For entrants in AY 2021

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)	
(English)	Program of Biotechnology

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 Biotechnology".

In order to contribute to the advancement of the key industries that will play a role in the next generation, such as medicine, food, and environment, this program aims at developing engineers and researchers that possess professional expertise and technical skills in the elucidation and utilization of biological molecules and living organisms. Therefore, this program establishes a curriculum through which students can organically and systematically acquire comprehensive knowledge of the basic mechanisms of life and technical skills in the most-advanced fields, such as gene, protein, carbohydrate, and lipid engineering; microorganism, animal, and plant engineering; biochemical engineering; bioinformatics engineering; environmental biotechnology; immunology; and brewing technology. Students can also acquire the different abilities required for researchers and engineers, such as the ability to think logically, the ability to plan and conduct experiments, the ability to explain data analysis, the ability to discover and resolve the problems, and the ability to deal with practical issues. This program awards the Type-1 High School Teaching License (Industry) to students who have taken the required courses. Graduates gain employment and work actively for corporations in the pharmaceutical, food, brewing, environmental, and chemical industries, or in public research institutions. Graduates can go to graduate school (Graduate School of Integrated Sciences for Life) to obtain a higher degree of education and undertake research.

3. Academic Awards Policy (Policy for awarding degrees and goal of the program)

The Program of Biotechnology nurtures professionals that have acquired the basic knowledge, skills, and attitudes needed to work as bioengineering researchers and engineers and, further, to embrace opportunities for creativity in scientific thought.

Therefore, this program offers education aimed at cultivating a broad range of general knowledge, a global perspective to seek peace, a general sense of judgment, and a well-rounded character. The program awards a bachelor's degree in engineering to students who have completed sufficient liberal arts education and specialized education to achieve the following goals from (A) to (E), as well as the number of credits necessary to meet the standard of the course.

- (A) The ability to understand the relationship between people, society, nature, and engineering, and to demonstrate multifaceted and logical thinking skills
- (B) The ability to understand basic natural science
- (C) The ability to acquire basic knowledge of biotechnology and biological science, and to expand it widely to applied technology
- (D) The ability to come up with conceptual ideas and to implement ideas, as well as the ability to transmit learning and research results
- (E) The ability to adapt to the highly sophisticated information society with high level communication skills

4. Curriculum Policy (Policy for Preparing and Implementing the Curriculum)

To achieve the goals from (A) to (E) set by this program, the Program of Biotechnology organizes and implements a curriculum in which liberal arts education and specialized education are closely connected. After acquiring basic academic abilities and knowledge in liberal arts education subjects, students must learn the specialized fields of engineering and biotechnology. Students mainly study these subjects until the first and second terms of the second year, and then after the third and fourth terms of the second year, when students are assigned to the program, they mainly study specialized subjects. Learning specialized basic subjects before being assigned to the program is effective in raising awareness of students' field of specialization, and in developing incentives for learning. Furthermore, receiving lectures by the faculties in charge of programs other than the Program of Biotechnology (Program of Chemical Engineering, Program of Applied Chemistry) provides students with knowledge about surrounding fields. Learning outcomes are evaluated based on the grade calculation for each subject and the level of attainment against the goals set by the educational program.

Knowledge and Abilities

Cultivation of understanding about the relationship between people, society, nature, and engineering, as well as an ethical outlook, which forms the basic knowledge that researchers and engineers are required to possess (Goal A). This is obtained through mastery of liberal arts education subjects, "Introductory Seminar for First-Year Students", "Peace Science Courses", "Introduction to University Education", "Information Subjects" and specialized basic subjects, "Introduction to Applied Chemistry, Chemical Engineering and Biotechnology", and "Introduction to Fundamental Industry" to be offered at the first year.

Basic knowledge of mathematical theory, physics theory, and experimental methods required of researchers and engineers in natural science (Goal B). This is obtained through mastery of mathematical fundamental subjects such as "Calculus" and "Linear Algebra" and fundamental physics subjects such as "General Mechanics I II" and "Experimental Methods and Laboratory Work in Physics" to be offered in the first year.

General understanding of biotechnology, life science, chemistry, and the basic knowledge required of experts in biotechnology (Goal B, C). This is obtained through mastery of specialized basic subjects, "Basic Life Science", "Basic Organic Chemistry I", "Basic Inorganic Chemistry" and "Basic Environmental Sciences" to be offered in the first year.

