

Appended Form 1

Specifications for Major Program

Name of School (Program) [School of Science (Department of Earth and Planetary Systems Science)]

Program name (Japanese)	地球惑星システム学プログラム
(English)	Earth and Planetary Systems Science

1. Degree to be obtained: Bachelor of Science

2. Overview

The School of Science at Hiroshima University aims to educate students to steadily learn the basics of natural science, and to foster acute sensitivity for exploring truth, in order to provide professionals with an integrated ability to make judgments based on broad and deep intelligence.

The Earth and Planetary Systems Science Program aims to provide people of talent who have their intellectual base in earth and planetary science and are capable of working as (1) researchers, (2) engineers, and (3) educators in various fields in society. For example, students are expected to become (1) faculty members at a college or researchers in another research institute, (2) civil engineering consultants and engineers in a company related to natural resources, energy, disaster prevention, and information technology, and (3) science teachers in junior and/or senior high schools. In order to educate students to acquire knowledge, specialized skills, and analytic capabilities that cover the wide field of earth and planetary science, and to provide subjects that meet the various interests and characteristics of each student, the program consists of field exercises and graduation research in addition to lectures, practices, and exercises provided as indoor classes.

In this program, students study, from the basics to the application, three categories of subjects required for advanced research in earth and planetary systems science, i.e. (1) minerals, rocks, and geology; (2) the solar system, the earth, and the emergence and evolution of life; and (3) the motion mechanisms and internal structure of the solid part of the earth and planets. This program is composed as a bottom-up process that works on a year by year basis to enable students to study earth and planetary science from its basics and finally become capable of the application and practice required for state-of-the-art research.

3. Diploma policy (policy for awarding degrees and goal of the program)

This program aims to educate students to become people of talent who can work actively, with an international point of view, as researchers, engineers, and educators in fields related to earth and planetary systems science, in which various areas of earth and planetary science are amalgamated. This program will award the degree bachelor of science to students who have acquired the capabilities described below and earned the required credits defined for the educational course:

- The basic knowledge of mathematics, physics, chemistry, biology, and earth and planetary science required for studying a wide variety of areas of earth and planetary systems science;
- The basic skills in English and information processing req

planetary systems science;

- The capability for reading academic documents related to earth and planetary science in Japanese and English, and understanding and examining structures and phenomena from the microscopic to the macroscopic level; and
- The capability for performing specialized research related to earth and planetary systems science, organizing the results into a thesis, and presenting it in English.

4. Curriculum policy (policy for organizing and implementing the curriculum)

This program has been designed to educate students through the study, first of all, of the wide range of basics in earth and planetary systems science that form a fusion of the various areas of the field, before advancing to further specialized areas.

- In the first year, students study subjects to learn a wide range of the basics of mathematics, physics, chemistry, biology, and earth and planetary science in liberal arts education and specialized education. In addition to this, they learn foreign languages, mainly English, and the basics of information processing, in order to acquire the fundamental skills required for studying earth and planetary science. Students also acquire basic knowledge related to geology in liberal arts seminars and field excursions.
- In the second year, in specialized education, students study the basics of geology, physics of earth and planetary interiors, and geo- and cosmochemistry, in order to acquire basic capabilities required for the specialized study of a variety of areas in earth and planetary systems science. Students also acquire skills in basic English that can be immediately useful for specialized areas in the classes that are specifically designed for earth and planetary science. The field excursion is conducted in a different location to that of the first year, to enhance students' knowledge of geology.
- In the third year, students enhance their knowledge and skills in specialized areas through lectures and exercises mainly related to elective subjects for specialized education. Students also acquire skills in intermediate English that can be immediately useful for specialized areas in the classes that are specifically designed for earth and planetary science. They conduct geological surveys and indoor experiments as practice in order to acquire the practical capabilities required for research activities such as observation in the field, data processing, report preparation, and presentation.
- In the fourth year, students are allocated to a laboratory to conduct graduation research on their own topics. They acquire knowledge and skills related to specialized areas through their activities in the laboratory, and develop communication and presentation abilities in seminars and presentation practice.

Academic achievement is evaluated based on grade scores for the subjects, and the level of achievement against the target defined for this program.

