

## Appended Form 1

### Specifications for Major Program

Name of School (Program)		School of Engineering,Cluster 4 (Social and Environmental Engineering)	
Program name (Japanese)		ラ	
		Program of Civil and Environmental Engineering	
)			
1. Academic degree to be Acquired		Bachelor's degree in Engineering	

#### 2. Overview

##### (1) Overview of "English-based Bachelor's Degree Program"

This program aims to foster and produce future members of a global society who have the knowledge to be innovative, creative, take leadership, and possess language abilities that will help them play an important role in the international world.

This program focuses specifically on producing individuals who are capable of addressing various global issues from an engineering perspective and contribute to the creation of new and valuable solutions that are significant to both the industrial and academic societies.

Students enrolled in the program will begin the curriculum from the first semester of their first year.

In the second year, students will set off on their major programs and take the designated courses which are offered at each cluster. Major program overview is as (2).

##### (2) Program overview of "Program of Civil and Environmental Engineering".

In this program, students learn the engineering theory needed to plan, design, construct, and maintain social infrastructure facilities that create rich communities and social environments, while attempting to harmonize and coexist with natural environments. Students also learn about a wide range of technology for environmental preservation on a global basis, considering that there is a strong demand for technologies that

(E) The ability to evaluate: The ability to propose multiple solutions, predict outcomes, and evaluate relative merits

(F) Communication abilities: The ability to communicate to others the details of the proposed solutions, their rationale, their effects, and their feasibility

(G) Implementation and problem-solving abilities: The ability to implement problem-solving processes in cooperation with other people, by making full use of a wide range of general knowledge and a broad perspective, as well as the ability to identify problems, the ability to configure problems, the ability to analyze problems, comprehensive communication abilities, and the ability to enhance problem-solving abilities voluntarily and continuously by learning the above processes,

#### 4. Curriculum Policy

The abilities required to achieve the seven goals (a wide range of general knowledge and a broad perspective, the ability to identify issues, the ability to configure problems, the ability to analyze problems, the ability to evaluate, communication abilities, and implementation and problem-solving abilities) are described below. The curriculum is organized in such a way that these abilities may be cultivated as required by engineers in civil and environmental engineering. Learning outcomes are evaluated based on the grade calculation for each subject and the level of attainment against the goals.

##### (A) Wide range of general knowledge and broad perspective

Required abilities: the ability to view the expanding and increasingly complex societies and natural environments from multiple scientific perspectives, such as nature, humanities, and society

The ability to explain the current status of the natural environment and expected environmental problems

The ability to give examples where different scientific findings on the same subject conflict

The ability to list multiple scientific facts relevant to the resolution of research tasks

Applicable subjects: liberal arts education subjects, Graduation Thesis

##### (B) Ability to identify issues

Required abilities: the ability to understand the relationship between nature, humankind, and technology in the international and regional communities, and the ability to identify issues

The ability to understand the characteristics of civil engineering structures and the surrounding environment, and to list possible natural phenomena and disasters

The ability to explain the roles that civil engineering has played in coexistence with the environment

The ability to position the existing technology related to research tasks, and to set goals

Applicable subjects: liberal arts education subjects, specialized basic subjects such as “Fundamentals of Environmental Science”, and “Infrastructure Planning”, specialized subjects such as “Design of Infrastructures”, and “Project Management in Civil and Environmental Engineering”, Graduation Thesis

##### (C) Ability to configure problems

Required abilities: the ability to organize problems logically and construct technical issues

The ability to use knowledge about mathematics and physics, and select equation systems that control major elements of phenomena

The ability to mathematically express and understand diverse phenomena, including disasters

The ability to accurately explain the major elements constituting phenomena which are the subject of study

Applicable subjects: specialized basic subjects such as “Strength of Materials”, “Structural Mechanics” “Hydraulics”, “Soil Mechanics”, and “Experiments in Civil and Environmental Engineering”, specialized subjects such as “Geotechnical Engineering”, “Environmental Hydraulics”, and “Fundamentals of Environmental Engineering”, Graduation Thesis

##### (D) Ability to analyze problems:

Required abilities: the ability to gather the necessary data and abstract, model, and analyze technical issues

The ability to acquire information necessary to model phenomenon

The ability to seek solutions for the model using mathematical methods

The ability to explain the validity and reliability of analytical approach in research

Applicable subjects: Liberal arts education subjects such as “Calculus”, “Linear Algebras”, and “General Mechanics”, specialized basic subjects such as “Exercise of Structural Mechanics”, and “Exercise of

