Graduate Major in Earth and Planetary Sciences

【Master's 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) Laboratory seminar to learn basics of scientific approaches in earth and planetary sciences
B) Interdisciplinary seminars to study a wide range of research topics
C) Lectures and exercise lessons to improve basic academic skills

4. IGP Completion Requirements

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

1. Attain a total of 30 credits or more from 400- and 500-level courses.
2. Fulfill requirements in Table M1 below.
3. Pass the master's dissertation review and defense.

Table M1 shows course categories and the number of credits required to complete the Master's Degree Program of this major. It also shows the required minimum credits in each course category and points to be noted when selecting the required courses and electives.

The learning goals to be obtained by students through courses are listed as "associated learning goals". Prior to registering courses, students need to fully understand the course goals.

Table M1. Graduate Major in Earth and Planetary Sciences 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 • 1 credit from 500-level	5 credits	C	
	Career development courses		2 credits		C	All Graduate Attributes (GA) should be acquired. (Refer to Section 7 for the definition of GA.)
	Other courses					
Core courses	**Research seminars**	Seminar in Earth and Planetary Sciences S1 Seminar in Earth and Planetary Sciences F1 Seminar in Earth and Planetary Sciences S2 Seminar in Earth and Planetary Sciences F2 A total of 8 credits, 2 credit each from the above courses.		22 credits	B	
	Research-related courses		4 credits, 1 credit each from sub-groups B, C, D, and E		A, B	
	Major courses		10 credits from sub-group A		A	
	Major courses and Research-related courses <u>outside</u> the Graduate Major in Earth and Planetary Sciences standard curriculum		1 credit	1 credit	A	
Total required credits		**A minimum of 30 credits including those attained according to the above conditions**				

Note	・Japanese Language and Culture Courses offered to international students can be recognized as equivalent to the Humanities and Social Science Courses of the corresponding course level. ・For details of the Liberal Arts and Basic Science Courses, please refer to the relevant sections.

5. IGP Courses

Table M2 shows the Core Courses of the Master's Degree Program in this major. Graduate Majors listed in the Comments column offer core courses that are recognized as equivalent to the corresponding Major Courses or Research-related Courses in the standard curriculum of this major.

Table M2. Core Courses of the Graduate Major in Earth and Planetary Sciences

Course category		Course number	Course title			Credits	Competencies	Learning goals	Comments
			Category	Sub-group	Title				
Research seminars	400 level	EPS.Z491.R	◎ ★		Seminar in Earth and Planetary Sciences S1	0-2-0	2,3	B	
		EPS.Z492.R	◎ ★		Seminar in Earth and Planetary Sciences F1	0-2-0	2,3	B	
	500 level	EPS.Z591.R	◎ ★		Seminar in Earth and Planetary Sciences S2	0-2-0	2,3	B	
		EPS.Z592.R	◎ ★		Seminar in Earth and Planetary Sciences F2	0-2-0	2,3	B	
Research-related courses	400 level	EPS.E471.B	○ ★	B	Exercise in Earth and Planetary Sciences A	0-1-0	3,4,5	A,B	a minimum of 1 credit from Exercise in Earth and Planetary Sciences A and B
		EPS.E472.B	○ ★	B	Exercise in Earth and Planetary Sciences B	0-1-0	3,4,5	A,B	
		EPS.E473.C	○ ★	C	Exercise in Earth and Planetary Sciences C	0-1-0	3,4,5	A,B	a minimum of 1 credit from Exercise in Earth and Planetary Sciences C and D
		EPS.E474.C	○ ★	C	Exercise in Earth and Planetary Sciences D	0-1-0	3,4,5	A,B	
	500 level	EPS.E571.D	○ ★	D	Exercise in Earth and Planetary Sciences E	0-1-0	3,4,5	A,B	a minimum of 1 credit from Exercise in Earth and Planetary Sciences E and F
		EPS.E572.D	○ ★	D	Exercise in Earth and Planetary Sciences F	0-1-0	3,4,5	A,B	
		EPS.E573.E	○ ★	E	Exercise in Earth and Planetary Sciences G	0-1-0	3,4,5	A,B	a minimum of 1 credit from Exercise in Earth and Planetary Sciences G and H
		EPS.E574.E	○ ★	E	Exercise in Earth and Planetary Sciences H	0-1-0	3,4,5	A,B	

