

Graduate Major in Energy Science and Engineering

【Master's Degree Program】

1. Outline

This degree 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 Master's Degree Program, for Graduate Major in Energy Science and Engineering 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.

2. MS Graduation Requirements

The following requirements must be met to complete the Master's Degree Program of this major.

1. A total of 30 credits or more acquired from 400- and 500-level courses.
2. From the courses specified in the Graduate Major in Energy Science and Engineering curriculum below,
 - Minimum of 25 credits acquired from major courses and research seminars
 - Minimum of 4 credits from “Interdisciplinary Scientific Principles of Energy Courses” and minimum 4 credits from the major courses in the department where the student belongs. For students in the Department of Chemistry, minimum 4 credits from the Chemistry Major Courses (*), and for students in Department of Transdisciplinary Science and Engineering, minimum of 4 credits from energy major courses in other departments that offer Graduate Major in Energy Science and Engineering.
 - 8 credits acquired from “Research Seminars” (Seminar in energy science S1, F1, S2, and F2); and
 - Minimum of 5 credits acquired from Liberal Arts and Basic Science Courses (3 credits from the Humanities and Social Science Courses of which 2 credits must be from 400-level courses and 1 credit from 500-level courses, and 2 credits from Career Development Courses).
3. Pass the master's thesis exam and oral defense.

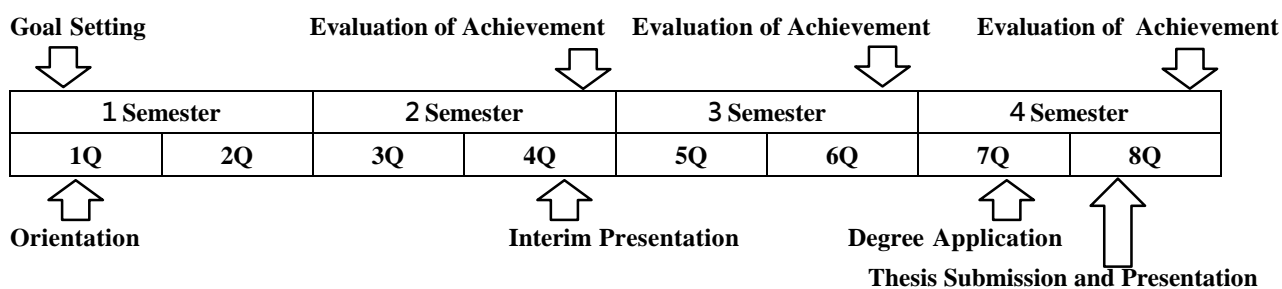
Table M1. Graduate Major in Energy Science and Engineering Completion Requirements

Course category		<Required courses> Required credits	<Electives> Minimum credits required	Minimum credits required	Associated learning goals	Comments
Liberal arts and basic science courses	Humanities and social science courses		2 credits from 400-level One credit from 500-level	5 credits	D	
	Career development courses		2 credits from 400- and 500- levels		C,D,E	
	Other courses					
Core courses	Research seminars	Seminar in Energy Science S1 Seminar in Energy Science F1 Seminar in Energy Science S2 Seminar in Energy Science F2 A total of 8 credits, 2 credits each from above courses.		25 credits	B,C,D,E	
	Research-related courses				B,C,D,E	
	Major courses		Minimum of 4 credits from “Interdisciplinary Scientific Principles of Energy Courses” and minimum 4 credits from the Major Courses in the student’s department. For students in Department of Chemistry, minimum of 4 credits from the Chemistry major courses (*), and for students in Department of Transdisciplinary Science and Engineering, minimum of 4 credits from energy major courses in other departments that offer Graduate Major in Energy Science and Engineering.		A,B	
	Major courses Research-related Courses <u>outside the Graduate</u>					

	Major in Energy Science Engineering standard curriculum					
Total required credits	A minimum of 30 credits in addition to meeting the above conditions					
Note	<ul style="list-style-type: none"> • Japanese Language and Culture Courses offered to International Students can be recognized as Humanities and Social Science Courses of the corresponding course level • As for Liberal Arts and Basic Science Courses, please refer to the relevant pages. 					

Research Related to the Completion of Master Theses

The master's thesis research aims to acquire the abilities to identify and to solve new issues and communication skills through research. The typical procedure of the master's thesis research is shown as follows. The learning achievement will be evaluated by the candidate's supervisor. The candidate will consider his or her study plan based on goals and progress of the master's thesis research as necessary.



- Interim Presentation of Master's Thesis

To understand background, purposes, and issues of his or her own master's thesis research, "Interim Presentation of Master's Thesis" is required.

- Screening Criteria for Master's Thesis

A master's thesis must include new knowledge contributing to the development in energy science and engineering and which is also original.

- Screening of Master's Thesis

Prior to the final screening, the thesis will be reviewed by examiners. Final screening and evaluation of the thesis is based on the student's oral presentation. Oral presentation must be carried out in English or Japanese.

【Doctoral Degree Program】

1. Outline

To integrate and reorganize the complicated conventional energy-related disciplines, which developed with differentiation and deepening, creation of a novel discipline, “Interdisciplinary Scientific Principles of Energy”, and development of human resources mastering this discipline have been strongly required for overlooking of energy issues and effectively utilization of energy-related disciplines.