Hydraulics”, specialized subjects such as “Energy Method for Structural Analysis”, and “Reinforced Concrete Mechanics and Exercises”, Graduation Thesis

(E) Ability to evaluate:

Required abilities: the ability to propose multiple solutions, predict outcomes, and evaluate relative merits

The ability to consider the applicability to actual phenomena of theoretically-gained solutions, and their limitations

The ability to design multiple alternative solutions, predict outcomes, and compare

The ability to explain knowledge gained from research and its applicability, and the limitations and social significance of civil engineering technology

Applicable subjects: specialized subjects such as “Design of Infrastructures”, and “Civil and Environmental Engineering and Engineer's Ethics”, Graduation Thesis

(F) Communicating abilities

Required abilities: The ability to communicate to others details of proposed solutions, their rationale, their effects, and their feasibility

The ability to use information processing equipment, and prepare accurate charts, tables, and sentences with a certain level of quality

The ability to make one's ideas understood in a discussion forum and presentation

The basic ability to communicate in Japanese and English

Applicable subjects: Liberal arts education subjects such as “Communication Courses”, and “Second Foreign Languages”, specialized basic subjects such as “Experiments in Civil and Environmental Engineering”, specialized subjects such as “Design of Infrastructures”, “Exercise of Technical English”, and “Civil and Environmental Engineering and Engineer's Ethics”, Graduation Thesis

(G) Implementation and problem-solving abilities:

Required abilities: the ability to implement problem-solving processes in cooperation with other people by making full use of (A) to (F) above. The ability to enhance problem-solving abilities voluntarily and continuously by learning the above processes.

The ability to consider one's role in a group, and proceed with work in a planned manner

The ability to evaluate problem-solving processes, and make suggestions for improvement

The ability to find knowledge to learn on one's own initiative in order to answer more complex questions

Applicable subjects: specialized basic subjects such as “Exercise of Surveying”, “Basic Engineering Computer Programming”, and “Experiments in Civil and Environmental Engineering”, mainly specialized subjects such as “Design of Infrastructures”, Graduation Thesis

## 5. Program Timing and Acceptance Conditions

The English-based Bachelor's Degree programs begin in the first semester of the first year. Enrollment in Program of Civil and Environmental Engineering is the second year.

Those who are to be assigned to this program are chosen based on their requests and GPA.

## 6. Qualifications to be Acquired

This program is certified by the Japan Accreditation Board for Engineering Education (JABEE). Those who finish this program are certified as associate professional engineers, and exempt from the first examination for national certification as professional engineers. By completing the program, students are certified as assistant surveyors. Other relevant licenses are those for professional engineers, civil engineering works implementation management engineers, concrete engineers, senior concrete engineers, concrete diagnosis engineers, qualified engineers of the Society of Civil Engineers, operations chiefs of every kind, construction machine operation engineers, and real estate surveyors. By meeting all of the requirements, students can obtain these licentiates.

By completing “Vocational Guidance”, “Comprehensive Exercises”, and liberal arts education subjects (Japanese Constitution, etc.), students can obtain the Type-1 High School Teaching License (Industry).

## 7. Class Subjects and Course Content

\* For class subjects, see the subject list in the attached sheet 1.

(subject list to be attached.)

\* For course content, see the syllabus published every academic year.

\* All courses are taught in Japanese. Course materials may be written in both Japanese and English or only English.

## 8 Academic Achievements

At the end of each semester, evaluation criteria are applied to each evaluation item of academic achievement to clearly demonstrate the attainment level. Students' grade calculations for each subject, from admission to the university until the current semester, is given as one of three levels: "Excellent," "Very Good," and "Good," based on evaluation criteria calculated by adding weighted values to the numerically-converted values of their academic achievements (S = 4, A = 3, B = 2, and C = 1) in each subject being evaluated.

Evaluation of academic achievement	Converted values
S (Excellent: 90 points or higher)	
A (Superior: 80-89 points)	
B (Good: 70-79 points)	
C (Fair: 60-69 points)	1

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

\* See the relationship between evaluation items and evaluation criteria in the attached sheet 2.

\* See the relationship between evaluation items and class subjects in the attached sheet 3.

\* See the curriculum map in the attached sheet 4.

## 9. Graduation Thesis (Graduation Research) (Purpose, when and how it is assigned, etc.)

This program approves graduation and awards a bachelor's degree in engineering to students who have completed four years' learning according to the standard of the course as described in student handbook, who have met graduation requirements, and who have acquired a total of 46 credits in liberal arts education, a total of 79 credits in specialized education, and an overall total of 125 credits or more. This program also requires the students to write graduation thesis in English.