Major courses	**400 level**	EPS.A410.A	○ ★ □	A	Advanced Earth and Space Sciences A	2-0-0	1,2,3,4,5	A	
		EPS.A411.A	○	A	Advanced Earth and Space Sciences B	2-0-0	3	A	
		EPS.A413.A	○ □	A	Advanced Earth and Space Sciences C	2-0-0	3,5	A	
		EPS.A418.A	○ □	A	Advanced Earth and Space Sciences E	2-0-0	1,2,3	A	
		EPS.A419.A	○	A	Advanced Earth and Space Sciences F	2-0-0	3	A	
		EPS.A421.A	○ □	A	Advanced Earth and Space Sciences G	2-0-0	3	A	
		EPS.A422.A	○ □	A	Advanced Earth and Space Sciences D	2-0-0	3	A	
		EPS.A424.A	○ □	A	Advanced Earth and Space Sciences H	2-0-0	3,5	A	
		EPS.A451.A	○	A	Special Lecture in Earth and Planetary Sciences AI	2-0-0	1,3,5	A	
		EPS.A452.A	○	A	Special Lecture in Earth and Planetary Sciences BI	2-0-0	3	A	
		EPS.A453.A	○	A	Special Lecture in Earth and Planetary Sciences CI	2-0-0	3	A	
		EPS.A454.A	○	A	Special Lecture in Earth and Planetary Sciences DI	2-0-0	3	A	
		EPS.A455.A	○	A	Special Lecture in Earth and Planetary Sciences AII	1-0-0	3	A	
		EPS.A456.A	○	A	Special Lecture in Earth and Planetary Sciences BII	1-0-0	3	A	
		EPS.A457.A	○ ★	A	Special Lecture in Earth and Planetary Sciences CII	1-0-0	1,2,3,4,5	A	
		EPS.A458.A	○ ★	A	Special Lecture in Earth and Planetary Sciences DII	1-0-0	1,2,3,4,5	A	
		EPS.C428.L	★		Cutting Edge Topics in Earth and Planetary Sciences A	0-1-0	1,2,4	C	

		EPS.C429.L	★		Cutting Edge Topics in Earth and Planetary Sciences B	0-1-0	1,2,4	C	
		EPS.C430.L	★		Cutting Edge Topics in Earth and Planetary Sciences C	0-1-0	1,2,4	C	
		EPS.C431.L	★		Cutting Edge Topics in Earth and Planetary Sciences D	0-1-0	1,2,4	C	
		EPS.C438.L	★		EPS Career Development A	0-1-0	2,4,5	C	
		EPS.C439.L	★		EPS Career Development B	0-1-0	2,4,5	C	
		EPS.C440.L	★		EPS Career Development C	0-1-0	2,4,5	C	
		EPS.C441.L	★		EPS Career Development D	0-1-0	2,4,5	C	
		EPS.C458.L	★		EPS Tutorial A	0-1-0	2,4,5	C	
		EPS.C459.L	★		EPS Tutorial B	0-1-0	2,4,5	C	
		EPS.C460.L	★		EPS Tutorial C	0-1-0	2,4,5	C	
		EPS.C461.L	★		EPS Tutorial D	0-1-0	2,4,5	C	
	500 level	EPS.A551.A	○	A	Special Lecture in Earth and Planetary Sciences EI	1-0-0	3	A	
		EPS.A552.A	○	A	Special Lecture in Earth and Planetary Sciences FI	1-0-0	3	A	
		EPS.A553.A	○	A	Special Lecture in Earth and Planetary Sciences GI	1-0-0	3	A	
		EPS.A554.A	○	A	Special Lecture in Earth and Planetary Sciences HI	1-0-0	3	A	
		EPS.A555.A	○	A	Special Lecture in Earth and Planetary Sciences EII	1-0-0	3	A	
		EPS.A556.A	○	A	Special Lecture in Earth and Planetary Sciences FII	1-0-0	3	A	

