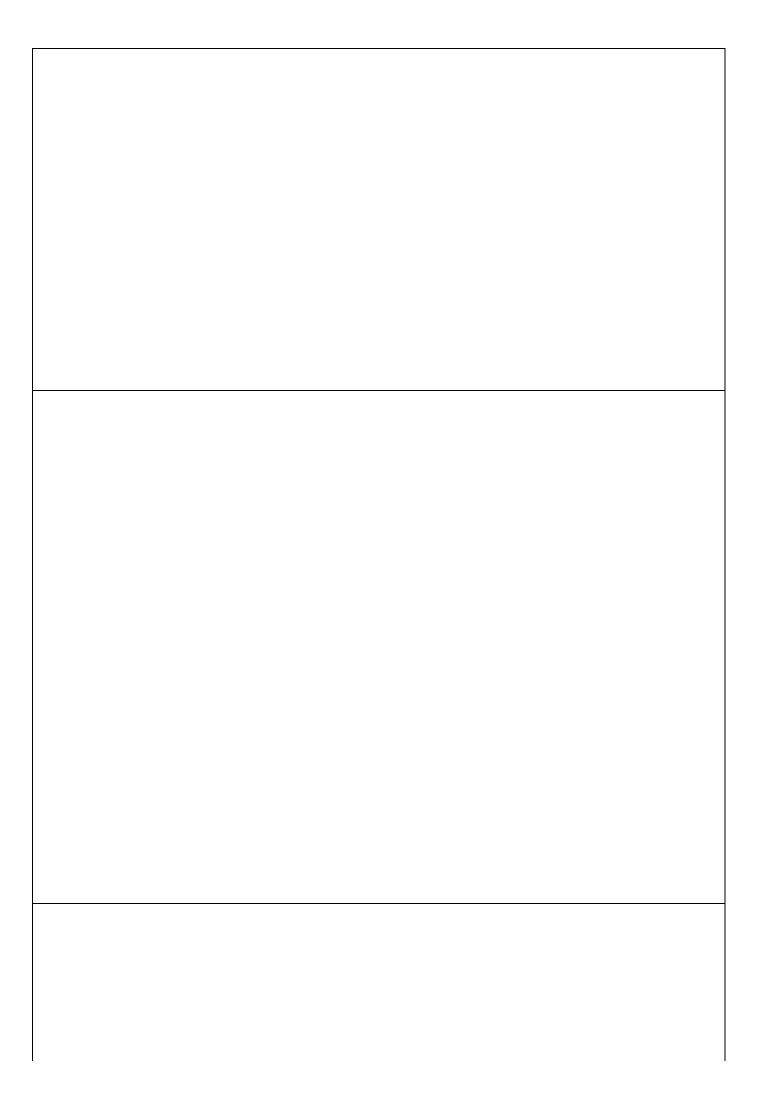
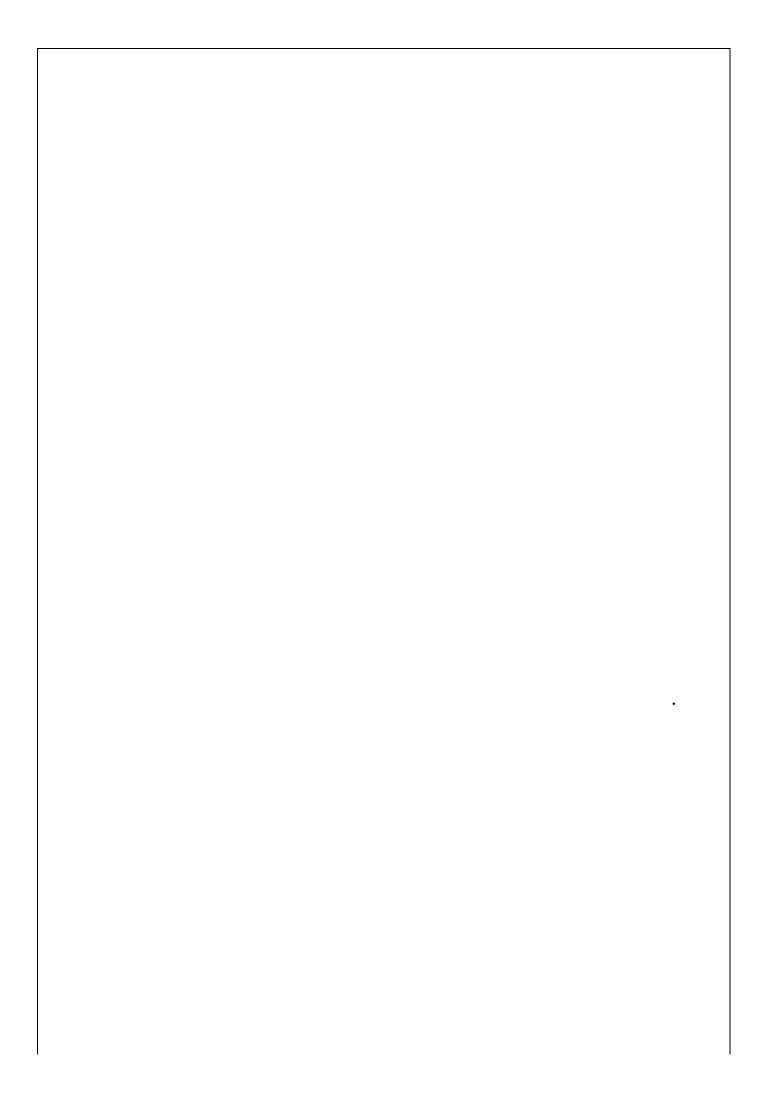
