Graduate Major in Earth and Planetary Sciences

【Doctoral Degree Program】

1. Outline

Phenomena covered by earth and planetary sciences are complex combinations of various factors ranging from nano- to tera-scale in space and time. This program provides a variety of learning opportunities to foster human resources challenging and solving such global and planetary-scale problems with scientific thinking and skills.

2. Competencies Developed

Students in this program are expected to acquire following abilities:

- Ability to get insight into the nature of complex phenomena in the earth and planets
- Ability to set a subject of research and to form a research plan
- Ability to build own expertise necessary for research accomplishment
- Ability to present research achievements and take an international leadership in an area of expertise

3. Learning Goals

Students in this program are expected to study by utilizing the following opportunities to obtain the abilities mentioned above:

A) Intensive courses that learn a wide range of advanced research topics on earth and planetary sciences
B) Laboratory seminars, lectures, and exercise lessons that learn basic and applied research skills
C) Classes that improve English skills and teaching skills and that learn carrier development

4. IGP 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. Meet the completion requirements indicated in Table D1.
3. Pass the doctoral dissertation review and defense.

Table D1. Graduate Major in Earth and Planetary Sciences Completion Requirements

<table>
<tr><th colspan="2">Course category</th><th><Required courses>
Required credits</th><th><Electives>
Minimum credits required</th><th>Minimum credits required</th><th>Associated learning goals</th><th>Comments</th></tr>
<tr><td rowspan="3">Liberal arts and basic science courses</td><td>Humanities and social science courses</td><td></td><td>2 credits</td><td rowspan="3">6 credits</td><td>C</td><td></td></tr>
<tr><td>Career development courses</td><td></td><td>4 credits</td><td>C</td><td></td></tr>
<tr><td>Other courses</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="4">Core courses</td><td>Research seminars</td><td>Seminar in Earth and Planetary Sciences S3
Seminar in Earth and Planetary Sciences F3
Seminar in Earth and Planetary Sciences S4
Seminar in Earth and Planetary Sciences F4
Seminar in Earth and Planetary Sciences S5
Seminar in Earth and Planetary Sciences F5
A total of 12 credits, 2 credits each from the above courses.</td><td></td><td rowspan="3">12credits</td><td>B</td><td></td></tr>
<tr><td>Research-related courses</td><td></td><td></td><td>B</td><td></td></tr>
<tr><td>Major courses</td><td></td><td></td><td>A, B</td><td></td></tr>
<tr><td colspan="2">Total required credits</td><td colspan="5">A minimum of 24 credits in addition to meeting the above conditions</td></tr>
<tr><td colspan="2">Note</td><td colspan="5">・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.</td></tr>
</table>

5. IGP Courses

Table D2. Core Courses of the Graduate Major in Earth and Planetary Sciences

Course category		Course number	Course			Credits	Competencies	Learning goals	Comments
Research seminars	600 level	EPS.Z691.R	◎		Seminar in Earth and Planetary Sciences S3	0-2-0	2,3	B	
		EPS.Z692.R	◎		Seminar in Earth and Planetary Sciences F3	0-2-0	2,3	B	
		EPS.Z693.R	◎		Seminar in Earth and Planetary Sciences S4	0-2-0	2,3	B	
		EPS.Z694.R	◎		Seminar in Earth and Planetary Sciences F4	0-2-0	2,3	B	
		EPS.Z695.R	◎		Seminar in Earth and Planetary Sciences S5	0-2-0	2,3	B	
		EPS.Z696.R	◎		Seminar in Earth and Planetary Sciences F5	0-2-0	2,3	B	
Research-related courses	600 level	EPS.E671.L			Exercise in Earth and Planetary Sciences I	0-1-0	3,4,5	A, B	
		EPS.E672.L			Exercise in Earth and Planetary Sciences J	0-1-0	3,4,5	A, B	
		EPS.E673.L			Exercise in Earth and Planetary Sciences K	0-1-0	3,4,5	A, B	
		EPS.E674.L			Exercise in Earth and Planetary Sciences L	0-1-0	3,4,5	A, B	
		EPS.E675.L			Exercise in Earth and Planetary Sciences M	0-1-0	3,4,5	A, B	
		EPS.E676.L			Exercise in Earth and Planetary Sciences N	0-1-0	3,4,5	A, B	
		EPS.E677.L			Exercise in Earth and Planetary Sciences O	0-1-0	3,4,5	A, B	
		EPS.E678.L			Exercise in Earth and Planetary Sciences P	0-1-0	3,4,5	A, B	
Major courses	600 level	EPS.A651.L			Special Lecture in Earth and Planetary Sciences I	1-0-0	3	A	
		EPS.A652.L			Special Lecture in Earth and Planetary Sciences J	1-0-0	3	A	
		EPS.A653.L			Special Lecture in Earth and Planetary Sciences K	1-0-0	3	A	
		EPS.A654.L			Special Lecture in Earth and Planetary Sciences L	1-0-0	3	A	
		EPS.A655.L			Special Lecture in Earth and Planetary Sciences M	1-0-0	3	A	
		EPS.A656.L			Special Lecture in Earth and Planetary	1-0-0	3	A	