○ Goal of the Course Students are assigned to one of the various educational courses of Program of Civil and Environmental Engineering and to a supervisor. They select the subjects in their specialized field, apply their acquired knowledge and abilities, acquire new knowledge, enhance their problem-solving abilities voluntarily and continuously, and conduct their research. Thereby, the program aims at cultivating the abilities described below. Correspondence of these abilities to the learning and educational goals of Program of Civil and Environmental Engineering is also described.

1. Ability to identify issues: the ability to understand the relationship between nature, humankind, and technology in the international and regional communities, and to identify issues

2. Ability to configure problems: the ability to organize problems logically and construct technical issues

3. Ability to analyze problems: the ability to gather necessary data and to abstract, model, and analyze technical issues,

4. Ability to evaluate: the ability to propose multiple solutions, predict outcomes, and evaluate relative merits

5. Communication abilities: the ability to communicate to others details of proposed solutions, their rationale, their effects, and their feasibility

6. Implementation and problem-solving abilities: the ability to implement problem-solving processes in cooperation with other people by making full use of a wide range of general knowledge and a broad perspective, the ability to identify problems, the ability to construct problems, the ability to analyze problems, comprehensive communication abilities, and the ability to enhance problem-solving abilities voluntarily and continuously by learning the above processes

○ When and how it is assigned

In principle, the educational subject is decided based on the student's request. However, the acceptable number of students for each educational subject is limited due to the requirement of providing sufficient guidance, so when the students' requests are distributed disproportionately some adjustment is made. The following is the schedule for the graduation thesis.

1. In mid-February of the third year, students attend the final meeting for graduation thesis presentations given by the fourth-year students in order to deepen their understanding of the subject of graduation theses.
2. In early March of the third year, how assignment and graduation theses in each educational course are conducted is explained.
3. At the end of March of the third year, after judging students' qualification to embark on a graduation thesis, where to assign students who meet the required standard is decided at an explanatory meeting.
4. How to proceed with graduation research varies depending on subject of research in educational course. Students begin with literature research, attend seminars, conduct surveys and experiments, and continue to work actively on research under the guidance of their supervisors. (The supervisors evaluate annual learning and research attitudes in mid-February.)
5. In December of the fourth year, a mid-term meeting about students' progress is held.
6. At the beginning of February of the fourth year, students submit their theses to two examining teachers (head/deputy head).
7. In mid-February of the fourth year, the final presentation meeting is held.

○ How academic results are evaluated

- (1) Using research daybooks, seminar materials, research notebooks, related literature, and experiment reports, and others documents prepared by the students as a reference, the chief (supervisor) checks whether time has been devoted to study on a regular basis in a way that enhances problem-solving abilities voluntarily and continuously, and whether research has been conducted, and the supervisor evaluates the learning and research attitudes during the year (goals of the course 1-6).
- (2) The deputy-head evaluates the attainment levels of the goals 1-6 of the course, based on the submitted theses.
- (3) Furthermore, in the mid-term and final presentation meetings, multiple teachers in attendance evaluate mainly the attainment level of goal 5 of the course.

Students who have earned a rating of 60% or more in the above points (1), (2), and (3) are regarded as having passed and are awarded credit.

Other

The graduation research is a comprehensive course aimed at cultivating implementation and problem-solving abilities while developing each ability by using cultivation, the ability to identify challenges, the ability to configure problems, the ability to analyze problems, the ability to evaluate, and the communication abilities acquired through taking the courses in the Program of Civil and Environmental Engineering of Cluster 4 (construction and environment), School of Engineering, Hiroshima University.

Based on the submitted theses and presentation content, the acquisition status of the abilities (1-6) which graduates of this program must acquire, are evaluated in a comprehensive manner.

## 10. Responsibility System

### (1) PDCA responsibility system ("Plan," "Do," "Check," and "Act")

To check and improve this program, the following two PDCA systems have been created.

PDCA system for checking and improving each class subject and related subject

PDCA system to check and improve the whole educational program, including educational goals and the image of students that is sent out

### (2) Program evaluation

In cooperation with the academic affairs committee overseeing the educational assessment and improvement of the whole School of Engineering, the educational program assessment and improvement committee was created, under which the examination working group for each subject and the external advisory committee are established, and each implements educational assessment and evaluation according to the above two PDCA systems,

The educational program assessment and improvement committee checks the establishment of learning and educational goals and the disclosure of these. By getting a picture of the operational status of the assessment and improvement system, mainly undertaken by the examination working group for each subject, the committee checks the amount of learning and education, the educational tools, educational environment, and

attainment of learning and educational goals. This committee improves the educational system by undertaking staff development, by holding the external advisory committee, and by conducting questionnaires targeted at graduates. The committee also checks and improves the validity of the assessment and improvement system itself.