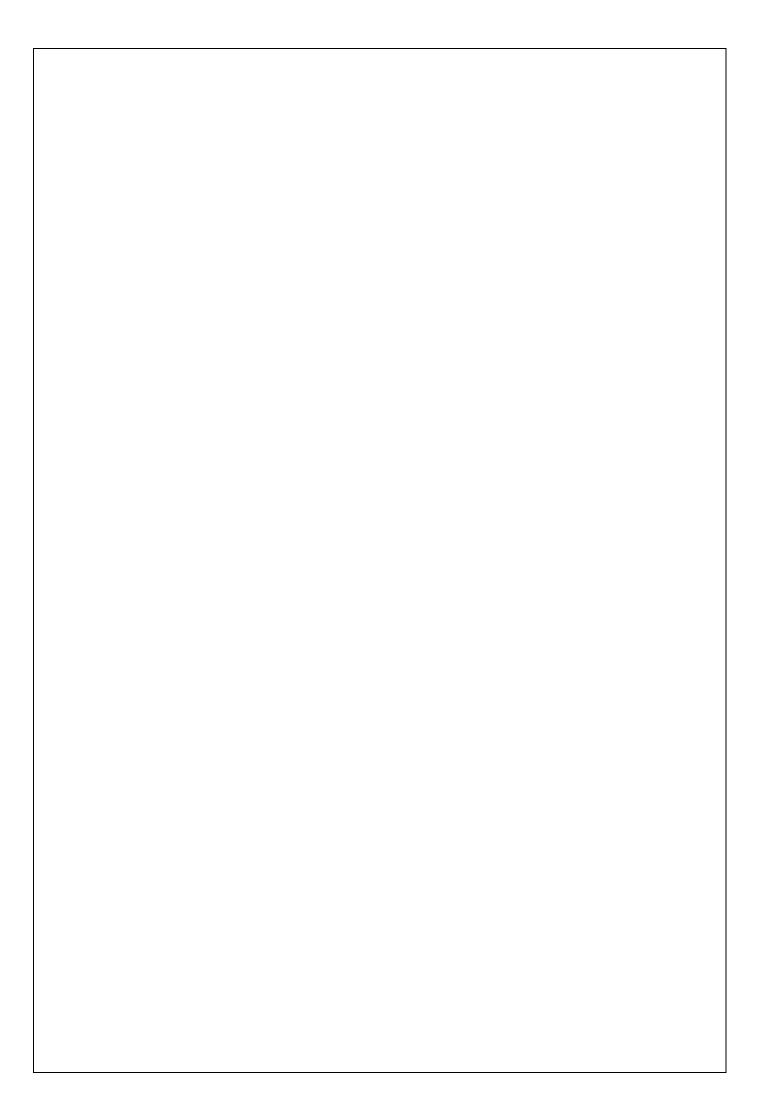
# For entrants in AY 2023