		EPS.A557.A	○	A	Special Lecture in Earth and Planetary Sciences GII	1-0-0	3	A	
		EPS.A558.A	○	A	Special Lecture in Earth and Planetary Sciences HII	1-0-0	3	A	
		EPS.C528.L	★		Cutting Edge Topics in Earth and Planetary Sciences E	0-1-0	1,2,4	C	
		EPS.C529.L	★		Cutting Edge Topics in Earth and Planetary Sciences F	0-1-0	1,2,4	C	
		EPS.C530.L	★		Cutting Edge Topics in Earth and Planetary Sciences G	0-1-0	1,2,4	C	
		EPS.C531.L	★		Cutting Edge Topics in Earth and Planetary Sciences H	0-1-0	1,2,4	C	
		EPS.C538.L	★		EPS Career Development E	0-1-0	2,4,5	C	
		EPS.C539.L	★		EPS Career Development F	0-1-0	2,4,5	C	
		EPS.C540.L	★		EPS Career Development G	0-1-0	2,4,5	C	
		EPS.C541.L	★		EPS Career Development H	0-1-0	2,4,5	C	
		EPS.C558.L	★		EPS Tutorial E	0-1-0	2,4,5	C	
		EPS.C559.L	★		EPS Tutorial F	0-1-0	2,4,5	C	
		EPS.C560.L	★		EPS Tutorial G	0-1-0	2,4,5	C	
		EPS.C561.L	★		EPS Tutorial H	0-1-0	2,4,5	C	

Note：

• ◎：Required course, ○：Restricted elective, ★：Classes in English

• □：Course recognized as equivalent to that of the Academy for Co-creative Education of Environment and Energy Science (ACEEES).

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

•【 】Course offered by another graduate major

• 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), Z (Research seminars)

6. IGP Courses That Can Be Counted as Humanities and Social Science Courses

None

7. IGP Courses That Can Be Counted as Career Development Courses

In order to fulfill the completion requirements for the master's degree program, students must attain at least 2 credits in Career Development Courses, and should satisfy all of the Graduate Attributes (GA) specified in Table MA-1 of the "Career Development Courses" (Liberal Arts and Basic Science Courses) in the Guide to Graduate Education and International Graduate Program. Students will be evaluated in regards to GA achievements at the time of their degree completion. As to the courses with more than one GA, the number of GA stipulated for the courses is considered to be acquired regardless of the credits received for the courses.

Major Courses that enable students to acquire GA and that are recognized as equivalent to Career Development Courses are listed in Table M3 below.

However, it must be noted that credits attained from these courses cannot be counted more than once as Major Courses or Career Development Courses towards the completion requirements for the master's degree program.

For Graduate Attributes, refer to the Guide to the Career Development Courses.
The Graduate Attributes of the Master's Degree Program are listed in Table MA-1 as follows:

C0M: Able to delineate one's career plan clearly and recognize the skills necessary to materialize the plan, also considering its relations to the society

C1M: Able to utilize its own expertise to the development of academia and technology, and work with others with different expertise to contribute to problem-solving

Table M3. Courses of the Graduate Major in Earth and Planetary Sciences recognized as equivalent to Career Development Courses

Course category	Course number	Course title			Credits	GA*	Learning goals	Comments
Courses that can be counted as Career Development Courses	XIP.A401		★	Special International Practice in Science	0-2-0	C1M		Common Course of School of Science Outside the Graduate Major in Earth and Planetary Sciences standard curriculum
	EPS.C428.L ～EPS.C431.L EPS.C528.L ～EPS.C531.L		★	Cutting Edge Topics in Earth and Planetary Sciences A～H	0-1-0	C1M	C	
	EPS.C438.L ～EPS.C441.L EPS.C538.L ～EPS.C541.L		★	EPS Career Development A～H	0-1-0	C0M	C	