5. Start time and acceptance conditions

Students of the Department of Earth and Planetary Science choose this program when they enter our university. There is no problem even if the student did not take a course in geoscience at high school, since the program is designed to allow the student to study earth and planetary systems science from the basics to specialized knowledge in a step-by-step process, starting upon entering the university.

The curriculum is composed with the expectation that students have studied mathematics, physics and chemistry at high school, and they are required to take the specified fundamental subjects in mathematics, physics and chemistry in

their first and second years to understand basics of those subjects.

Requirements for when a student in a department other than the Department of Earth and Planetary Systems Science chooses this program are separately stipulated based on the provisions regarding transfer between schools/departments.

6. Obtainable qualifications

1: Educational personnel certification

(1) Type 1 License for Junior High School Teacher (Science)

(2) Type 1 License for High School Teacher (Science)

2: Curator license

3: Assistant registered surveyor

7. Class subjects and their contents

* For the class subjects, refer to the subject table in Attachment 1.

* For the details of the class subjects, refer to the syllabus that is published for each academic year.

8. Academic achievement

The evaluation criteria are specified for each evaluation item for academic achievement, and the level of achievement against the criteria is designated at the end of the semester.

The evaluation score for each evaluation item is converted to a numerical value (S = 4, A = 3, B = 2, and C = 1) and the evaluation standard for academic achievement, from when the student entered the university to the end of the last semester, is determined using these values while applying weightings. The evaluation standards consist of three levels, i.e. Excellent, Very Good, and Good.

Evaluation of academic achievement	Converted value
S (90 or more points)	4
A (80 – 89 points)	3
B (70 – 79 points)	2
C (60 – 69 points)	1

Academic achievement	Evaluation criteria
Excellent	3.00 – 4.00
Very Good	2.00 – 2.99
Good	1.00 – 1.99

* Refer to the relationship between evaluation items and evaluation criteria described in Attachment 2.

* Refer to the relationship between evaluation items and class subjects described in Attachment 3.

* Refer to the curriculum map in Attachment 4.

9. Graduation thesis (graduation research) (meaning, student allocation, timing, etc.)

1. Meaning

To demonstrate achievement in the bachelor's course as a whole.

2. Timing of student allocation

At the beginning of the fourth academic year. To be allocated to a laboratory, students must satisfy the "Conditions for Starting Graduation Research." For the details, refer to Study Guidance for the Earth and Planetary Science Program in the "Students Handbook" (received when the student enters the university).

3. Method of student allocation

If the number of students who wish to be allocated to each member of faculty varies significantly, the faculty member to which students are allocated for graduation research is determined based on their academic score at the end of the third academic year.

10. Responsibility

(1) Responsibility for PDCA (plan, do, check, and act) cycle

If the number of students who wish to be allocated to each member of faculty varies significantly, the faculty member to which students are allocated for graduation research is determined based on their academic score at the end of the third academic year.

Liberal Arts Education Subjects	Common Subjects	Peace Science Courses	2	From "Peace Science Courses"	Each 2	Elective/required	○				
		Introduction to University Education	2	Introduction to University Education	2	Required	②				
		Introductory Seminar for First-Year Students	2	Introductory Seminar for First-Year Students	2	Required	②				
		Area Courses	Advanced Seminar	1	Free elective	○	○				
			From "Area Courses" (Note 3)	1or2	Elective/required	○	○	○	○		
			Basic English Usage I	1		①					
			Basic English Usage II	1				①			
			Communication IA	1		①					
			Communication IB	1		①					
			Communication IIA	1				①			
	Communication IIB		1				①				
	Foreign Languages: Basic Studies I		1	Elective/required	○						
	Foreign Languages: Basic Studies II	1	Elective/required	○							
	Social Cooperation Courses (Note 7)	(0)	2 Introduction to Information and Data Sciences	2	Required	②					
			Starting Programming from Scratch	2				○			
			Fundamental Date Science	2				○			
			From "Health and Sports Courses"	1or2	Free elective	○	○				
		From "Social Cooperation Courses"	1or2	Free elective	○	○					
		Calculus I	2		○						
		Calculus II	2				○				
4 Linear Algebra I		2		○							
Linear Algebra II		2				○					
Foundation Courses		8	Experimental Methods and Laboratory Work in Physics I	1			○				
	Experimental Methods and Laboratory Work in Physics II		1			○					
	Experimental Methods and Laboratory Work in Chemistry I		1					○			
	Experimental Methods and Laboratory Work in Chemistry II		1					○			
	Experimental Methods and Laboratory Work in Biology I		1			○					
	Experimental Methods and Laboratory Work in Biology II		1			○					
	Experimental Methods and Laboratory Work in Earth Sciences I		1		○						
	Experimental Methods and Laboratory Work in Earth Sciences II		1		○						
Total (Liberal Arts Education Subjects)			34								

