

For entrants in AY 2018

Appended Form 1

Specifications for Major Program

Name of School (Program) [School of Science (Department of Chemistry)]

| | |
|---|-----------|
| Program name (Japanese) | 化学プログラム |
| (English) | Chemistry |
| 1. Degree to be obtained: Bachelor of Science | |
| 2. Overview | |
| <p>Chemistry is a study of natural phenomena from the perspective of substances, in order to develop new methods for understanding natural phenomena and create materials with new and useful functions that will contribute to the progress of human beings. It is important for students to understand deeply a wide range of areas, from the basics of chemistry, i.e., physical chemistry, inorganic chemistry, and organic chemistry, to interdisciplinary fields.</p> <p>This program is constituted of "liberal arts subjects" and "specialized education subjects." The "liberal arts subjects" consist of "peace subjects", "fundamental subjects for university education", "common subjects", and "fundamental subjects". "Specialized education subjects" consist of "specialized fundamental subjects" and "specialized subjects." The "liberal arts subjects" are provided for students to develop general intelligence and their personality. Students can choose subjects according to their interests. Through the "common subjects", students acquire skills of foreign languages, which are fundamental means of conveying advanced knowledges internationally, computers, and presentations. Practice based on knowledge is important in chemistry, the subject in which students in this program will major, and students acquire knowledges and abilities for practice in a bottom-up manner. Therefore, students obtain the fundamental knowledge in the "basic subjects", "specialized basic subjects", and "specialized subjects" that is organized systematically, mainly based on physical chemistry, inorganic chemistry, and organic chemistry. In addition, the program allows students to take subjects provided by other departments of the School of Science, taking into consideration the importance of interdisciplinary fields. Based on the knowledge they have obtained in the above subjects, students learn basic skills for practice in the subjects "Chemical Experiments I" and "Chemical Experiments II", and in the "specialized subjects". Students also develop abilities required for scientists in society in their "graduation research". The graduate school provides substantial curricula and a research environment for students who have graduated from the School of Science. The graduate school is an ideal place where students can enhance their abilities as scientists and exercise these abilities through their research. The Chemistry Program is designed to have continuity with the education in the graduate school.</p> <p>This program also provides sufficient education to meet requirements of students who wish to obtain the certification for science teachers of junior and senior high schools.</p> <p>In this program, approximately three quarters of students who graduate from the university go on to the Department of Chemistry or the Department of Mathematical and Life Science at the Graduate School of Science in our university. The remaining students are employed as teachers, public servants, or company workers in the areas of</p> | |

chemistry, computing, and pharmaceuticals, or advance to the graduate school of another university.

We truly hope that students who are interested in searching for the truth, and are ambitious to try new things, will join us.

3. Diploma policy (policy for awarding degrees and goal of the program)

This program aims to educate students to be scientists, with the background in chemistry and of international quality, who work in the cutting edge of areas related to chemistry, such as basic and applied researches, practical work in industry, and science education. In addition, the program aims to produce professionals who are capable of undertaking their work autonomously and with flexibility.

This program will award the degree of bachelor of science to students who, in addition to earning required credits defined for this educational course, have acquired capabilities and qualities described below:

- The qualities required for pioneering a new area of chemistry, based on profound knowledge of chemistry, expertise, thinking ability, judgment, and creative perspective;
- The abilities required for leading in modern society, based on an interest in an interdisciplinary field that has a relationship with more than one area, or a new area of chemistry that exceeds borders of previous frameworks;
- The ability to adapt oneself to a new situation and environment, based on constant, active, and voluntary academic interest in chemistry, and a comprehensive outlook; and
- The ability to constantly pursue one's endeavors, to logically exhibit and explain one's ideas in convincing manners, and to correct and improve one's understanding through discussion with others.

4. Curriculum policy (policy for organizing and implementing the curriculum)

This program provides high quality education courses that were established based on the tradition inherited from Hiroshima Bunrika University, in order to enable students to achieve the targets listed in the diploma policy. The organization with which these programs are implemented is formed to provide education flexibly while taking the level of achievement of the students into consideration. These programs are reviewed and evaluated every academic year after they have been implemented, to constantly improve the methodology of the education. In addition, these educational programs are designed to provide smooth continuity to the advanced education and research in the graduate school. The achievement in education is evaluated based on grade scores for the subjects and the level of achievement against the targets defined for this program. The following lists the educational policy and courses that are provided for students in each year:

- In the first year, students study subjects related to outlines of mathematics, physics, biology, and earth and planetary system science as specialized education subjects, which enable students to obtain basic knowledges in a wide range of areas of natural science. Students acquire qualities necessary for pioneering interdisciplinary fields beyond previous frameworks. Students also develop basic abilities needed for presenting their own ideas and logic in foreign languages through class subjects in foreign languages, principally English. The liberal arts subjects are provided to enable students to develop a wide-ranging intelligence, judgment, and deep humanity. In the specialized fundamental subjects of chemistry, students learn again basic knowledges of chemistry, physics, biology, and mathematics that they have studied in high school, in order to prepare for advanced chemistry. In addition, they study fundamentals of quantum chemistry that are required for understanding all other areas of

chemistry.