Mathematical method required of experts in biotechnology (Goal B). This is obtained through mastery of specialized basic subjects, "Applied Mathematics I II", and "Probability and Statistics" to be offered from the third and fourth term of the first year through the second year.

The expertise and grasp of concepts required of researchers and engineers in biotechnology (Goal C). This is obtained through mastery of the specialized subjects of the Program of Biotechnology such as "Microbiology I II", "Molecular Biology I II III", "Enzyme Chemistry", and "Biochemical Engineering" to be offered from the third and the fourth term of the second year through the fourth year.

Abilities and Skills

The ability to conduct experiments to resolve issues and problems that arise, and the ability to examine and resolve problems using experimental outcomes and related materials (Goal C, D, E). This is obtained through

Type-1 High School Teaching License (Industry) (By mastering "Vocational Guidance", the prescribed "liberal arts education subjects" and "specialized education subjects", students can obtain the Type-1 High School Teaching License (Industry) upon graduation.)

Details are described in the student handbook and guidance materials.

- 7. Class Subjects and Course Content
- * For class subjects, see the subject list in the attached Tables 1 and 2. (Subject list to be attached.)
- * 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 are applied to each evaluation item and indicate academic achievement by indicating the attainment level. Students' grade calculations for each subject, from admission to the university until the current semester, is given as one of the three levels: "Excellent," "Very Good," and "Good," based on evaluation criteria calculated by adding the weighted values to the numerically-converted values of their academic achievements (S = 4, A = 3, B = 2, and C = 1) in each subject being evaluated.

Result Evaluation	Conversion
90 points or more	
80 ~ 89 points	
70 ~ 79 points	
60 ~ 69 points	

Academic Results	Standard
Excellent	3.00 ~ 4.00
Very Good	2.00 ~ 2.99
Good	1.00 ~ 1.99

- * See the relationship between evaluation items and evaluation criteria in the attached sheet 2.
- * See the relationship between evaluation items and class subjects in the attached sheet 3.
- * See the curriculum map in the attached sheet 4.

9. Graduation Thesis (Graduation Research) (Positioning, when and how it is assigned, etc.)

Students receive practical guidance through graduation work in a research laboratory where world-leading research is conducted in various fields of biotechnology, and acquire a fundamental capability as bioengineering researchers and engineers.

Students are to be assigned at the start of the fourth year. As requirements for undertaking a graduation thesis, students must acquire 8 credits in foreign languages and must have completed all experiment subjects and practical subjects to be taken. Furthermore, students must acquire a total of 115 or more credits (including liberal arts education subjects) including a total of 69 or more credits in specialized basic subjects and specialized subjects. (Refer to the attached Table 1 and Table 2)

10. Responsibility System

(1) PDCA Responsibility System ("Plan," "Do," "Check," and "Act")

The Educational Evaluation Committee (in charge of examining and handling the faculties' evaluation of the curriculum and the content of lectures), The Student Evaluation Committee (in charge of examining and handling evaluation of the students, such as attainment levels against goals), and the Educational Improvement Committee (in charge of planning and handling curricula based on self-assessment and questionnaires) are set up within the committee for this program (see the attached sheet 54). Under the leadership and responsibility of the head of the program, all the teachers of this program work together in cooperation with each other to carry out the system.

(2) Program Assessment

Criteria for program assessment:

Evaluation outcome of attainment levels against goals

Requests from students and demands of society

Evaluation outcome of self-assessment by faculties

Method of assessment (connection with class evaluation to be described)

In addition to attainment levels evaluation summary sheet completed by the Education and Student Evaluation Committee, questionnaires by students and graduates, and self-assessment evaluation by faculties, an external evaluation will be conducted.

Procedure on giving feedback to students

In the case of problems with class subjects, faculties deal with these problems after taking into account the learning conditions of each individual student. The tutors or the Educational Improvement Committee members handle matters comprehensively, which is reflected in the improvement of the program through discussions in the committee.