Appended Form 1	Specifications for Major Program
)	
	化学工学プログラム



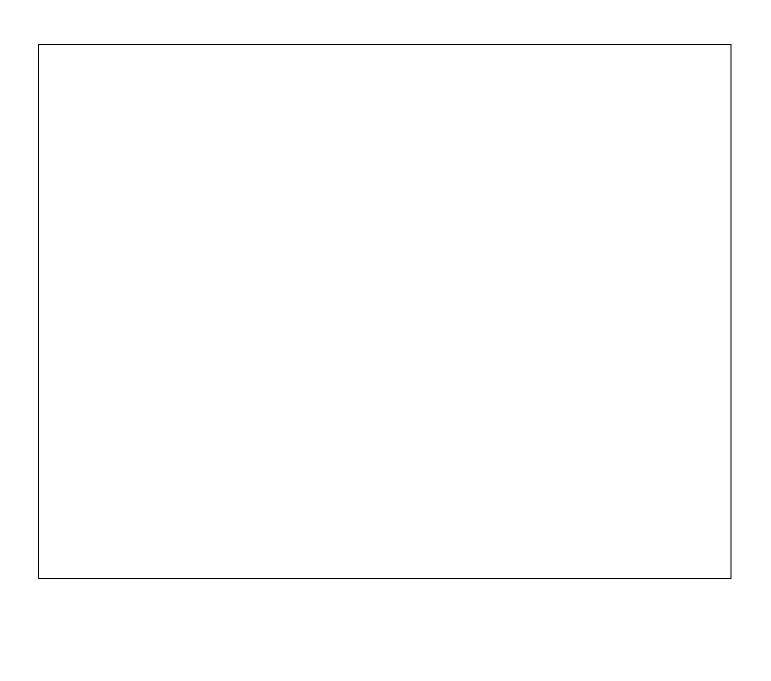


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#### Cluster 3 (Applied Chemistry, Biotechnology and Chemical Engineering)

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)

Free elective subject (any of these subjects shall be registered) rear in which the subject is taken; the lower ngure means semester)

1st grade 2nd grade 1st grade 4th grade Spring Fall Spring Fall Spring Fall Spring Fall 1T 2T 3T 4T Type of course Required Subject Type No. of Class subjects credits Compulsory Peace Science Courses 2 2 elective Introduction to University Education Introduction to University 2 2 Required Basic Courses in Education Introductory Seminar for First-2 Required niversity Year Students Free Advanced Seminar 0 elective Courses in Arts and 4 2 Humanities/Social So Compulsory Area Courses elective Courses in Natural Sciences Basic English Usage I 1 Basic English Usage Basic English Usage II Foreign Languages Communication IA Common Suqch Communication IB Communication IIA Communication Communication IIB Initial Foreign Languages (Select one language from German, French, Spanish, 1 subjects from Basic language I Compulsor 2 sian, Chinese, Korean 1 subjects from Basic language II Information and Data Introduction to Information and Required Science Courses Data Sciencies Compulsor Health and Sports Courses 2 1or2 y elective Calculus I 2 Calculus II 2 Linear Algebra I 2 Linear Algebra II 2 General Mechanics I 2 Required General Mechanics II 9 Experimental Methods and 1 Basic Subjects Laboratory Work in Physics I Experimental Methods and Laboratory Work in Physics II Seminar in Basic Mathematics I Seminar in Basic Mathematics II

No. of credits required for graduation  $\phantom{0}44$ 

Free elective subjects

Liberal Arts Education Subjects

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.

2

Compulsor

y elective

Free

elective

Experimental Methods and Laboratory Work in Biology I Note

5 Experimental Methods and Laboratory Work in Biology II

Basic Electromagnetism

From all Subject Type

1

2

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 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

	S	Type of course registration Class Hours/ Week																			
Class Subjects	Credits	Applied Chemistry	Biotechnolog y	Chemical neenering	1	lst g					grad		_		grad			lth g	_		note
Class Subjects	Cre	Ap	otech	Chemical enneenering	Spr	ing	Fa					Spring Fall			Spring			all			
				_ ~	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	<b>!</b>
Applied Mathematics I	2	0	0	0			4														
Applied Mathematics II	2	0	0	0					4												
Applied Mathematics III	2													4							
Basic Engineering Computer Programming	2	0	0	0					4												
Probability and Statistics	2												4								
Technical English	1	0	0	0								4									
Basic Environmental Sciences	2						4														
Chemical Stoichiometry	2	0	0	0						4											
Basic Organic Chemistry I	2	0	0	0			4														
Basic Organic Chemistry II	2							4													
Physical Chemistry I	2	0	0	0						4											
Biochemistry I	2	0	0	0						4											
Basic Experiments in Chemistry	4	0	0	0							12	12									
Basic Inorganic Chemistry	2	0	0	0			4														
Analytical Chemistry	2	0	0	0					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 Chemical Engineering