Introduction to Physics A	2	②		
Introduction to Chemistry A	2	②		
Introduction to Biological Sciences A	2	②		
Introduction to Earth and Planetary Sciences A	2	②		
Field Excursion for Earth Science A	1	①		
Tectonics of the Earth	2		②	
Introduction to Earth and Planetary Sciences B	2		②	
Basics of Earth and Planetary Materials Science	2			②
Geologic Mapping	2			②
English for Earth and Planetary Sciences I	2			②
Introduction to Mathematics	2	○		
Introduction to Information Mathematics	2		○	
Introduction to Physics B	2		○	
Introduction to Chemistry B	2		○	
Introduction to Biological Sciences B	2		○	
Sedimentology and Paleontology I	2			②
Physics of Earth and Planetary Interiors I	2			②
Solid Geochemistry I	2			②
Optical crystallography laboratory	1			①
Practice for Basics of Earth and Planetary Materials Science	1			①
Physics of Earth and Planetary Interiors II	2			②
Earth and Planetary Materials Science I	2			②
Petrology	2			②
Petrology laboratory	1			①
Practice for Earth and Planetary Materials Science I	1			①
Field Excursion for Earth Science B	1			①
English for Earth and Planetary Sciences II	2			②
Practice of Earth and Planetary Systems Science A (Field Work)	4			④
Practice of Earth and Planetary Systems Science B (Experimental Study)	2			②
Special Study for Graduation (Note 9)				



Relationships between the evaluation items and class subjects

Subject Classification	Subject Name	Credits	Type of course registration	Grade	Evaluation items																														Total weighted values of evaluation items in the subject				
					Knowledge and Understanding														Abilities and Skills										Comprehensive Abilities										
					(1)		(2)		(3)		(4)		(5)		(6)		(7)		(1)		(2)		(3)		(4)		(5)		(6)		(7)		(1)			(2)		(3)	
					Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject		Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	Weighted values of evaluation items in the subject	
Liberal Arts Education	Peace Science Courses	2	Elective/required	1										100	1																						100		
Liberal Arts Education	Introduction to University Education	2	Required	1												100	1																				100		
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	1									100	1																							100		
Liberal Arts Education	Advanced Seminar	1	Free elective	1~2									100	1																							100		
Liberal Arts Education	Area Courses	8	Elective/required	1~4													100	1																			100		
Liberal Arts Education	Basic English Usage I	1	Required	1																100	1																100		
Liberal Arts Education	Basic English Usage II	1	Required	2																	100	1															100		
Liberal Arts Education	Communication I	2	Required	1																	100	1															100		
Liberal Arts Education	Communication II	2	Required	2																		100	1														100		
Liberal Arts Education	Foreign Languages: Basic Studies I	1	Elective/required	1																		100	1														100		
Liberal Arts Education	Foreign Languages: Basic Studies II	1	Elective/required	1																		100	1														100		
Liberal Arts Education	Introduction to Information and Data Sciences	2	Required	1																						100	1										100		
Liberal Arts Education	Starting Programming from Scratch	2	Elective/required	2																							100	1									100		
Liberal Arts Education	Fundamental Date Science	2	Elective/required	2																								100	1								100		
Liberal Arts Education	Health and Sports Courses	0	Free elective	1~2																										100	1						100		
Liberal Arts Education	Social Cooperation Courses	0	Free elective	1~2												100	1																				100		
Liberal Arts Education	Calculus I	2	Elective/required	1																				100	1												100		
Liberal Arts Education	Calculus II	2	Elective/required	2																					100	1											100		
Liberal Arts Education	Linear Algebra I	2	Elective/required	1																					100	1											100		
Liberal Arts Education	Linear Algebra II	2	Elective/required	2																						100	1										100		
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I	1	Elective/required	2																						100	1										100		
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics II	1	Elective/required	2																						100	1										100		
Liberal Arts Education	Experimental Methods and Laboratory Work in Chemistry I	1	Elective/required	3																						100	1										100		
Liberal Arts Education	Experimental Methods and Laboratory Work in Chemistry II	1	Elective/required	3																						100	1										100		
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology I	1	Elective/required	1																						100	1										100		
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology II	1	Elective/required	1																						100	1										100		
Liberal Arts Education	Experimental Methods and Laboratory Work in Earth Sciences I	1	Elective/required	1																						100	1										100		

