

# Appended Form 1

## Specifications for Major Program

Name of School (Program) [ School of Engineering,Cluster 4 (Social and Environmental Engineering)]

Program (Japanese)  (English )	name	社会基盤環境工学プログラム
		Program of Civil and Environmental Engineering

1. Academic degree to be Acquired :

### 2. Overview

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 coexists 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 can create advanced, circulatory society that makes effective use of limited resources. Therefore, this program produces professionals and future engineers or researchers who take the initiative in addressing various environment. This program produces professionals and future engineers or researchers who set goals on their own initiative, explore solution to problems in a scientific and rational way, and possess the leadership and vitality to achieve their goal in an ethical and harmonious way.

### 3.Academic Awards Policy (Policy for awarding degrees and goal of the program)

The Program of Civil and Environmental Engineering aims at developing engineers and researchers who are able, at their own discretion, to deal with the various problems faced when engaged in social infrastructure improvement in a comprehensive manner.

engineering to students who have acquired the number of credits necessary to meet the standard of the course and who, through learning the engineering theory needed to plan, design, construct, and maintain social infrastructure facilities, have acquired the liberal arts education and special education designed to achieve the following goals.

(A) A wide range of general knowledge and a broad perspective: The ability to view the expanding and increasingly complex societies and natural environments from multiple scientific perspectives of nature, humanities, and society

(B) The ability to identify issues: the ability to understand the relationship between nature, humankind, and technology, in both international and regional communities, and ability to identify issues

(C) The ability to configure problems: The ability to organize problems logically and construct technical issues

(D) The ability to analyze problems: The ability to gather the necessary data, and to abstract, model, and analyze technical issues

(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

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

(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

specialized

(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

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(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

(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

• entation

• The basic ability to communicate in Japanese and English

○Applicable subjects: Liberal arts education

specialized basic ntal  
specialized

(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

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

• omplex questions

○Applicable subjects: specialized basic

and , mainly specialized

5. Program Timing and Acceptance Conditions

When the first year students who are enrolled in Cluster 4 of the School of Engineering (construction and environment) advance to 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.

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.

8. Academic Achievements

At the end of each semester, evaluation criteria are applied to each evaluation item of academic lculations for each subject, from

-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)	4

A (Superior:80-89 points)	3	Academic achievement	Evaluation criteria
B (Good: 70-79 points)	2		
C (Fair: 60-69 points)	1		Excellent
			Very Good
			Good

\* 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

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.

7. In mid-February of the fourth year, the final presentation meeting is held.

(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

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.

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Relationships between the evaluation items and class subjects

