For entrants in FY 2023

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 Applied Chemistry

1. Academic degree to be acquired

Bachelor's degree in engineering

2.Outline

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)

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

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

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,

(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.

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