	EPS.C458.L ～EPS.C461.L EPS.C558.L ～EPS.C561.L		★	EPS Tutorial A～H	0-1-0	C1M	C	

★ : Classes in English

Credits in Career Development Courses must be attained from among the above-listed courses and those listed as such in the Liberal Arts and Basic Science Courses Guide.

＊GA: Graduate Attributes

8. Overview of Curriculum System

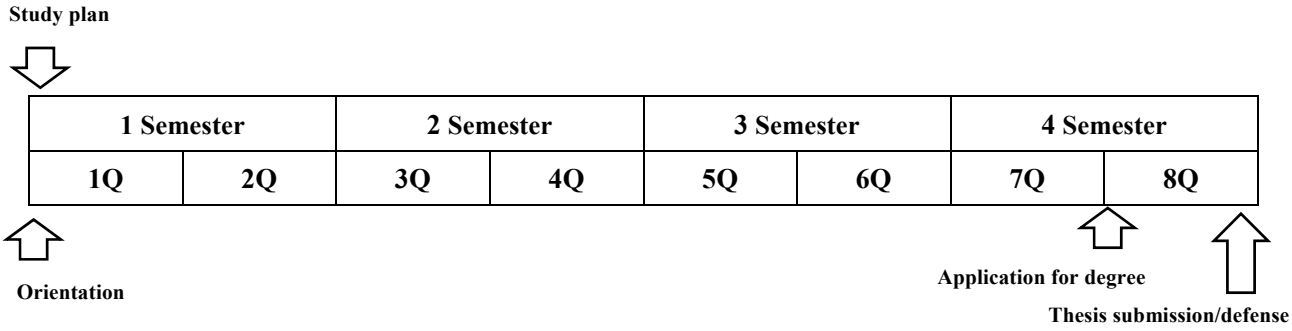
	1①	1②	1③	1④	2①	2②	2③	2④
Major courses	Advanced Earth and Space Sciences A	Advanced Earth and Space Sciences B	Advanced Earth and Space Sciences C	Advanced Earth and Space Sciences D	Advanced Earth and Space Sciences A	Advanced Earth and Space Sciences B	Advanced Earth and Space Sciences C	Advanced Earth and Space Sciences D
	Advanced Earth and Space Sciences E	Advanced Earth and Space Sciences F	Advanced Earth and Space Sciences G	Advanced Earth and Space Sciences H	Advanced Earth and Space Sciences E	Advanced Earth and Space Sciences F	Advanced Earth and Space Sciences G	Advanced Earth and Space Sciences H
	Special Lecture in Earth and Planetary Sciences AI, AII	Special Lecture in Earth and Planetary Sciences BI, BII	Special Lecture in Earth and Planetary Sciences CI, CII	Special Lecture in Earth and Planetary Sciences DI, DII	Special Lecture in Earth and Planetary Sciences EI, EII	Special Lecture in Earth and Planetary Sciences FI, FII	Special Lecture in Earth and Planetary Sciences GI, GII	Special Lecture in Earth and Planetary Sciences FI, FII
Reserach-related courses	Exercise in Earth and Planetary Sciences A	Exercise in Earth and Planetary Sciences B	Exercise in Earth and Planetary Sciences C	Exercise in Earth and Planetary Sciences D	Exercise in Earth and Planetary Sciences E	Exercise in Earth and Planetary Sciences F	Exercise in Earth and Planetary Sciences G	Exercise in Earth and Planetary Sciences H
Core courses	Seminar in Earth and Planetary Sciences S1		Seminar in Earth and Planetary Sciences F1		Seminar in Earth and Planetary Sciences S2		Seminar in Earth and Planetary Sciences F2	
Career courses	Cutting Edge Topics in Earth and Planetary Sciences A	Cutting Edge Topics in Earth and Planetary Sciences B	Cutting Edge Topics in Earth and Planetary Sciences C	Cutting Edge Topics in Earth and Planetary Sciences D	Cutting Edge Topics in Earth and Planetary Sciences E	Cutting Edge Topics in Earth and Planetary Sciences F	Cutting Edge Topics in Earth and Planetary Sciences G	Cutting Edge Topics in Earth and Planetary Sciences H
	EPS Career Development A	EPS Career Development B	EPS Career Development C	EPS Career Development D	EPS Career Development E	EPS Career Development F	EPS Career Development G	EPS Career Development H
	EPS Tutorial A	EPS Tutorial B	EPS Tutorial C	EPS Tutorial D	EPS Tutorial E	EPS Tutorial F	EPS Tutorial G	EPS Tutorial H