Cluster 3 (Applied Chemistry, Biotechnology and Chemical Engineering)

- © Required subject (period of registration specified)

 Compulsory elective subject (any of these subjects shall be registered)

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		Pea	ce Scie	ence Courses	2		2	Compulsory elective		0													
	ourses rersity ation	Int Ed	roduct ucation	ion to University	2	Introduction to University Education	2	Required	0														
	Basic Courses in University Education	Int Fir		ory Seminar for r Students	2	Introductory Seminar for First- Year Students	2	Required	0														
		Arc	ea Cou	rsas	4	Courses in Arts and Humanities/Social Sc	2	Compulsory	0		0												
		7110	a cou	1505	4	Courses in Natural Sciences	2	elective		0		0											
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Arts Education Subjects				on and Data ourses	2	(Note 4) Elements of Information Literacy or Exercise in Information Literacy	2	Compulsor y elective		0													
Liberal A		He	alth aı	nd Sports Courses	2		1or2	Compulsor y elective	0	0	0	0											
Lib						Calculus I	2		0														
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	No. of c	redi	ts requ	uired for graduatio	n 44																		

- Note 1: When students fail to acquire the credit during the term or semester marked with \bigcirc , \bigcirc , \triangle 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 I or II 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 "Elements of Information Literacy" provided in the first semester. You can take the "Exercise in Information Literacy" provided in the second semester only if you fail to obtain credit for "Information Utilization Basics."
- Note 5: Students must take both Experimental Methods and Laboratory WorkI (1credit) and Experimental Methods and Laboratory WorkII

Cluster 3 Specialized Basic Subjects

Required

	ø	Type of course Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hours/ Week Class Hour																			
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Applied Mathematics I	2	Ô	Ô	Ô			4														
Applied Mathematics II	2	Ô	Ô	Ô					4												
Applied Mathematics III	2													4							
Basic Engineering Computer Programming	2	Ô	Ô	Ô					4												
Probability and Statistics	2												4								
Technical English	1	Ô	Ô	Ô								4									
Basic Environmental Sciences	2						4														
Chemical Stoichiometry	2	Ô	Ô	Ô						4											
Basic Organic Chemistry I	2	Ô	Ô	Ô			4														
Basic Organic Chemistry II	2								4												
Physical Chemistry I	2	Ô	Ô	Ô						4											
Biochemistry I	2	Ô	Ô	Ô						4											
Basic Experiments in Chemistry	4	Ô	Ô	Ô							12	12									
Basic Inorganic Chemistry	2	Ô	Ô	Ô				4													
Analytical Chemistry	2	Ô	Ô	Ô					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 Biotechnology)

ÔRequired subjects ÑCompulsory Elective subjects

		Class Hours/ Week																	
	its	Type of course registration	1st grade 2nd grade 3rd grade 4						41	th g	rac	le.							
Class Subjects	Credits	e of cristra		ring		all		ing			Spr					ing			Note
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Training of Biotechnology I	4	Ô	T	T	T	T	Т	Т	T	T	$\frac{\mathbf{m}}{12}$	$\frac{\mathbf{r}}{12}$	Т	T	Т	T	T	Т	
Experiments on Biotechnology II	4	Ô											12	12					
MicrobiologyI	2	Ô								4									
MicrobiologyII	2	Ô										4							
Molecular biology I	2	Ô								4									
Molecular biology II	2	Ô										4							
Biochemistry II	2	Ô							4										
BiochemistryIII	2	Ô									4								
Enzyme Chemistry	2	Ñ							4										
Bioorganic Chemistry	2	\bigcirc									4								
Fermentation Technology	2	Ô									4								
Biochemical Engineering	2	Ô										4							
Glycotechnology & Immunotechnology	2	Ñ												4					
Molecular BiologyIII	2	Ñ												4					
Genetic and protein engineering	2	\bigcirc												4					
Molecular Bioinformatics	2	\bigcirc											4						
Biotechnology	2	Ñ											4						
Group Discussion of Current Biotechnology Topics	2	Ô											2	2					
FoodProcess Engineering I	1											2							
Food Process Engineering II	1													2					
FermentationProcess Engineering I	1														1	1			
Fermentation process engineeringII	2											4							
Fermentation Process Engineering III	1													2					
Physical Chemistry II	2								4										
Chemical Kinetics	2	Ñ										4							
Organic Structural Analysis	2											4							
Advanced Organic Chemistry IV	2												4						
Chemical Engineering Exercise I	2	Ñ							4	4									
Chemical Engineering Fundamentals	2	Ñ							2	2									
Green Technology	2													4					
Recycling engineering	2													4					
Graduation Thesis	5	Ô																	