The examination working groups for each subject check and confirm the class plans and class implementation status, and ask the persons in charge of each subject to prepare class improvement plans. The groups report to the educational program assessment and improvement committee on the achievements of working groups. The external advisory committee examines whether the details of learning and the educational goals and standards can respond to the requirements of society and industry, and gives advice as needed to the educational program assessment and improvement committee. It checks the functioning of the educational assessment and improvement system in this group, and gives advice as needed about its improvement.

## Cluster 4 (Civil Engineering and Architecture)

Required subject (period of registration specified)

Compulsory elective subject (any of these subjects shall be registered)

Free elective subject (any of these subjects shall be registered)

Subject Type					Require d No. of credits	Class subjects	No. of credits	Type of course registratio	Year in which the subject is taken(*The lower figure means semester) Note 1																
									1st grade				2nd grade				3rd grade				4th grade				
									Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall			
									1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	
L i b e r a l  A r t s  E d u c a t i o n  S u b j e c t s	Peace Science Courses				2		2	Compulsory elective																	
	Basic Courses in University Education	Introduction to University Education				2	Introduction to University Education	2	Require d																
		Introductory Seminar for First-Year				2	Introductory Seminar for First-Year	2	Require d																
		Area Courses				4	Courses in Arts and Humanities/Social Sc	2	Compulsory elective																
	4					Courses in Natural Sciences	2																		
	Common Subjects	Foreign Languages		Basic English Usage	0	Basic English UsageI	1	Free elective																	
					Basic English UsageII	1																			
				Communic ation I	2	CommunicationI	1	Require d																	
					Communication I	1																			
				Communic ation	2	Communication II	1	Require d																	
					Communication II	1																			
			Initial Foreign Languages (Select one language from German, French, Spanish, Russian, Chinese, Korean and Arabic)		2	1 subjects from Basic language I	1	Compulsory elective																	
					1 subjects from Basic language II	1																			
		Information and Data Science Courses		2	Elements of Information Literacy or Exercise in Information Literacy	2	Compulsory elective																		
		Health and Sports Cou		2		1or 2	Compulsory elective																		
		Basic Subjects				16	CalculusI	2	Require d																
							CalculusII	2																	
	Linear AlgebraI						2																		
	Linear AlgebraII						2																		
	Seminar in Basic Mathematics I						1																		
	Seminar in Basic Mathematics II						1																		
	General Mechanics I						2																		
	General Mechanics II						2																		
	Experimental Methods and Laboratory Work in Physics I Note 5						1																		
	Experimental Methods and Laboratory Work in Physics II Note 5						1																		
	Free elective subjects				6	From all Subject Type Note		Free elective																	
No. of credits required for graduation				46																					

- Note When students fail to acquire the credit during the term or semester marked with \_\_\_\_\_ in the boxes for the year in which the course is taken, they can take the course in subsequent terms or semesters. Depending on class subject, courses may be offered in semesters or terms different from those scheduled. Please be sure to check the time schedule for Liberal Arts Education subjects to be issued every year.
- Note The credit obtained by mastery of "English-speaking Countries Field Research" or self directed study of "Online Seminar in English A/B" cannot be counted towards the credit necessary for graduation. The credit obtained by Overseas Language Training can be recognized as Communication \_\_\_\_\_ or \_\_\_\_\_ if application is made in advance. For more details, please refer to the article on English in Liberal Arts Education in the student handbook.
- Note We have a recognition of credit system for foreign language proficiency tests. For more details, please refer to the article on English in Liberal Arts Education in the student handbook.
- Note Students must take "Elements of Information Literacy" provided in the first semester. You can take the "Exercise in Information Literacy" provided in the second semester only if you fail to obtain credit for "Information Utilization Basics."
- Note Students must take both Experimental Methods and Laboratory Work 1credit and Experimental Methods and Laboratory Work \_\_\_\_\_ credit.
- Note Students can calculate the credits of Basic English Usage.

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 ①, ②, ③  
 ○, ①, ②, ③, ④  
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①, ②, ③  
○, ①, ②, ③, ④ }  
△






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## Curriculum Map

## Program of Civil and Environmental Engineering

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