[illegible]

Academic achievements Evaluation items		1st grade		2nd grade		3rd grade		4th grade	
		Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
Knowledge and Understanding	To acquire knowledge and understanding about the origin and development of the solar system and the earth.	Introduction to Earth and Planetary Sciences A(◎)	Introduction to Earth and Planetary Sciences B(◎)	Optical crystallography laboratory(◎)	Geologic Mapping(◎)	Material evolution in the solar system(○)	Cosmochemistry and Geochemistry(○)		
				Solid Geochemistry I(◎)	Petrology(◎)	Solid Geochemistry II(○)			
					Petrology laboratory(◎)	Astrobiology(○)			
					Exercise of Astronomy & Planetary Science(○)				
	To acquire understanding and technical knowledge about earthquake phenomena and the earth's internal structure.	Introduction to Earth and Planetary Sciences A(◎)	Introduction to Earth and Planetary Sciences B(◎)	Optical crystallography laboratory(◎)	Physics of Earth and Planetary Interiors II(◎)	Physics of Earth and Planetary Interiors A(○)	Physics of Earth and Planetary Interiors B(○)		
			Tectonics of the Earth(◎)	Physics of Earth and Planetary Interiors I(◎)	Petrology(◎)	Mathematical and numerical methods in the physics of Earth and Planetary Interiors A(○)	Mathematical and numerical methods in the physics of Earth and Planetary Interiors B(○)		
					Petrology laboratory(◎)	Rock Deformation I(○)	Rock Deformation II(○)		
	To acquire understanding and technical knowledge about the progress of Earth surface environment and biosphere.	Introduction to Earth and Planetary Sciences A(◎)	Introduction to Earth and Planetary Sciences B(◎)	Basics of Earth and Planetary Materials Science(◎)	Sedimentology and Paleontology II(◎)	Practice for Earth and Planetary Materials Science II(○)			
				Sedimentology and Paleontology I(◎)	Petrology laboratory(◎)				
				Optical crystallography laboratory(◎)	Earth and Planetary Materials Science II(○)				
				Practice for Basics of Earth and Planetary Materials Science(◎)	Earth and Planetary Materials Science I(◎)				
					Practice for Earth and Planetary Materials Science I(○)				
	Being able to collect materials by basic ways. Being able to find issues from specific phenomena and explain them. Being able to make clearly arguable discussion and effective presentation.	Introductory Seminar for First-Year Students(◎)							
		Advanced Seminar(△)	Advanced Seminar(△)						
	To be able to express opinions by thinking of peace from multiple perspectives, including understanding various causes and complex aspects which hinder the realization of peace, as well as conflicts between ideal and reality. Also, to be able to explain one's knowledge.	Peace Science Courses(○)							
	To be able to explain historical or modern issues that human and society face (social structure and the way science should be, significance of intellectual activities, and significance of multicultural relations and coexistence with nature) from multiple perspective.	Introduction to University Education(◎)							
		Social Cooperation Courses(△)							
	Being able to explain the process of construction and development in each academic discipline. Being able to explain how each academic discipline relates to culture and society.	Area Courses(○)	Area Courses(○)	Area Courses(○)	Area Courses(○)				