9. Example of a Standard Curriculum

	1①	1②	1③	1④	2①	2②	2③	2④
Major courses	Advanced Earth and Space Sciences A	Advanced Earth and Space Sciences B	Advanced Earth and Space Sciences C	Advanced Earth and Space Sciences D	Classes in other majors	Advanced Earth and Space Sciences F	Advanced Earth and Space Sciences G	
Research-related courses	Exercise in Earth and Planetary Sciences A	Exercise in Earth and Planetary Sciences B	Exercise in Earth and Planetary Sciences C	Exercise in Earth and Planetary Sciences D	Exercise in Earth and Planetary Sciences E		Exercise in Earth and Planetary Sciences G	
Core courses	Seminar in Earth and Planetary Sciences S1		Seminar in Earth and Planetary Sciences F1		Seminar in Earth and Planetary Sciences S2		Seminar in Earth and Planetary Sciences F2	
Career courses				EPS Career Development D		Cutting Edge Topics in Earth and Planetary Sciences F		

10. Research Related to the Completion of Master's Theses

In the master thesis research, students experience the research process through the small-group specialized instruction in each laboratory promoting cutting-edge research and develop their own skills in problem establishment, problem solving and communication through preparation of theses.



• The criteria for examination

Following requirements must be met.

1. On the research content
   The content should be the level that contributes to the progress in relevant research field.
2. On the thesis
   It includes an adequate review of the relevant research field. The relative position of the research in the field needs to be clear.

• The thesis review procedure

The review committee consists of at least three faculty members of the earth and planetary sciences course. The final judgment is carried out after reviewing the thesis and the presentation by the candidate. The examination for candidate who enters the PhD course is made by at least five faculty members.

11. Seamless Transition Between Degree Programs

The course program is constructed in order that students can satisfactorily advance their research from the global point of view on the basis of the basic, advanced and cutting-edge knowledge that they learned in the master course. The curriculum includes advanced training courses for research presentation and writing of paper, and courses for the support of overseas research activities and those for training for organizing international conferences.

• Deep understanding in earth and planetary sciences acquired by exploring the fundamental laws and principles in the earth and planets.
• Competency to create new knowledge and to transmit it.
• Competency to lead research frontiers in earth and planetary sciences with deep insight and ethical perspective.
• Competency to show international leadership in specialized research fields.

As shown in Table D2, the PhD curriculum provides practical major courses of 600-level as those which support domestic and overseas research activities, bearing the internationalization in mind. Advancing major courses of 400- and 500-levels, the PhD curriculum aims to foster researchers who are active in the world.

【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. Attain a total of 24 credits or more from 600-level courses.
2. Fulfill requirements in Table D1 below.
3. Pass the doctoral dissertation review and defense.

Table D1 shows course categories and the number of credits required to complete the Doctoral Degree Program of this major. It also shows the required minimum credits in each course category and points to be noted when selecting the required courses and electives.

The learning goals to be obtained by students through courses are listed as “associated learning goals”. Prior to registering courses, students need to fully understand the course goals.