					Sciences N				
		EPS.A657.L			Special Lecture in Earth and Planetary Sciences O	1-0-0	3	A	
		EPS.A658.L			Special Lecture in Earth and Planetary Sciences P	1-0-0	3	A	
		EPS.C628.L			Cutting Edge Topics in Earth and Planetary Sciences I	0-1-0	1,2,4	C	
		EPS.C629.L			Cutting Edge Topics in Earth and Planetary Sciences J	0-1-0	1,2,4	C	
		EPS.C630.L			Cutting Edge Topics in Earth and Planetary Sciences K	0-1-0	1,2,4	C	
		EPS.C631.L			Cutting Edge Topics in Earth and Planetary Sciences L	0-1-0	1,2,4	C	
		EPS.C632.L			Cutting Edge Topics in Earth and Planetary Sciences M	0-1-0	1,2,4	C	
		EPS.C633.L			Cutting Edge Topics in Earth and Planetary Sciences N	0-1-0	1,2,4	C	
		EPS.C634.L			Cutting Edge Topics in Earth and Planetary Sciences O	0-1-0	1,2,4	C	
		EPS.C635.L			Cutting Edge Topics in Earth and Planetary Sciences P	0-1-0	1,2,4	C	
		EPS.C638.L			EPS Career Development I	0-1-0	2,4,5	C	
		EPS.C639.L			EPS Career Development J	0-1-0	2,4,5	C	
		EPS.C640.L			EPS Career Development K	0-1-0	2,4,5	C	
		EPS.C641.L			EPS Career Development L	0-1-0	2,4,5	C	
		EPS.C642.L			EPS Career Development M	0-1-0	2,4,5	C	
		EPS.C643.L			EPS Career Development N	0-1-0	2,4,5	C	
		EPS.C644.L			EPS Career Development O	0-1-0	2,4,5	C	
		EPS.C645.L			EPS Career Development P	0-1-0	2,4,5	C	
		EPS.C658.L			EPS Tutorial I	0-1-0	2,4,5	C	
		EPS.C659.L			EPS Tutorial J	0-1-0	2,4,5	C	
		EPS.C660.L			EPS Tutorial K	0-1-0	2,4,5	C	
		EPS.C661.L			EPS Tutorial L	0-1-0	2,4,5	C	

		EPS.C662.L			EPS Tutorial M	0-1-0	2,4,5	C	
		EPS.C663.L			EPS Tutorial N	0-1-0	2,4,5	C	
		EPS.C664.L			EPS Tutorial O	0-1-0	2,4,5	C	
		EPS.C665.L			EPS Tutorial P	0-1-0	2,4,5	C	

Note：

・◎：Required course，○：Restricted elective，O：odd academic years，E：even academic years

・□：Course is recognized as an Academy for Co-creative Education of Environment and Energy Science, Leading Graduate School (ACEEES) course.

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

• 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 ABC.D400.R): A (advanced), C (career)

6. IGP Courses That Can be Recognized as Humanities and Social Science Courses

None

7. IGP Courses That Can be Recognized as Career Development Courses

As a general rule, students who would like their Career Development Courses to contribute to completion requirements of their doctoral degree program need to satisfy all of the specified Graduate Attributes (“GA”), including the attainment of at least four course credits, listed in Table A-1 or A-2 of the “Guide to Graduate Education and International Graduate Program (Liberal Arts and Basic Science Courses) - Career Development Courses”. The status of the GA will be evaluated at the time of degree completion.

In addition to Career Development Courses, there are Major Courses that can also be recognized as such — shown below in Table D3 and D4 — which may go toward fulfilling the GA requirements.

However, note that when the corresponding Major Courses are recognized and accredited as Career Development Courses, their credits cannot be counted a second time (as Major Courses) towards degree completion requirements.