Academic Achievements in Biotechnology Program The Relationship between Evaluation Items and Evaluation Criteria

		Academic Achievements		Evaluation Criteria	
		Evaluation Items	Excellent	Very Good	Good
and		Understanding of relations among human, society, nature, and engineering. (Target A)	Being able to fully understand diversity of sense of values and ways of thinking in areas other than engineering and able to take various consideration.	Being able to understand the relations and differences between engineering and other areas and being to take consideration to the standard level.	Being able to well understand the relations and differences between engineering areas and other areas and take various consideration to the standard level.
1 1		Understanding of basic natural science (target B)	Being able to fully understand mathematics and physics which are a base of engineering.	Being able to understand mathematics and physics in the standard level.	Being able to understand mathematics and physics well.
Knowledge Understan	(3)	Acquisition of basic and advanced knowledge relating to biotechnology and life science. (Target/Lecture class)	Being able to understand chemistry, applied mathematics, process engineering, basic biological science, and applied biological science, which are essential to biotechnologists.	Being able to understand chemistry, applied mathematics, process engineering, basic biological science and applied biological science to the standard level.	Being able to understand basic and advanced discipline described on the left well.
Abilities and Skills	(1)	Acquisition of basic and advanced skills relating to biotechnology and life science. (Target/ Research class)	Being able to display abilities required for biotechnological engineers: logical thinning ability, ability to conduct experiment along with a plan, ability to analyze data and explanation.	Being able to demonstrate standard level abilities to think logically, to plan and carry out research and to analyze data.	Being able to well demonstrate the ability described on the left.
Abilities	(1)	Cultivation of ability creating concept and solving problesms (achievement target D)	Being able to display abilities, required for biotechnologists, such as to make plan and carry out research, to demonstrate research outcome, to discuss, and to solve problems.	To be able to demonstrate standard level abilities to make plan and carry out research, to show outcomes and to solve problems.	Being able to demonstrate the ability described on the left.
Overall	(2)	Cultivation of communication skills (achievement target E)	Being able to show logical writing abilities, information transmission abilities to domestic and overseas, debating and information utilization	abilities to make plan and carry out research, to show outcomes and to solve	Being able to demonstrate the ability described on the left.