Required subjects Compulsory Elective subjects

Class Hours/ Week

		e .			Cl	ass	Ho	urs	We	ek					
Class Cashinata	Credits	cours	1st g	grade	2nd g	gra	de	3	rd g	rac	de	41	th g	rade	Not
Class Subjects	Cre	Type of course registration	1st g	Fall	Spring	Fa	all	Spi	ring	Fa	all	Spr	ring	Fall	e
		<u> </u>			T 1T 2T	3T	4T	1T	2T	3T	4T	1T	2T	3T 4T	
Experimental Chemical Engineering	3	0								9	9	-			
Chemical Equipment Design and Practice	2	0	<del></del>	<u>,                                      </u>				4	4						
Fluids Engineering	2	0						4							
Heat Transfer	2	$\bigcirc$								4					
Mass Transfer	2	$\bigcirc$						2	2						
Chemical Engineering Thermodynamics	2	$\bigcirc$						2	2						
Chemical Reaction Engineering	2	$\bigcirc$								4					
Powder Technology	2	$\bigcirc$						4							
Chemical Process Design	3	$\bigcirc$										6	6		
Chemical Engineering Fundamentals	2	$\bigcirc$				2	2								
Mechanics of Materials	2	$\bigcirc$							4						
Chemical Engineering Exercise I	2					4	4								
Chemical Engineering Exercise II	2	$\bigcirc$						4	4						
Chemical Engineering Exercise III	2	$\bigcirc$								4	4				
Exercise of Chemical Engineering Thermodynamics	1	$\bigcirc$						2	2						
Mathematics for Chemical Engineers	2	$\bigcirc$				4									
Materials Science	2	$\bigcirc$					4								
Process Control Eng.	2	$\bigcirc$							4						
Numerical Calculation Method	2							4							
Chemical Process and Engineering Ethics	2	$\bigcirc$										6			
Chemical Industrial Process	2											6			
Corrosion and Protection of Materials	2									4					
Green Technology	2									4					
Recycling engineering	2										4				
Inorganic Chemistry	2								4						
Physical Chemistry II	2	$\bigcirc$				4									
Chemical Kinetics	2								4						
Synthetic Polymer Chemistry	2									4					
Electrochemistry	2									4					
Biochemistry II	2					4									
Fermentation Technology	2							4							
Biotechnology	2									4					
<b>Graduation Thesis</b>	5	$\bigcirc$													

### Academic Achievements in Chemical Engineering

The Relationship between Evaluation Items and Evaluation Criteria

	1	Academic Achievements		Evaluation Criteria				
		Evaluation Items	Excellent	Very Good	Good			
Knowledge and Understanding	(A)	To improve multiple thinking ability and understanding of relations among human, society, nature, and engineering.	Sufficient understanding of relations among human, society, nature, and engineering. Acquiring sufficient thinking ability with multiple perspectives.	Good understanding relations among human, society, nature, and engineering deeply. Acquiring thinking ability with multiple perspectives.	Understanding relations among human, society, nature, and engineering.			
Know Unde	(B)	Development of logical thinking ability	Acquiring an excellent logical thinking ability.	Acquiring a logical thinking ability.				
Abilities and Skills	(C4	Definite learning of basic chemistry and chemical engineering and cultivation of engineering basis.  I chemical engineering basis chemical basis.  I chemical basis.  I chemical engineering field chemical engineering application	Sufficiently learned basic chemistry and chemical engineering and the applied skills.	Learned basic chemistry and chemical engineering.	Well learned basic chemistry and chemical engineering and the applied skills.			
Abilities	(D)	Developing the flexible adapting ability and creativity and cultivating motivation for self- development and self-improvement	Acquiring excellent flexibility and creativity; also to have a willingness for self-improvement and self-enlightenment.	Acquiring good flexibility and creativity; also to have a willingness for self-improvement and self-enlightenment.	Acquiring flexibility and creativity; also to have a willingness for self-improvement and self-enlightenment.			
Overall Abilities	(E)	Improvement of presentation and communication ability and cultivation of application ability to high informatization.	Developed presentation and communication ability very well. Acquired application ability to high informatization very well.	Developed presentation and communication ability well. Acquired application ability to high informatization well.	Developed presentation and communication ability. Acquired application ability to high informatization.			

### Placement of the Liberal Arts Education in the Major Program

Liberal Arts Education in this program assumes the role of establishing the academic foundation on which the specialized education will be built. It respects a voluntary, self-reliant attitude and cultivates scientific thinking based on information gathering abilities, analytical abilities, and critical thinking abilities. It establishes perspectives that make it possible to provide insight on the inner nature of things and their background from a wide broad viewpoint, and enhances linguistic abilities to the level appropriate for living as a global citizen. It also strengthens interest in peace, and integrates a broad range of knowledge into a body of knowledge that will be truly useful in solving problems. It cultivates the ability to explore and promote cross-disciplinary /comprehensive research that goes beyond the established frameworks.

