

# **Program for Highly Skilled Professionals for a Smart Society Supported by Advanced Materials and Chemical Technology**

## **1. IGP (A) Outline**

Program for Highly Skilled Professionals for a Smart Society Supported by Advanced Materials and Chemical Technology (SSMCT) aims to train highly educated engineers with excellent international outlook equipped to work for advanced smart societies. The Program graduates will have a wide spectrum of technical knowledge ranging from fundamentals to applications in the fields of advanced materials and chemical technology. They are expected to take roles as leaders in international projects, such as overseas deployments by Japanese companies or development projects by international organizations, and show high degree of creativity and innovative thinking in their respective fields. SSMCT consists of five Graduate Majors in fundamental engineering disciplines aiming at advanced smart societies and related development. The students will be enrolled in one of the Graduate Major and educated under the Integrated Doctoral Education Program, in which they will be required to study from Master to Doctoral programs continuously and to obtain both degrees. Outlines of each Graduate Major are given below.

1. Graduate Major in Materials Science and Engineering: Major of Materials Science and Engineering aims at nurturing research scientists and engineers who have deep insight into materials properties and function, and ability to develop highly innovative materials. The education is aimed towards developing creative and practical minds, and in addition to nurture excellent understanding of social problems and modern society requirements. Through the advanced educational system, the students are expected to thrive in the global competence to contribute towards human welfare and sustainability.

2. Graduate Major in Chemical Science and Engineering: Major in Chemical Science and Engineering aims at fostering human resources, who have basic academic skills and logical thinking ability in chemical science and engineering and related fields, and can contribute to developing environmentally-benign society by applying their science and engineering wisdom. Program aims at training international engineers and leading scientists, who can understand the relationship between “Science and Technology”, “Industrials”, and “Environment”, acquire advanced expert knowledge in chemistry, well-rounded accomplishment, and international communication skills.

3. Graduate Major in Energy Science and Engineering: This program takes a holistic approach to graduate education in the Interdisciplinary field of Energy Science and Engineering. It aims to develop energy science and engineering leaders of the future who can solve complex problems using technology, science and engineering. The Program teaches students highly technical knowledge based on fundamental disciplines such as physics, chemistry, materials, machinery, and electricity. In addition, this major provides students various skills for evaluating diverse energy-related issues from the viewpoint of multidisciplinary energy sciences, fact-finding, problem solving, and global leadership, which are necessary for innovation in a sustainable society.

4. Graduate Major in Human Centered Science and Biomedical Engineering: In this major, all research and development of engineering and technology regarding human healthcare, medicine and environment conservation, which has been conducted in each disciplinary field, were defined as “Human Centered Science and Biomedical Engineering” and the education and research to consider the correlation between human characteristics and artifact ones comprehensively are provided as based on the in-depth understanding of people and society. The major’s goal is to foster talents who have a deep understanding of human being by acquiring the knowledge of natural sciences, bioethics, the foundation of health, medical and environmental sciences and also learn several disciplinary fields such as Materials and Chemical Technology, Mechanical Engineering, Electrical and Electronic Engineering, Information Technology, Life Science & Technology. That means to foster scientists and engineers who can contribute to the development of science & technology to protect people's health and realize a sustainable society.

5. Graduate Major in Nuclear Engineering: This graduate major provides with core curriculum for nuclear reactor engineering and fuel cycle technologies and also covers extended nuclear energy, such as beam, accelerator, plasma sciences, nuclear fusion, energy and environment, and social relations.

### **1-1. Graduate Major(s) available to IGP (A) Students**

Graduate Major in Materials Science and Engineering  
Graduate Major in Chemical Science and Engineering  
Graduate Major in Energy Science and Engineering  
Graduate Major in Human Centered Science and Biomedical Engineering  
Graduate Major in Nuclear Engineering

## **2. Competencies Developed**

In this program, students will acquire the following skills:

- Ability to resolve problems using broad engineering knowledge and skills
- Ability to develop a diverse view of things with well-rounded education and engineering ethics
- Ability to see the social trends, and find and solve current problems
- Ability to perform a project with understating of future trends from a global view by collaborating with others
- Ability to have communication and presentation abilities with logical explanation

## **3. Learning Goals**

The goals of student learning as follows:

- A) Fundamental knowledge in the field of advanced materials and chemical technology for a smart society
- B) Specialized and advanced subjects in the field of advanced materials and chemical technology for a smart society
- C) Interdisciplinary view of science and engineering in international perspective for a smart society
- D) Creative and practical research ability
- E) Logical communication skills

## **4. IGP (A) Completion Requirements and Courses**

### **【For Master's degree】**

#### **【1.】 IGP (A) Completion Requirements**

##### **(1) Credits**

- a. 2 credits from restricted elective courses must be acquired.
- b. The seminar must be acquired in each semester.

##### **(2) Thesis**

The student must complete a special research, submit a thesis for the degree and take the final examination given after the submission of her/his thesis for the qualification. The students qualified by the examination committee can go onto the Doctoral program with some formalities.

Under this program, in addition to the above-mentioned requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). For completion requirements of your Graduate Major, please refer to the relevant Graduate Major pages in “Guide to Graduate Majors (for IGP)”.

## 【2.】 IGP (A) Courses

**Table M1. Courses of IGP (A)**

Course category		Course number	Course title		Credits	Competencies	Learning goals	Comments
Breadth courses	400 level	LAW.X414		Technical Management for Sustainable Engineering	2-0-0	1,3,5	A,C,D	C0M
		LAW.X416	○	Modern Japan	1-1-0	1,2,4,5	A,B,C,D,E	
		LAW.X417	○	Sustainable Engineering Technology	1-1-0	1,2,4,5	A,B,C,D,E	
		LAW.X418		Communication Skills in Japanese Industries I	0-1-0	1,2	A,C,D,E	C0M C1M
		LAW.X419		Communication Skills in Japanese Industries II	0-1-0	1,2	A,C,D,E	C0M C1M
<p>Note :</p> <ul style="list-style-type: none"><li>○ : Restricted elective</li><li>Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills; 5 = Practical and/or problem-solving skills</li><li>The character preceding the three digits in the course number denotes the course's subdiscipline (i.e., "D" represents the subdiscipline code in the course number LAW.D400.R): X (Global awareness and other breadth courses)<ul style="list-style-type: none"><li>C0M,C1M: courses that enable students to acquire GA (Graduate Attributes) and that are recognized as equivalent to Career Development Courses (For GA (Graduate Attributes) and Career Development Courses, please refer to the relevant Graduate Major pages in “Guide to Graduate Majors (for IGP).)”) )</li></ul></li></ul>								

## **【For Doctoral degree】**

### **【1.】 IGP (A) Completion Requirements**

- (1) The seminar must be acquired in each semester.
- (2) The candidate must complete and upload a thesis for the degree, and take and pass the final examination and evaluation of his/her thesis.

The candidate who satisfies the above requirements and passes the final examination is awarded a Doctoral degree.

Under this program, in addition to the above-mentioned requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). For completion requirements of your Graduate Major, please refer to the relevant Graduate Major pages in “Guide to Graduate Majors (for IGP)”. All students should consult with their own supervisors and program/special course coordinators about the study plan.

### **【2.】 IGP (A) Courses**

4 credits (0-0-4) of Off-Campus Project of the Graduate Major are recommended.

Under this program, in addition to the above-mentioned requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). For core courses of your Graduate Major, please refer to the relevant Graduate Major pages in “Guide to Graduate Majors (for IGP)”.