

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 a special course 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. Course outlines 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 CO₂ 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 beam, 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: It is a foundation of an advanced industrial nation and a key technology for the industries such as automobile, electrical and electronic products, precision instruments and robotics. To learn and master the ability of planning, operation and management through a research project related on the art and craft.

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.

2. Competencies Developed

To be determined.

3. Learning Goals

To be determined.

4. IGP (A) Completion Requirements

Under this program, in addition to the following requirements, students must also fulfill the Graduate Major completion requirements of their departments (degree completion requirements). Please refer to the relevant IGP (C) pages for completion requirements of your Graduate Major.

【Master's degree program】

(1) Credits

- a. Sustainable Engineering Technology (LAW.X501L) must be acquired.
- b. 16 credits or more must be acquired from the subjects provided by special course which she/he enrolls in.
- c. The seminar must be acquired in each term.

(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.

【Doctoral degree program】

(1) Seminar in each term and Off-Campus Project must be acquired.

(2) Beside the requirement (1), 22 credits or more must be acquired from the subjects provided in the Master's and Doctoral programs.

(3) The candidate must complete and upload a thesis for the degree, and take 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 both the Master's and Doctoral program for the both degrees. Note that the above requirements for Master and Doctoral degrees are minimal and additional requirements are conditioned depending on the special course and department which the student enrolls. All students should consult with their own supervisors or program/special course coordinators about the study plan.

5. Courses

Table M2. Courses

To be determined.

6. Courses That Can Be Taken as Humanities and Social Sciences Courses

Table M3. Courses that can be taken as Humanities and Social Sciences

Course category	Course Number	Course			Required credits	competencies	Learning goals	Comments
can be taken as Humanities and Social Sciences Courses								
To satisfy the Humanities and Social Sciences requirement, credits may be acquired from courses listed above as well as from those listed under the Humanities and Social Sciences Courses (see the Liberal Arts and Basic Science Courses Guide)								

7. Courses That Can Be Taken as Career Development Courses

Table M4. Courses That Can Be Taken as Career Development Courses

Course category	Course Number	Course			Required credits	GA *	Learning goals	Comments
can be taken as Career Development Courses								
To satisfy the Career Development requirement, credits may be acquired from courses listed above as well as from those listed under Career Development Courses (see the Liberal Arts and Basic Science Courses Guide).								
* GA : Graduate Attribute								

8. Courses

Table D2. Courses

To be determined.

9. Courses That Can Be Taken as Humanities and Social Sciences Courses

Table D3. Courses that can be taken as Humanities and Social Sciences

To be determined.

10. Courses That Can Be Taken as Career Development Courses

Table D4. Courses That Can Be Taken as Career Development Courses

Course category	Course Number	Course			Required credits	GA *	Learning goals	Comments
can be taken as Career Development Courses								
<p>To satisfy the Career Development requirement, credits may be acquired from courses listed above as well as from those listed under Career Development Courses (see the Liberal Arts and Basic Science Courses Guide).</p> <p>*GA : Graduate Attribute</p>								