		Wetshand		Weighted		Weighted		Weighted				Weighted		Weighted		Weighted		Weighted		
		Weighted values of evaluation	Weightsed values of	values of evaluation	Weightsed values of	values of evaluation	values of	values of evaluation	Weightsed values of	evaluation	values of	values of evaluation	Weightsed values of	values of evaluation	values of	values of evaluation	Weightsed values of	values of evaluation	Weightsed values of	
		items in the subject	evaluation items	items in the subject	evaluation items	items in the subject	evaluation items	items in the subject	evaluation items	items in the subject	evaluation items	items in the subject	evaluation items	items in the subject	evaluation items	items in the subject	evaluation items	items in the subject	evaluation items	
Liberal Arts Education Introduction to University	2 Required	40	4	Subject		Judjece		Judject		subject		Judjece		Subject		subject		Judjece		100
Education Introductory Seminar for First-	2 Required	40	4													40	4	20	2	100
Vear Students  Liberal Arts Education Peace Science Courses	2 Elective	100	10																	100
Liberal Arts Education Area Courses	8 Elective	100	10																	100
Liberal Arts Education Basic English Usage I	1 Required																			100
Liberal Arts Education Basic English Usage II	1 Required																			100
Liberal Arts Education Communication IA	1 Required																	100	10	100
Liberal Arts Education Communication IB	1 Required																	100	10	100
Liberal Arts Education Communication IIA	1 Required																	100	10	100
Liberal Arts Education Communication IIB  Liberal Arts Education Basic language I	1 Required 1 Elective																	100	10	100
Liberal Arts Education Basic language I	1 Elective																	100	10	100 100
Information and Data Science	2 Required					40	4											100 60	10 6	100
Courses  Liberal Arts Education Health and Sports Courses	2 Elective	100	10			10	-											00	Ü	100
Liberal Arts Education Calculus I	2 Required	100	10	100	10															100
Liberal Arts Education Calculus II	2 Required			100	10															100
Liberal Arts Education Linear Algebra I	2 Required			100	10															100
Liberal Arts Education Linear Algebra II	2 Required			100																

		П										Е	valuati	on ite	ns								
					Knowl	edge and	Unders	tanding				Ab	ilities	and Sk	ills				Com	prehen	sive Ab	ilities	Total weighte
		s	Type of		(.	A)	(1	B)	(C	(1)	((	(2)	(0	(3)	((	24)	((	C5)	(	D)	(1	E)	d values
Subject type		credit	course registr ation	Period	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	evaluation	evaluation	of evaluati on items in the subject														
Specialized Education	Chemical Process and Engineering Ethics	2	Required		40	4									20	2	40	4					100
Specialized Education	Chemical Industrial Process	2	Elective		20	2							20	2	20	2	40	4					100
Specialized Education	Corrosion and Protection of Materials	2	Elective												100	10							100
Specialized Education	Green Technology	2	Elective		50	5			20	2					30	3							100
Specialized Education	Recycling Engineering	2	Required		50	5			20	2					30	3							100
Specialized Education	Inorganic Chemistry	2	Elective										100	10									100
Specialized Education	Physical Chemistry II	2	Required								100	10											100
Specialized Education	Chemical Kinetics	2	Elective										100	10									100
Specialized Education	Synthetic Polymer Chemistry	2	Elective										100	10									100
Specialized Education	Electrochemistry	2	Elective										100	10									100
Specialized Education	Biochemistry II	2	Elective										100	10									100
Specialized Education	Fermentation Technology	2	Elective										100	10									100
Specialized Education	Biotechnology	2	Elective										100	10									100
Specialized Education	Graduation Thesis	5	Required		10	1											20	1	50	5	20	2	100

				Class Su	Class Subjects										
Leaning and Educational	1 <sup>st</sup> gr	rade	2 <sup>nd</sup> §	grade	3 <sup>rd</sup>	grade	4 <sup>th</sup> grade								
Goals	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall							
(A) To improve multiple thinking ability and understanding of relations among human, society, nature, and engineering. (Ethics as engineers)															
(B)E Development of logical thinking ability															
(C1) Engineering basis															
(C2) Chemical engineering basis.															
(C3) Chemical basis															
(C4) Chemical engineering field															
(C5) Chemical engineering application.															