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

									F	<u>Evalu</u> at	ion iten	ıs					Total
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Subject type	Class subjects	credits	course registr	Period	Weighted	Weightse	values of evaluation										
			ation 区分		values of evaluatio n items in the	d values of evaluatio	n items in the										
					subject	n items	subject										
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	lsemsester	40	1							40	1	20	1	100
Liberal Arts Education	Introduction to University Education	2	Required	lsemsester	100	1											100
Liberal Arts Education	Peace Science Courses	2	Elective	lsemsester	100	1											100
Liberal Arts Education	Area Courses	8	Elective	lsemsester	100	1											100
Liberal Arts Education	Basic English Usage I	1	Required	lsemsester											100	1	100
Liberal Arts Education	Basic English Usage II	1	Required	lsemsester											100	1	100
Liberal Arts Education	CommunicationI	1	Required	lsemsester											100	1	100
Liberal Arts Education	Communication I	1	Required	lsemsester											100	1	100
Liberal Arts Education	Communication II	1	Required	2semsester											100	1	100
Liberal Arts Education	Communication II	1	Required	2semsester											100	1	100
Liberal Arts Education	Basic language I	1	Required	lsemsester	100	1									100	1	100
Liberal Arts Education				lsemsester													100
	Basic language II	1	Required		100	1									400	_	
Liberal Arts Education	Information Courses	2	Elective	lsemsester											100	1	100
Liberal Arts Education	Information Courses	2	Elective	lsemsester	100	1					_						100
Liberal Arts Education	CalculusI	2	Required	lsemsester			100	1									100
Liberal Arts Education	CalculusII	2	Required	2semsester			100	1									100
Liberal Arts Education	Linear AlgebraI	2	Required	lsemsester			100	1									100
Liberal Arts Education	Linear AlgebraII	2	Required	2semsester			100	1									100
Liberal Arts Education	General Mechanics I	2	Required	lsemsester			100	1									100
Liberal Arts Education	General Mechanics II	2	Required	2semsester			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I	2	Required	3semsester			50	1			30	1	20	1			100
Liberal Arts Education	Seminar in Basic Mathematics I	1	Elective	lsemsester			100	1									100
Liberal Arts Education	Seminar in Basic Mathematics II	1	Elective	2semsester			100	1									100
Liberal Arts Education		2	Elective	2			100	1			80	1	20	1			100
	Experimental Methods and Laboratory Work in Biology I			2semsester			100	-			80	1	20	1			
Liberal Arts Education	Basic Electromagnetism	2	Elective	2semsester			100	1		_							100
Specialized Education	Applied Mathematics I	2	Required	2semsester					100	1							100
Specialized Education	Applied Mathematics II	2	Required	3semsester					100	1							100
Specialized Education	Applied Mathematics III	2	Elective	5semsester					100	1							100
Specialized Education	Probability and Statistics	2	Elective	5semsester					100	1							100
Specialized Education	Technical English	1	Required	4semsester					20	1					80	1	100
Specialized Education	Basic Engineering Computer Programming	2	Required	3semsester					100	1							100
Specialized Education	Basic Environmental Sciences	2	Elective	2semsester	60	1			40	1							100
Specialized Education	Chemical Stoichiometry	2	Required	3semsester					100	1							100
Specialized Education	Basic Organic Chemistry I	2	Required	lsemsester					100	1							100
Specialized Education	Basic Organic Chemistry II	2	Elective	2semsester					100	1							100
Specialized Education	Physical Chemistry I	2	Required	3semsester					100	1							100
Specialized Education	Biochemistry I	2	Required	3semsester					100	1							100
Specialized Education	Basic Experiments in Chemistry	4	Required	4semsester					100		80	1	20	1			100
		2	Required	1semsester					100	1	30	1	20	1			
	Basic Inorganic Chemistry								100	1							100
Specialized Education	Analytical Chemistry	2	Required	3semsester					100	1							100
Specialized Education	Basic life science	2	Elective	2semsester	40	1			60	1							100
Specialized Education	Interduction to Applied Chemistry, Cheminal Engineering and Rinterhodogy	2	Elective	3semsester	40	1			60	1							100
Specialized Education	Introduction to Fundamental Industry	2	Elective	3semsester	40	1			60	1							100
Specialized Education	Training of Biotechnology I	4	Required	5semsester							60	1	20	1	20	1	100
Specialized Education	Experiments on Biotechnology II	4	Required	6semsester							60	1	20	1	20	1	100
Specialized Education	MicrobiologyI	2	Required	4semsester					100	1	L						100
Specialized Education	MicrobiologyII	2	Required	5semsester					100	1							100
Specialized Education	Molecular biology I	2	Required	4semsester					100	1							100
Specialized Education	Molecular biology II	2	Required	5semsester					100	1							100
Specialized Education	Biochemistry II	2	Required	4semsester					100	1							100
Specialized Education	Biochemistry III	2	Required	5semsester					100	1							100
Specialized Education	_	2															100
	Enzyme Chemistry		Elective	4semsester					100	1							
Specialized Education	Bioorganic Chemistry	2	Elective	5semsester					100	1							100
Specialized Education	Fermentation Technology	2	Required	5semsester					100	1							100
Specialized Education	Biochemical Engineering	2	Required	5semsester					100	1							100