- In the second year, students further develop their communication abilities in English through liberal arts subjects. Also, specialized education aimed at full-fledged study in chemistry is provided, in order for students to acquire advanced knowledges of chemistry. This enables students to improve basic abilities required for pioneering new areas of chemistry. Because faculty members consistently use the same textbook for physical chemistry, inorganic and analytical chemistry, and organic chemistry, students can systematically study each area.
- In the third year, students are trained for chemical experiments throughout the academic year. In this process, students improve their skills in chemistry and foster their ability to constantly expend effort until they achieve their aim. They also study chemistry subjects related to advanced application, and state-of-the-art chemistry that is being developed on the front lines around the world. Through this study, students learn the roles that chemistry plays in solving various problems that human beings are facing, and develop basic creativity and practical abilities for leading activities in the local community and the international society.
- In the fourth year, students carry out their graduation research in a study group in the Department of Chemistry, and present their results. Through this process, they acquire the ability to autonomously advance their research while cooperating with faculty members and other students, objectively observing unfamiliar properties and phenomena, and logically explaining their cause and mechanism, logically presenting and explaining their obtained chemical findings in a convincing manner, and correcting and improving their understanding through discussion with others. Furthermore, they reinforce the basics required for working in cutting edge areas of chemistry in such fields as industry, education, academia, and graduate school.

5. Start time and acceptance conditions

In School of Science, each department holds its entrance examinations. This program is organized primarily for students of the Department of Chemistry. Students are automatically registered in this program when they enter our university. Therefore, students will be educated according to this program from the start of the first year.

Students who enter the Department of Chemistry are expected to have mastered the subjects in high school listed below:

Subject name: Mathematics, Physics

This program also accepts all students at our university. When a student who does not belong to the Department of Chemistry chooses this program, requirements are stipulated separately, based on the provisions regarding transfer between schools / departments.

6. Obtainable qualifications

1: Educational personnel certification

(1) Type 1 License for Junior High School Teacher (Science)

(2) Type 1 License for High School Teacher (Science)

2: Curator license

3 Certification of Poisonous and Deleterious Substances Business Operator

4 License for which eligibility for examination is awarded to a person with a bachelor's degree: Class A hazardous materials engineer

7. Class subjects and their contents

- * For the class subjects, refer to the subject table in Attachment 1.
- * For the details of the class subjects, refer to the syllabus that is published for each academic year.

8. Academic achievement

The evaluation criteria are specified for each evaluation item of academic achievement, and the achievement level against the criteria is given at the end of the semester.

The evaluation score for each evaluation item is converted to a numerical value (S = 4, A = 3, B = 2, and C = 1) and the evaluation standard for academic achievement, from when the student entered the university to the end of the last semester, is determined by using these values and applying weightings. The evaluation standards consist of three levels, i.e., Excellent, Very Good, and Good.

| Evaluation of academic achievement | Converted value |
|------------------------------------|-----------------|
| S (90 or more points) | 4 |
| A (80 – 89 points) | 3 |
| B (70 – 79 points) | 2 |
| C (60 – 69 points) | 1 |

| Academic achievement | Evaluation criteria |
|----------------------|---------------------|
| Excellent | 3.00 – 4.00 |
| Very Good | 2.00 – 2.99 |
| Good | 1.00 – 1.99 |

- * Refer to the relationship between evaluation items and evaluation criteria described in Attachment 2.
- * Refer to the relationship between evaluation items and class subjects described in Attachment 3.
- * Refer to the curriculum map in Attachment 4.

9. Graduation thesis (graduation research) (meaning, student allocation, timing, etc.)

1. Purpose

Students join state-of-the art research that is being performed in the research group to which they are allocated, based on the fundamental knowledge and skills in basic practices in chemistry that they have acquired in their studies up to and including the third year. They acquire the latest knowledge of the research area and connected areas, as well as advanced practical skills. In addition to this, they study how to advance their research and refine their personal qualities as cooperative, unique, ambitious, patient, and flexible scientists. Furthermore, they acquire skills that can be used for further study in the graduate school, research activities in a company, and educational and/or social activities in other fields.

2. Overview of Research

An overview of research is given on the website of each research group. Materials introducing the research groups will be delivered to students before we conduct a survey of their allocation preferences. Students are also permitted to visit each research group at any time in order to learn about the situation in the group directly from the faculty members and students. Additionally, the lecture in "Advanced Chemistry" that is given in the third year helps students understand various aspects of the research.

3. Student allocation timing and method

Students are allocated to their research group at the beginning of the fourth academic year. To be allocated to a laboratory, students must satisfy the conditions for starting graduation research. For details of this, refer to the "Criteria for Attending Specialized Education Subjects in Chemistry Program 2" found in the "Student Handbook" (received when the student enters the university).

Students are allocated to a research group based on their individual wishes, within the capacity constraints of each group that are defined by the faculty committee of the Department of Chemistry.

10. Responsibility

(1) Responsibility for PDCA (plan, do, check, and act) cycle

The faculty committee of the Chemistry Program (head: chair of the Department of Chemistry) is engaged in the "plan" and "do" processes.

For the process "check" process, the chair of Department of Chemistry consults with the committee responsible (the education affairs review committee in the Department of Chemistry) based on materials prepared by the faculty committee of the Chemistry Program. In the case of the "action" process, the required actions are carried out by the faculty committee of the Chemistry Program, taking the result of the consultation into consideration.

The faculty members who constitute the faculty committee for each major program are listed in Attachment 5.

(2) Evaluation of the program

○ Perspectives for the evaluation of program

- 1: Objective level of achievement of the students
- 2: Level of satisfaction of the students
- 3: Level of satisfaction of the faculty members
- 4: Results of graduation research

○ Evaluation method

- 1: An external evaluation is conducted by ex-students.
- 2: A questionnaire for evaluation of the whole program is distributed to students and ex-students of the program.
- 3: A questionnaire for evaluation of the whole program is distributed to members of faculty.
- 4: A questionnaire for the results of the graduation research is distributed to ex-students.

○ Policy and method for feedback to students

Based on the basic philosophy of "student-oriented education", an external evaluation by ex-students and questionnaires for students and ex-students are conducted each academic year, and the results are comprehensively reviewed to identify any problems in the program. Then, the faculty committee of the Chemistry Program revises the composition of the program and the contents of subjects as required.