Academic achievements Evaluation items		1st grade		2nd grade		3rd grade		4th grade	
		Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
Abilities and Skills	To acquire the ability to apply and develop the basic knowledge of earth and planetary science by organizing it.			Geochemistry and Geophysics Internship(O)		Material evolution in the solar system(O)	Cosmochemistry and Geochemistry(O)		
						Surveying(O)	Advanced Earth and Planetary Science(O)		
	Reading related papers and acquiring the ability of understanding the contents. Reading related papers and acquiring the ability of understanding the contents. Verbal or written regular/daily communication can be carried out using foreign languages. Understand different languages and cultures by using multiple foreign languages.	Basic English Usage I (◎)	Basic English Usage II (◎)		English for Earth and Planetary Sciences I(◎)	English for Earth and Planetary Sciences II(◎)			
		Communication I A(◎)	Communication II A(◎)						
		Communication I B(◎)	Communication II B(◎)						
		Foreign Languages: Basic Studies I (△)							
		Foreign Languages: Basic Studies II (△)							
	Being able to understand, learn and explain logical framework and system of basic studying according to each subject and necessary knowledge and skills for constructing learning.	Introduction to Physics A(◎)	Introduction to Earth and Planetary Sciences B(◎)	Experimental Methods and Laboratory Work in Chemistry I (O)	English for Earth and Planetary Sciences I(◎)	Advanced Mathematics (O)	Advanced Chemistry(O)		
		Introduction to Chemistry A (◎)	Introduction to Information Mathematics (O)	Experimental Methods and Laboratory Work in Chemistry II (O)	Advanced Physics (O)	Advanced Biology (O)	Advanced Earth and Planetary Science(O)		
		Introduction to Biological Sciences A(◎)	Introduction to Physics B (O)						
		Introduction to Earth and Planetary Sciences A(◎)	Introduction to Chemistry B (O)						
		Introduction to Mathematics (O)	Introduction to Biological Sciences B(O)						
		Calculus I(O)	Calculus II(O)						
		Linear Algebra I(O)	Linear Algebra II(O)						
		Experimental Methods and Laboratory Work in Earth Sciences I (O)	Experimental Methods and Laboratory Work in Physics I (O)						
		Experimental Methods and Laboratory Work in Earth Sciences II (O)	Experimental Methods and Laboratory Work in Physics II (O)						
			Experimental Methods and Laboratory Work in Biology I (O)						
			Experimental Methods and Laboratory Work in Biology II (O)						
	Learn field research method and acquire results and acquire ability of making a presentation	Field Excursion for Earth Science A(◎)			Field Excursion for Earth Science B(◎)	Practice of Earth and Planetary Systems Science A (Field Work)(◎)			
						Practice of Earth and Planetary Systems Science B (Field Work)(◎)			
	To be able to learn to practice methods of presenting, collecting, examining, and analyzing geosciences data.					Practice of Earth and Planetary Systems Science A (Field Work)(◎)			
						Practice of Earth and Planetary Systems Science B (Field Work)(◎)			
	To understand and explain the moral and social issues needed to utilize information. Also, to learn basic knowledge, skills, and attitudes pertaining to information.	Introduction to Information and Data Sciences(◎)	Starting Programming from Scratch(O)						
			Fundamental Date Science(O)						
	To be able to scientifically explainthe need for fitness and health promotion. Also, through practice of sports, to be able to understand and explain the significance of practicing sports for life and the importance of an appropriate attitude and sense of collaboration	Health and Sports Courses(△)	Health and Sports Courses(△)						
Comprehensive Abilities	Acquire the ability and skills of setting team themes.							Special Study for Graduation (◎)	Special Study for Graduation (◎)
	Learning the ability・skills to plan and carry out research plans.							Special Study for Graduation (◎)	Special Study for Graduation (◎)
	Having acquiring the ability・skills to compile research results and make the presentation.							Special Study for Graduation (◎)	Special Study for Graduation (◎)

Liberal Arts Education Subjects

Basic Specialized Subjects

Specialized Education Subjects

Graduation Thesis

(◎) Required

(○) Elective/required

(△) Free elective