Table D3. Courses of the Graduate Major in Earth and Planetary Sciences that can be recognized as Career Development Courses for the Academic Leader Program (ALP)

Course category	Course number	Course			Credits	GA*	Learning goals	Comments
can be recognized as Career Development Courses	XIP.A601		★	Advanced International Practice in Science	0-2-0	A1D		Common Course of School of Science Outside the Graduate Major in Earth and Planetary Sciences standard curriculum
	EPS.C628.L ～ EPS.C635.L			Cutting Edge Topics in Earth and Planetary Sciences I～P	0-1-0	A1D, A2D, A3D	C	
	EPS.C638.L ～ EPS.C645.L			EPS Career Development I～P	0-1-0	A0D, A2D	C	
	EPS.C658.L ～ EPS.C665.L			EPS Tutorial I～P	0-1-0	A2D, A3D	C	

★: Classes in English

To satisfy the Career Development Courses 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

Table D4. Courses of the Graduate Major in Earth and Planetary Sciences that can be recognized as Career Development Courses for the Productive Leader Program (PLP)

Course category	Course number	Course			Credits	GA*	Learning goals	Comments
can be recognized as Career Development Courses	XIP.A601		★	Advanced International Practice in Science	0-2-0	P1D		Common Course of School of Science Outside the Graduate Major in Earth and Planetary Sciences standard curriculum

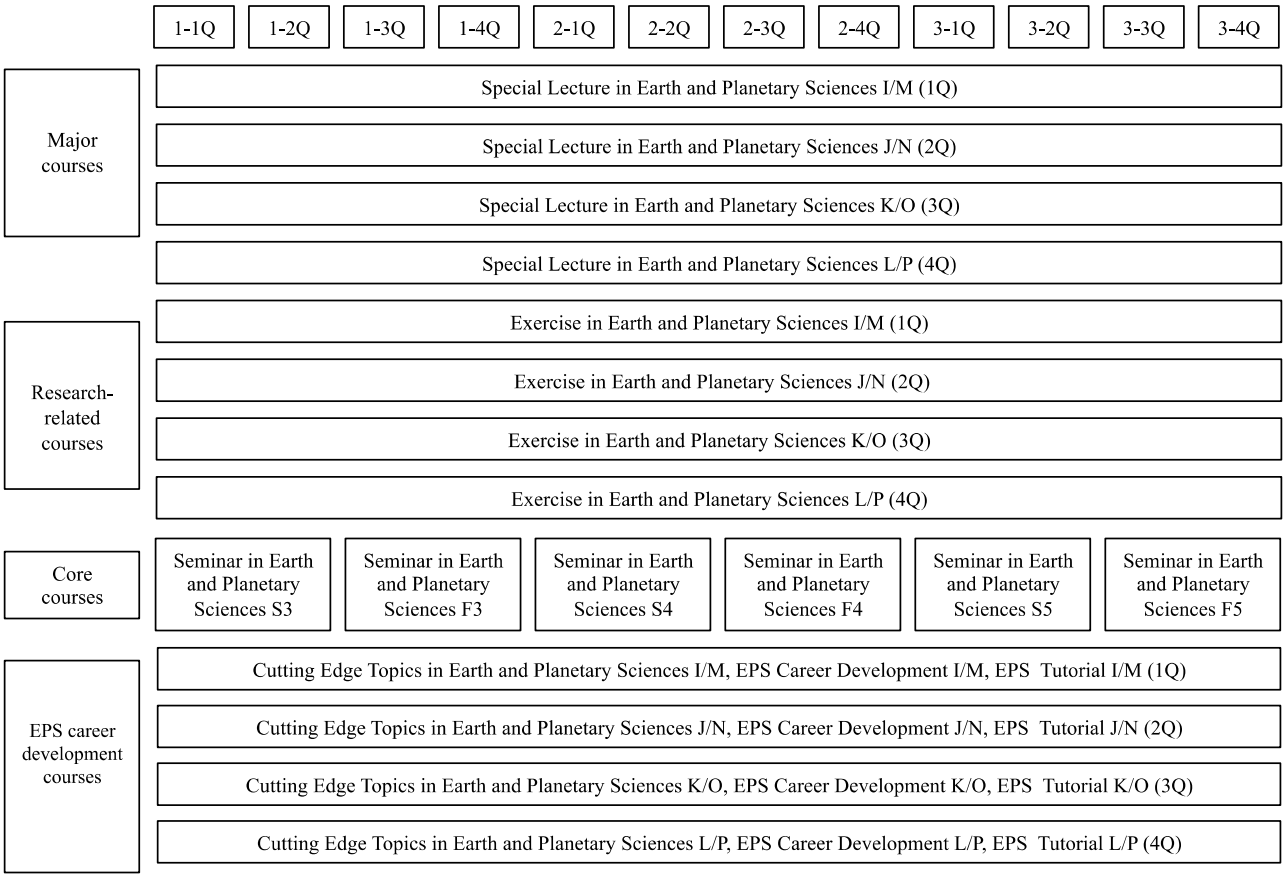
	EPS.C628.L ～ EPS.C635.L			Cutting Edge Topics in Earth and Planetary Sciences I～P	0-1-0	P1D, P2D, P3D	C	
	EPS.C638.L ～ EPS.C645.L			EPS Career Development I～P	0-1-0	P0D, P2D	C	