In the Doctoral Degree Program, the Energy Science and Engineering Major aims at nurturing an independent research scientist and engineer with advanced expert knowledge in the field of energy science and engineering. Students in this major are expected to pursue the principles of energy-related phenomena by using organized knowledge in the field of energy science and engineering and to lead a cutting-edge research and development with the societal responsibilities and the ethics as well as the competence as a global leader who contributes to create a sustainable society.

2. Competencies Developed

The students are expected to acquire,

- Abilities to identify, to investigate, and to solve new issues by using organized knowledge in the field of energy science and engineering.
- Ability to conduct innovative research and development in an ethical manner.
- Management and communication skills by integrating energy-related findings from the viewpoint as an expert of energy-related discipline.
- Competence as a global leader in the energy-related fields.

3. Learning Goals

Students will learn,

A) Advanced expert knowledge in the field of energy science and engineering

Students will gain expert knowledge in greater depth than the master course and to have the ability to apply the knowledge to energy-related phenomena through the doctoral coursework Core Courses and Research Seminars.

B) Ability to solve problems

Students are requested to acquire the ability to find out the problems and the way to solve the problems by integrating their original discipline chemistry, applied chemistry, material science, mechanical engineering, or electrical engineering with other energy-related disciplines.

C) Ability to create issues

Students are requested to acquire the ability to create issues by freely utilizing their original discipline and other energy-related disciplines.

D) Competency as a global leader in energy research

Students will acquire the abilities to evaluate their research perspectives and applications from the global point of view, establishing a human network, and lead frontier energy science and engineering, by integrating energy-related disciplines.

E) Communication skills

Develop communication skills through discussions with expert scientists in the domestic and international community.

4. Doctoral Completion Requirements

The following requirements must be met to complete the Doctoral Degree Program of this major.

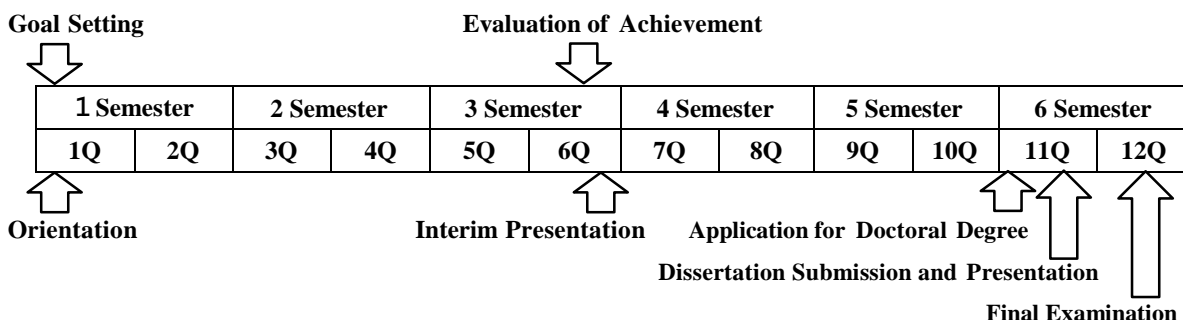
1. A total of 24 credits or more acquired from 600-level courses.
2. From the courses specified in the Graduate Major in Energy Science and Engineering curriculum,
 - 12 credits acquired from Research Seminars;
 - 18 credits or more, acquired from the subject in 600-level courses of this major;
 - Minimum of 6 credits acquired from Major Courses; and
 - Minimum of 6 credits acquired from Liberal Arts and Basic Science Courses (2 credits from the 600-level Humanities and Social Sciences Courses, and 4 credits from Career Development Courses).
3. Pass the doctoral thesis review and defense.

Table D1 Graduate Major in Energy Science and Engineering Completion Requirements

Course category		<Required courses> Required credits	<Electives> Minimum credits required	Minimum credits required	Associated learning goals	Comments
Liberal arts and basic science courses	Humanities and social science courses		2 credits	6 credits	B	
	Career development courses		4 credits		C,D,E	
	Other courses					
Core courses	Research seminars	Seminar in Energy Science S3 Seminar in Energy Science F3 Seminar in Energy Science S4 Seminar in Energy Science F4 Seminar in Energy Science S5 Seminar in Energy Science F5 A total of 12 credits, 2 credits each from the above courses.		18 credits	A,B,C,D,E	
	Research-related courses				C,D,E	
	Major courses		6 credits		A,B,C,D	
Total required credits		A minimum of 24 credits in addition to meeting the above conditions				
Note		<ul style="list-style-type: none"> • Japanese Language and Culture Courses offered to International Students can be recognized as Humanities and Social Science Courses of the corresponding course level. • As for Liberal Arts and Basic Science Courses, please refer to the relevant pages. 				

Research Related to the Completion of Doctoral Theses

The doctoral dissertation research aims to acquire the abilities to identify, to investigate, and to solve new issues by using organized knowledge in the field of energy science and engineering. In addition, improvement in English communication skill is strongly required. These abilities will be acquired through the process of goal setting and evaluation of the achievement. The typical procedure of the doctoral dissertation research is shown as follows.



- Screening Criteria for Doctoral Dissertation

A doctoral dissertation must be his or her dissertation which has sufficient novelty, originality, and academic value in the field of energy science and engineering. The dissertation must be written in English or Japanese.

- Screening of Doctoral Dissertation

The Screening Committee shall consist of multiple examiners who can evaluate the dissertation from an academic and a technological point of view. The committee can also include external examiners who belong to other universities, institutions, and companies. After the submission of doctoral dissertation, the final screening and evaluation will be carried out via oral presentation and reviewing the dissertation by examiners. Oral presentation must be carried out in English or Japanese.