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Subject type	Class subjects	creuits	ation	reriou	values of	Weightse d values	values of	Weightse d values	values of	Weightse d values	values of	Weightse d values	values of	Weightse d values	values of	Weightse d values	n items
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Specialized Education	Glycotechnology & Immunotechnology	2	Elective	6semsester	subject		subject.	<u> </u>	subject.		subject.		subject		subject.		
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Academic Achievement	1st	grade	2nd	grade	3rd	grade	4th	grade
Evaliation Items	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
	Introductory Seminar for First-Year Students()				FoodProcess Engineering I ()	Food Process Engineering II()	Graduation Thesis	Graduation Thesis
Understanding of relations	Introduction to University Education	Peace Science Courses			Fermentation process engineeringII ()	Fermentation Process Engineering III()	FermentationProcess Engineering I()	
among human, society,	Area Courses ()	Area Courses ()				Group Discussion of Current Biotechnology Topics()		
	Health and Sports Courses)	Health and Sports Courses)						
nature, and engineering.	Area Courses ()	Area Courses()	Area Courses ()	Area Courses ()				
(Target A	Basic language I	Basic Environmental Sciences	Introduction to Applied Chemistry, Chemisal Engineering and Bistechnology					
bn	Basic language II	Basic life science	Introduction to Fundamental Industry					
Understanding of basic natural science (target B) Acquisition of basic and advanced knowledge relating	CalculusI()	CalculusII()	Experimental Methods and Laboratory Work in Physics I ()					
on a		Linear AlgebraII()						
Understanding of basic	(2T)General Mechanics I()	T)General Mechanics II()						
natural science (target B)	Seminar in Basic Mathematics I()	Seminar in Basic Mathematics II ()						
9		T)Basic Electromagnetism ()						
an		Experimental Methods and Laboratory Work in Biology I		Technical English	Probability and Statistics ()	Glycotechnology & Immunotechnology		
90	Basic Organic Chemistry I()	Basic Organic Chemistry II	Basic Engineering Computer Programming	Physical Chemistry II ()	Applied Mathematics III ()	Molecular BiologyIII		
ਹ ੋ	Basic Inorganic Chemistry()	Applied Mathematics I ()	Applied Mathematics II ()	MicrobiologyI ()	MicrobiologyII ()	Genetic and protein engineering		
A	and the game of the same of th	Basic life science	Physical Chemistry I	Molecular biology I ()	Molecular biology II ()	Molecular Bioinformatics		
Acquisition of basic and		Basic Environmental Sciences	Chemical Stoichiometry	Biochemistry II ()		Biotechnology		
-		Dasic Environmental Sciences	Biochemistry I	Enzyme Chemistry ()	Bioorganic Chemistry()	Advanced Organic Chemistry IV ()		
to biotechnology and life			Analytical Chemistry	Chemical Engineering Fundamentals ()	Fermentation Technology ()	Green Technology		! !
science. (Target/Lecture			2 mary ticar chemistry	Chemical Engineering Exercise I ()	Biochemical Engineering()	Recycling engineering ()		
class)		i 	Introduction to Fundamental Industry	Chemical Engineering Exercise I ()	Chemical Kinetics ()	Food Process Engineering II()		i
			introduction to Fundamental industry		Organic Structural Analysis	Fermentation Process Engineering III()		
		i 	i !	i 	FoodProcess Engineering I ()	rermentation Process Engineering III()		i
					Fermentation process engineering I ()			
αį		Experimental Methods and Laboratory Work in Biology I		D . D	Training of Biotechnology I	Experiments on Biotechnology II	Graduation Thesis	Graduation Thesis
Acquisition of basic and		Experimental Methods and Laboratory Work in Biology I		Basic Experiments in Chemistry	Training of biotechnology I	Experiments on Biotechnology II	Graduation Thesis	Graduation Thesis
Acquisition of basic and								
advanced skills relating to								
biotechnology and life								
science. (Target/ Research class)								
El class)								
								
	Introductory Seminar for First-Year Students()	Experimental Methods and Laboratory Work in Biology I		Basic Experiments in Chemistry	Training of Biotechnology I	Experiments on Biotechnology II	Graduation Thesis	Graduation Thesis
© Cultivation of ability creating						Group Discussion of Current Biotechnology Topics ()		
concept and solving								
problesms (achievement								
target D)								
Cultivation of ability creating concept and solving problesms (achievement target D) Cultivation of communication skills (achievement target E)								
en	Introductory Seminar for First-Year Students()			Technical English	Training of Biotechnology I	Experiments on Biotechnology II	Graduation Thesis	Graduation Thesis
e e e e e e e e e e e e e e e e e e e	Communication I ()					Group Discussion of Current Biotechnology Topics()		
Cultivation of communication		Communication IIB()						
skills (achievement target E)	Basic English UsageI(©)							
ا د	Basic English UsageII (©)							
	(1T)Information Courses()	T. 1 4 4 7 7 1	Dania Caralalia					
	Ex	Liberal Arts Education Subjects	Basic Specialized Subjects	Specialized Subjects	Graduation Thesis	Required	Compulsory electi	ve Free elective