★: Classes in English

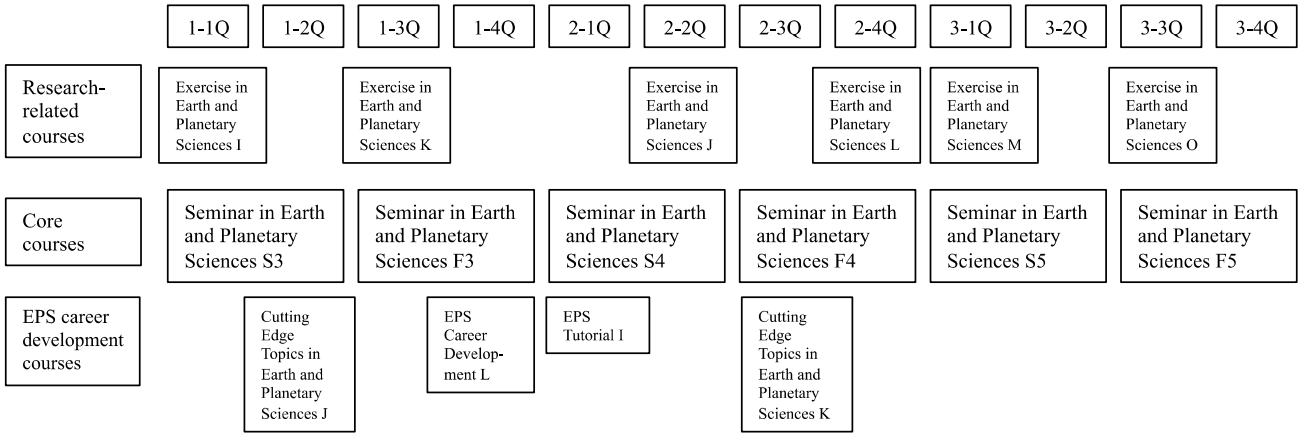
To satisfy the Career Development Courses requirement, credits may be acquired from courses listed above as well as from those listed under Career Development Courses (see the Liberal Arts and Basic Science Courses Guide).

＊GA: Graduate Attribute

8. Overview of Curriculum System

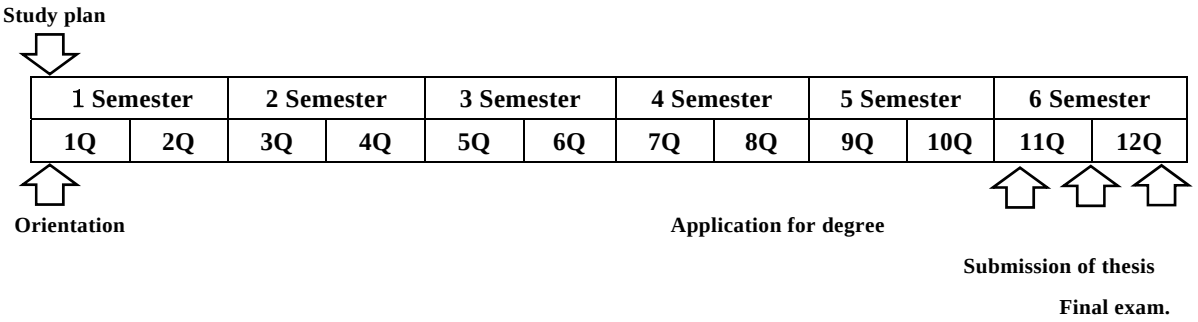


9. Example of a Standard Curriculum



10. Research Related to the Completion of Doctoral Theses

Through the doctoral thesis research, the candidate must develop the abilities for pointing out the issues to be solved, analyzing the situations, and proposing the solution. At the same time, communication skills in English are also gained to publish research results in international journals.



Following requirements must be met for the qualification

- The thesis should be original and is confirmed to be the world level of research which would contribute to the development of the field of earth and planetary sciences.
- At least one research paper, in which the candidate has a major contribution, is published or accepted in a refereed international journal.
- The candidate must have English ability to promote international collaborations.

<u>The thesis review procedure</u>

Preliminary evaluations of the submitted thesis are carried out on the basis of a hearing of the thesis presentation and the contents of the thesis. When the thesis passes the preliminary screening, the candidate submits a complete version of the thesis to the review committee. After the thesis presentation by the candidate, the thesis is reviewed by the committee and the final exam follows. The review committee consists of at least five faculty members in the Earth and Planetary Sciences course.