Sustainable Engineering Program

1. IGP (A) Outline

Sustainable Engineering Program (SEP) aims to train “highly educated, internationalized engineers” having a wide spectrum of technical knowledge from fundamentals to their applications. Degree recipients in this program are expected to participate as leaders in international projects, such as overseas deployments by Japanese companies and development projects by international organizations, with creative and innovative manners in the related fields. SEP consists of six Special Courses as fundamental disciplines in sustainable engineering aiming at the sustainable society and development. The student will be enrolled in one of them and educated in Integrated Doctoral Education Program, in which they are expected to study from Master’s to Doctoral programs continuously for the both degrees. Six Special Courses consists of several departments, which are closely related to the objectives of the course. Outlines of each Special Course are given in order as below.

1. Development and Environmental Engineering (DEE) Course: Construction, maintenance and renewal of various infrastructures are of vital importance in every nation for developing all types of industry and creating secure and firm built environments. Infrastructure developments have been carried out as a national or an international project under various environments, such as natural, social, economic and human environments. This course based on Civil and Environmental Engineering and Transdisciplinary Science and Engineering aims its mission to train creative engineers and scientists.

2. Nuclear Engineering (NCE) Course: Growing attention has been again placed on nuclear energy as an ultimate measure for reduction of fossil fuel consumption and CO_2 emission. Under the circumstances of global warming and the price hike of oil, gas and coal, a number of countries have been considering the implementation of nuclear power plants. The key factor of the nuclear energy development is the development of human resources. This course provides with core curriculum for nuclear reactor engineering and fuel cycle technologies and also covers extended nuclear energy, such as laser and particle beams, accelerator, plasma sciences, nuclear fusion, energy and environment, and social relations.

3. Infrastructure Metallic Materials (IMM) Course: Steel making industries and other metalworking industries play important roles in advancing civilized society because they are producing all kinds of infrastructure metallic materials to be used for other industries such as construction, civil, mechanical, automobile and electronic industries. Therefore, metallurgical engineering is one of the important basic academic/engineering fields for industrialization of developing countries. This course is, thus, designed for those who want to be a pillar of metalworking industries in developing countries. The course provides both fundamental and applied metallurgy and covers all subjects of metallurgy based on the following three categories: metal physics, metal chemistry, and materials metallurgy.

4. Mechanical and Production Engineering (MPE) Course: Of the many fields of engineering, mechanical engineering including system control is directly connected with society. Through innovative "monozukuri" - the Japanese way of making products - we aim to enrich the future of humanity by removing difficulties that exist in the world and provide greater comfort. In order to realize such ideas, this course offers a broad and systematic educational curriculum and an advanced research and development environment to produce scientists and engineers with diverse abilities.

5. Information and Communication Technology (ICT) Course: Information and communications technology consists of a broad spectrum of technology and is one of the most important social infrastructures supporting the industry, economy, and culture. This course is organized by the departments of electrical and electronic engineering and information and communications engineering, offering comprehensive research and education covering software and hardware technologies in these fields. This course covers various topics related with information and communications technologies including signal processing, electromagnetic waves, integrated circuits, electron devices, embedded systems, and so on.

6. Advanced Materials and Chemicals Processing (MCP) Course: The aim of this course is to cultivate scientists and engineers specializing in nanotechnology, advanced materials science and advanced chemical processing technology, disciplines which are at the core of sustainable development. The interactive and intensive curriculum, aimed at putting knowledge to work on an applicable level, is prepared by top-level departments, world-acclaimed in the field of ceramics science, organic and polymeric materials and chemical engineering.

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

Graduate Major in Mechanical Engineering
Graduate Major in Systems and Control Engineering
Graduate Major in Electrical and Electronic Engineering
Graduate Major in Information and Communications Engineering
Graduate Major in Materials Science and Engineering
Graduate Major in Chemical Science and Engineering
Graduate Major in Civil Engineering
Graduate Major in Global Engineering for Development, Environment and Society
Graduate Major in Energy Science and Engineering
Graduate Major in Engineering Sciences and Design
Graduate Major in Human Centered Science and Biomedical Engineering
Graduate Major in Nuclear Engineering
Graduate Major in Urban Design and Built Environment

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 sustainability and engineering
B) Specialized and advanced subjects in the field of sustainability and engineering
C) Interdisciplinary view of science and engineering in international perspective
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. Sustainable Engineering Technology (LAW.X417) 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	
		LAW.X417	◎		Sustainable Engineering Technology	1-1-0	1,2,4,5	A,B,C,D,E	
		LAW.X418			Communication Skill in Japanese Industry I	0-1-0	1,2	A,C,D,E	
		LAW.X419			Communication Skill in Japanese Industry II	0-1-0	1,2	A,C,D,E	

Note：

• ◎：Required course

• Competencies: 1 = Intercultural skills; 2 = Communication skills; 3 = Specialist skills; 4 = Critical thinking skills; 5 = Practical and/or problem-solving skills

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)”.

【For Doctoral degree】

【1.】IGP (A) Completion Requirements

(1) 4 credits (0-0-4) of Off-Campus Project of the Graduate Major must be acquired.

(2) The seminar must be acquired in each semester.

(3) 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.

The minimum period of study is three years in total, which include the Master's and Doctoral program for the both degrees. Under this program, in addition to the above requirements, students must also fulfill the Graduate Major 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 must be acquired.

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)".