Table D1. Graduate Major in Earth and Planetary Sciences 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	C	
	Career development courses		4 credits		C	All Graduate Attributes (GA) should be acquired. (Refer to Section 7 for the definition of GA.)
	Other courses					
Core courses	Research seminars	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.		12 credits	B	
	Research-related courses				B	
	Major courses				A, C	
	Major courses and Research-related courses <u>outside</u> the Graduate Major in Earth and					

	Planetary Sciences standard curriculum					
Total required credits		**A minimum of 24 credits including those attained according to the above conditions**				
Note		**・Japanese Language and Culture Courses offered to international students can be recognized as equivalent to the Humanities and Social Science Courses of the corresponding course level.** **・For details of the Liberal Arts and Basic Science Courses, please refer to the relevant sections.**				

5. IGP Courses

Table D2 shows the Core Courses of the Doctoral Degree Program of this major. Graduate Majors listed in the Comments column offer core courses that are recognized as equivalent to the corresponding Major Courses or Research-related Courses in the standard curriculum of this major.

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

Course category		**Course number**	**Course title**			**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 Sciences N	1-0-0	3	A	
		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 recognized as equivalent to that of the Academy for Co-creative Education of Environment and Energy Science (ACEEES).

• 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.D600.R): A (advanced), C (career)

6. IGP Courses That Can Be Counted as Humanities and Social Science Courses

None

7. IGP Courses That Can Be Counted as Career Development Courses

In order to fulfill the completion requirements for the doctoral degree program, students must attain at least 4 credits in Career Development Courses, and should satisfy all of the Graduate Attributes (GA) specified in Table A-1 or A-2 of the “Career Development Courses” (Liberal Arts and Basic Science Courses) in the Guide to Graduate Education and

International Graduate Program. Students will be evaluated in regards to GA achievements at the time of their degree completion. As to the courses with more than one GA, the number of GA stipulated for the courses is considered to be acquired regardless of the credits received for the courses.

Major Courses that enable students to acquire GA and that are recognized as equivalent to Career Development Courses are listed in Tables D3-1 and D3-2 below.

However, it must be noted that credits attained from these courses cannot be counted more than once as Major Courses or Career Development Courses towards the completion requirements for the doctoral degree program.

For Graduate Attributes, refer to the Guide to the Career Development Courses.
The Graduate Attributes of the Academic Leader Program (ALP) are listed in Table A-1 as follows:

A0D: You will be able to precisely draw your own career plan and self-train yourself to acquire the skills required for attaining your goals in the academic field

A1D: You will be able to ascertain the true nature of phenomena, master the secret of learning, and lead the pioneering of a new academic discipline or research area

A2D: You will be able to understand the position of academia in society, and adequately explain the academic progress to members of society, which is the stakeholder

A3D: You will be able to nurture junior students in educational institutions, inculcating in them an interest in academics and enabling them to later join in the pioneering of new academic disciplines or research areas

The Graduate Attributes of the Productive Leader Program (PLP) are listed in Table A-2 as follows:

P0D: You will be able to precisely draw your own career plan and self-train yourself to acquire the skills required for attaining your goals in the industry, etc.

P1D: You will be able to precisely grasp the needs of society and detect its problems, and lead the future developments in science and technology

P2D: While leading teams consisting of members with varied specialties and value systems, you will be able to create products and enterprises that bring forth new values in the society

P3D: Through the project, you will be able to nurture junior students, enabling them to later join in the development of next generation society and industry

Table D3-1. Courses of the Graduate Major in Earth and Planetary Sciences recognized as equivalent to Career Development Courses in the Academic Leader Program (ALP)

Course category	Course number	Course title			Credits	GA*	Learning goals	Comments
Courses that can be counted 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

Credits in Career Development Courses must be attained from among the above-listed courses and those listed as such in the Liberal Arts and Basic Science Courses Guide.

