooperation between these Groups and assigns a leader and sub-leader for each Group to make the responsibility system clear. The Program has a system in which all faculty members in charge contribute to the Committee in cooperation with each other, with the Chair of the Educational Program Reviewing Committee as its chairmember.

(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 mechanism has been disclosed, and whether all activities related to the system have been conducted,

Whether the educational checking system contains a mechanism that takes into account social demands and requests of students, and is able to check 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 participate in the educational checking system, and

Whether there is any system to check ... y in 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 flow 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 assessment and for students to answer questionnaires on classes and the educational environment, and then checks the evaluation of education by the Program based on the questionnaires. After checking ... ing the validity of the learning & educational goals and the educational environment, the Committee forms proposals for 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 full-time faculty members conduct external assessment of class subjects and their contents, and using the assessment as a reference, the committee periodically checks whether the class subjects and the class contents are appropriate or not, and drafts improvement plans. If further adjustments between subjects and examinations and improvements to the contents are needed, the committee will request discussion by the respective Specialized Subject Group Liaison Co... ferences: 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 contents 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 Course 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 contents 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 entrance and during the Program, Top ... classes based on requests

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(The lower figure means semester) 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		○														
	Common Subjects	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																
		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	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 "English-speaking Countries Field Research" or 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 or if application is made in advance. For more details, please refer to the article on English in Liberal Arts Education in

Note 3 We have a recognition of credit system for foreign language proficiency tests. For more details, please refer to the article on English 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.

Clus Spring

Required

	Credits	Applied Chemistry	Biotechnology	Chemical engneering	1st grade				2nd grade								4th grade				
							Fall				Fall						Spring				
					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						
Quantum Chemistry III	2												4						
Chemical Kinetics	2											4							
Organometallic Chemistry	2										4								
Organic Structural Analysis	2									4									
Catalysis Chemistry	2												4						
Synthetic Polymer Chemistry	2												4						
Physical Chemistry III	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

Sheet

Academic Achievements in Chemical Engineering

The Relationship between Evaluation Items and Evaluation Criteria

Academic achievements			Evaluation criteria		
Evaluation items			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

							(2)		(3)																			
					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	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	Peace Science Courses	2	Elective	1semester															20	1	20	1	20	1	20	1	20	1	100
Liberal Arts Education	Area Courses	8	Elective	1semester	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	1semester																					50	1	50	1	100
Liberal Arts Education	CommunicationI	1	Required	1semester																					50	1	50	1	100
Liberal Arts Education	Communication I	1	Required	1semester																					50	1	50	1	100
Liberal Arts Education	Communication II	1	Required	2semester																					50	1	50	1	100
Liberal Arts Education	Communication II	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	1semester	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	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	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	4semester																					100	1			100
Specialized Education	Basic Environmental Sciences	2	Elective	3semester	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	Introduction to 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	4semester	40	1	40	1	20	1																			100
Specialized Education	Physical Chemistry II	2	Required	4semester	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																													

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Curriculum Map of Applied Chemistry