Subject type	Class subjects	credits	Type of course registration	Period	Evaluation items																Total weighted values of evaluation items in the subject
					Knowledge and Understanding		Abilities and Skills				Comprehensive Abilities										
					(1)		(1)		(2)		(1)		(2)		(3)		(4)				
					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject		
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	1 semester	33	1					33	1			34	1			100		
Liberal Arts Education	Peace Science Courses	2	Required	1 semester	50	1					50	1							100		
Liberal Arts Education	CommunicationI	1	Required	1 semester	50	1									50	1			100		
Liberal Arts Education	Communication I	1	Required	1 semester	50	1									50	1			100		
Liberal Arts Education	Communication II	1	Required	1 semester	50	1									50	1			100		
Liberal Arts Education	Communication II	1	Required	1 semester	50	1									50	1			100		
Liberal Arts Education	Basic language I	1	Required	1 semester	50	1									50	1			100		
Liberal Arts Education	Basic language II	1	Required	1 semester	50	1									50	1			100		
Liberal Arts Education	Information Courses	2	Required	1 semester											100	1			100		
Liberal Arts Education	Area Courses	2	Elective	1 semester	100	1													100		
Liberal Arts Education	Free elective subjects	6	Elective	1 semester	100	1													100		
Liberal Arts Education	Health and Sports Courses	2	Required	1 semester	100	1													100		
Liberal Arts Education	CalculusI	2	Required	1 semester					100	1									100		
Liberal Arts Education	CalculusII	2	Required	1 semester					100	1									100		
Liberal Arts Education	Linear AlgebraI	2	Required	1 semester					100	1									100		
Liberal Arts Education	Linear AlgebraII	2	Required	1 semester					100	1									100		
Liberal Arts Education	Seminar in Basic Mathematics I	1	Required	1 semester					100	1									100		
Liberal Arts Education	Seminar in Basic Mathematics II	1	Required	1 semester					100	1									100		
Liberal Arts Education	General Mechanics I	2	Required	1 semester					100	1									100		
Liberal Arts Education	General Mechanics II	2	Required	1 semester					100	1									100		
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I	1	Required	1 semester					100	1									100		
Specialized Education	Creation of Architectural Space	2	Elective	1 semester	50	1					50	1							100		
Specialized Education	Lifestyle and the city	2	Elective	1 semester	50	1					50	1							100		
Specialized Education	Applied Mathematics I	2	Required	1 semester					100	1									100		
Specialized Education	Applied Mathematics II	2	Elective	1 semester					100	1									100		
Specialized Education	Applied Mathematics III	2	Elective	1 semester					100	1									100		
Specialized Education	Engineering Mathematics A	2	Elective	1 semester					100	1									100		
Specialized Education	Probability and Statistics	2	Elective	1 semester					100	1									100		
Specialized Education	Synthesis of Applied Mathematics	2	Elective	1 semester					100	1									100		
Specialized Education	Exercise of Mathematics	2	Elective	1 semester					100	1									100		
Specialized Education	Basic Engineering Computer Programming	2	Required	1 semester					33	1					33	1	34	1	100		
Specialized Education	Exercise of Technical English	1	Required	1 semester											100	1			100		
Specialized Education	Civil and Environmental Engineering and Engineer's Ethics	2	Elective	1 semester							33	1	33	1	34	1			100		
Specialized Education	Strength of Materials	2	Required	1 semester			100	1											100		
Specialized Education	Exercise of Strength of Materials	1	Elective	1 semester					100	1									100		
Specialized Education	Structural Mechanics	2	Required	1 semester			100	1											100		
Specialized Education	Exercise of Structural Mechanics	1	Elective	1 semester					100	1									100		
Specialized Education	Hydraulics	2	Required	1 semester			100	1											100		
Specialized Education	Exercise of Hydraulics	1	Elective	1 semester					100	1									100		
Specialized Education	Soil Mechanics	2	Required	1 semester			100	1											100		
Specialized Education	Exercise of Soil Mechanics	1	Elective	1 semester					100	1									100		
Specialized Education	Materials Science	2	Required	1 semester			50	1			50	1							100		
Specialized Education	Fluid Mechanics	2	Required	1 semester			50	1			50	1							100		
Specialized Education	Concrete Engineering	2	Required	1 semester			50	1			50	1							100		
Specialized Education	Fundamentals of Environmental Science	2	Required	1 semester			50	1			50	1							100		
Specialized Education	Infrastructure Planning	2	Required	1 semester			50	1			50	1							100		
Specialized Education	Land Survey	2	Required	1 semester					100	1									100		
Specialized Education	Exercise of Surveying	2	Required	1 semester					25	1			25	1	25	1	25	1	100		
Specialized Education	Experiments in Civil and Environmental Engineering	4	Required	1 semester			20	1	20	1			20	1	20	1	20	1	100		
Specialized Education	Field Work at Construction Sites	1	Elective	1 semester							25	1	25	1	25	1	25	1	100		
Specialized Education	Energy Method for Structural Analysis	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Geotechnical Engineering	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Reinforced Concrete Mechanics and Exercises	4	Elective	1 semester			50	1	50	1									100		
Specialized Education	Disaster Prevention Geotechnology	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Bridge and Earthquake-resistance	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Maintenance Engineering of Structures	2	Elective	1 semester							100	1							100		
Specialized Education	Road Engineering	3	Elective	1 semester							100	1							100		
Specialized Education	Environmental Chemistry of Concrete	2	Elective	1 semester							100	1							100		
Specialized Education	Environmental Hydraulics	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Transportation System Engineering	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Sanitary and environmental engineering and exercise	4	Elective	1 semester			50	1	50	1									100		
Specialized Education	Urban and Regional Engineering	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	River Engineering	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Coastal Engineering	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Fundaments of Environmental Engineering	2	Elective	1 semester			50	1	50	1									100		
Specialized Education	Hydrology and Water Resource Engineering	2	Elective	1 semester							100	1							100		
Specialized Education	Ecology and civil engineering	2	Elective	1 semester							100	1							100		
Specialized Education	Meteorology	2	Elective	1 semester							100	1							100		
Specialized Education	Exercises in Algorithm	2	Elective	1 semester					33	1					33	1	34	1	100		
Specialized Education	Design of Infrastructures	4	Elective	1 semester			16	1	16	1	17	1	17	1	17	1	17	1	100		
Specialized Education	Project Management in Civil and Environmental Engineering	2	Elective	1 semester							100	1							100		
Specialized Education	Graduation Thesis	5	Elective	1 semester	14	1	14	1	14	1	14	1	14	1	15	1	15	1	100		

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