＊GA: Graduate Attributes

Table D3-2. Courses of the Graduate Major in Earth and Planetary Sciences recognized as equivalent to Career Development Courses in the Productive Leader Program (PLP)

Course category	Course number			Course title	Credits	GA*	Learning goals	Comments
Courses that can be counted 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

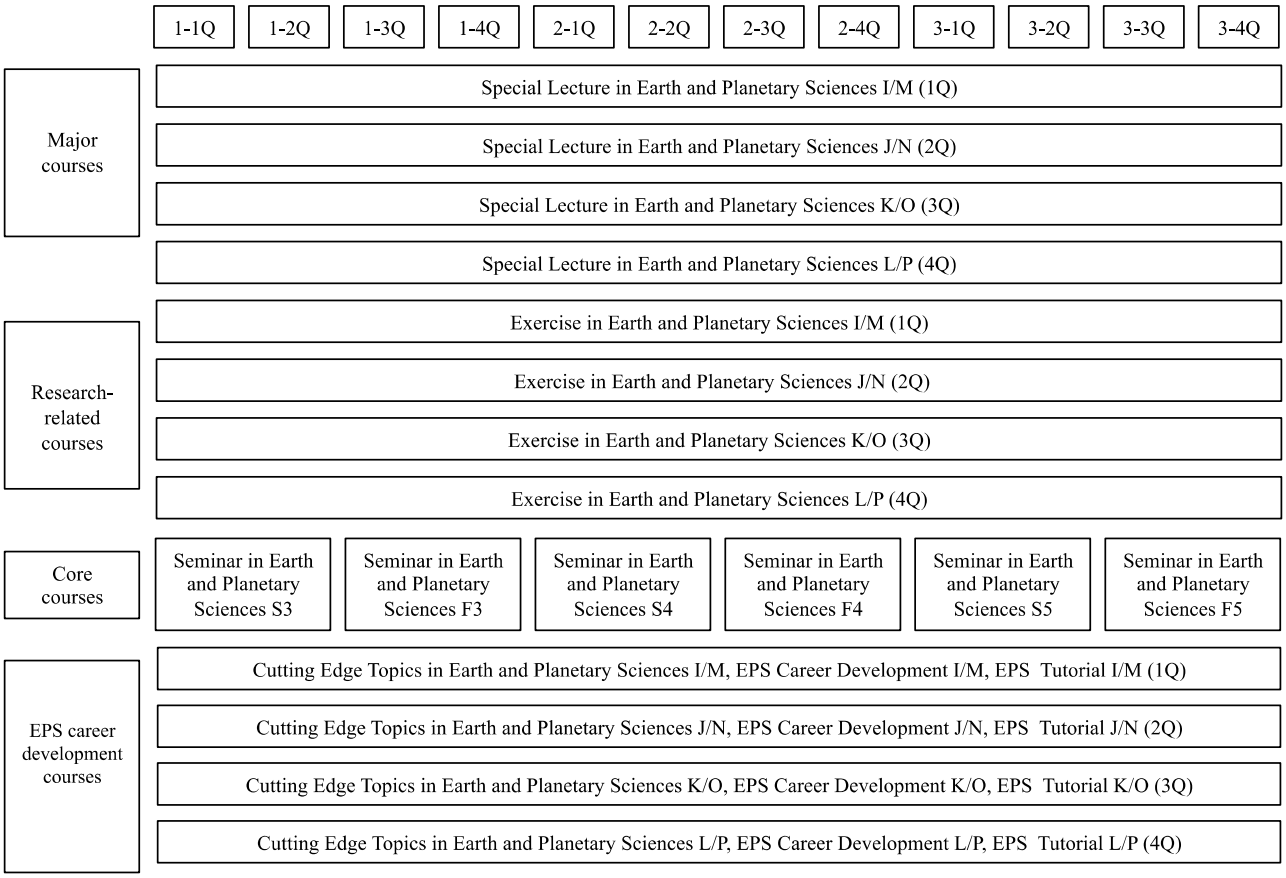
Credits in Career Development Courses must be attained from among the above-listed courses and those listed as such in the Liberal Arts and Basic Science Courses Guide.

＊GA: Graduate Attributes

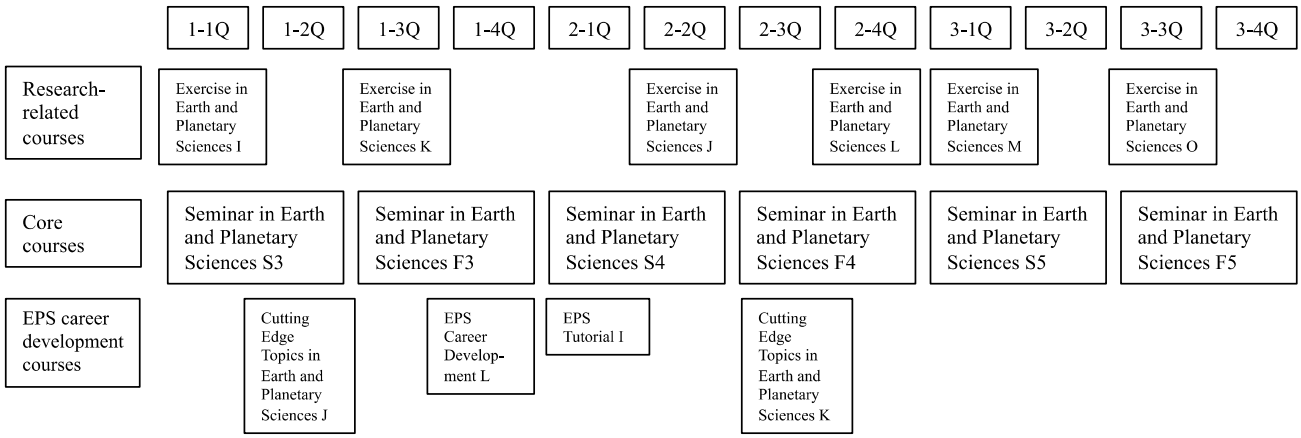
Students enrolled in the educational program for leading graduate schools or in the Tokyo Tech Academy for Leadership (ToTAL) may be offered courses recognized as equivalent to Career Development Courses besides those listed as such in the “Liberal Arts and Basic Science Courses” in the Guide to Graduate Education and International Graduate Program. For details

about available courses or completion requirements, please refer to the Study Guide of the Academy that offers the relevant program.

8. Overview of Curriculum System

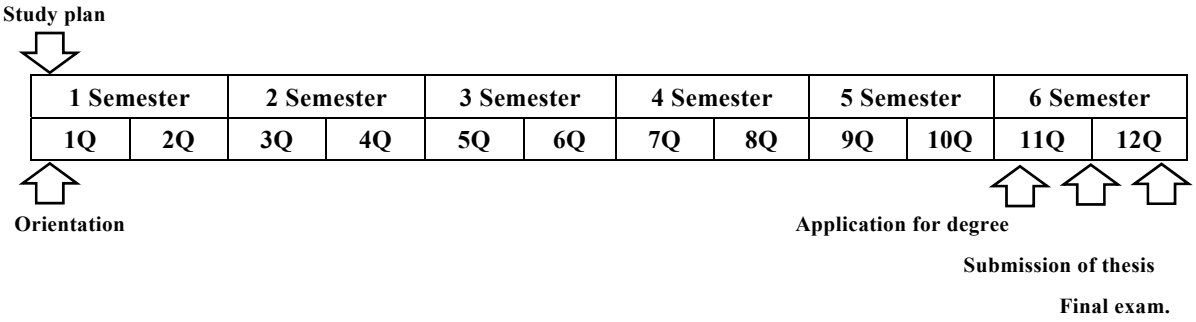


9. Example of a Standard Curriculum



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.