

1. Program Outline

Civil Engineering is the practice of developing a civilized built environment in harmony with our natural surroundings, in which we may live safely and comfortably. The Department of Civil and Environmental Engineering at Tokyo Tech trains its students to develop technical engineering skills in a diverse and international environment, with the goal of producing tomorrow's global leaders in the Civil Engineering industry and in academia. Students in the Department learn the fundamentals of civil engineering through a variety of courses, and then receive intensive training in their specific field of interest by conducting cutting-edge research under the close guidance of a distinguished faculty member.

2. Course Outlines

【Master's degree】

In the Master's degree program, students are trained to develop technical engineering skills in a diverse and international environment, giving them the tools to become tomorrow's global leaders in the Civil Engineering industry. To achieve this goal, the Department seeks to confer the following skills to students:

- Theoretical understanding of the fundamentals of engineering necessary for professional practice and research.
- Technical skills and knowledge required for practice and research in the field of civil engineering.
- Appreciation of the societal responsibilities of civil engineers, and understanding of the ethics of the practice.
- Management and communication skills necessary to be competitive in the global marketplace.

【Doctoral degree】

In the Doctoral degree program, students are trained to develop cutting-edge technical engineering skills in a diverse and international environment, giving them the tools to become tomorrow's global leaders in the Civil Engineering industry and in academia. To achieve this goal, the Department seeks to confer the following skills to students:

- Theoretical understanding of the fundamentals of engineering necessary for professional practice and research.
- Technical skills and knowledge required for cutting-edge research in their field of civil engineering, and the ability to apply this research to practical use.
- Creativity required for producing, communicating, and applying new research ideas and knowledge.
- Understanding and appreciation of cultural diversity, necessary for the international practice of civil engineering.
- Communication and leadership skills needed for the international practice of civil engineering.

3. Guide to Study in Department of Civil Engineering

【Master's degree】

For the Master's degree, students engage in the following program of study:

A) Fundamental courses which cover the breadth of science and engineering

Broad, fundamental engineering courses are offered to convey the foundation for building professional skill for the practice of civil engineering.

B) In-depth courses focused on specific fields within civil engineering

Students may take in-depth courses in 4 or more of the 6 major fields within civil engineering, in order to acquire a deep understanding of the profession.

C) Practical internships and seminars

Students enroll in internships and seminars to acquire an in-depth understanding of how theory is applied to practice in the field of civil engineering.

D) Problem-solving and communication training

By engaging in original research focused on a specific problem and completing a Master's thesis, students learn to work independently and proactively, and to communicate their results convincingly.

【Doctoral degree】

For the Doctoral degree, students engage in the following program of study:

A) Practical education for cutting-edge research and practice

By engaging in research toward a Doctoral dissertation, students work together with a faculty advisor to develop cutting-edge experimental and analytical methods that push the frontier of civil engineering research and practice.

B) Communication training for participation in international projects

Doctoral coursework (including seminars and research presentations), writing of the Doctoral dissertation, and presentation of the Doctoral dissertation are all conducted in English. This gives students the communication ability necessary to engage successfully in overseas projects.

C) Problem-solving and leadership training

By engaging in doctoral research, students learn how to be leaders in their field and to solve problems in an ethical manner. Students will participate in field-specific and interdisciplinary seminars, and will interact with foreign students, researchers, and civil engineering practitioners via conferences and collaborative research. This will impart students with skills to further their ambitions to engage in international business or collaboration.

4. Graduation Requirements

【Master's degree】

For a Master's degree a student must take 30 credits or more and meet other requirements as follows:

(1) Credits

- 30 credits or more from the graduate school courses in total.
- 8 credits from the Seminar Courses(講究科目)*¹
- 16 credits or more from the Courses by Departments(専門科目群)*²
- 2 credits or more from the Liberal Arts and General Education(G)(大学院教養・共通科目群).

(2) Thesis

The student must complete a master thesis research, submit a thesis for the degree and take and pass the final examination given after the submission of her/his thesis for the qualification.

*1: Seminar in each term must be taken. 8 credits are the requirement for the normal study period of master study, i.e., two years, or four semesters. If the student completes the master study in less than 4 semesters, the required credit is reduced according to the number of spent semesters, e.g., 4 credits for two semesters (minimum), and 6 credits for 3 semesters.

*2: Courses in Department of Civil Engineering are categorized into seven fields, namely, (1) Structural Engineering, (2) Hydraulic and Environmental Engineering, (3) Geotechnical Engineering, (4) Transportation and Infrastructure Planning, (5) Concrete and Material Engineering, (6) Earthquake Engineering, (7) Common Basic Science. As requirements for master degree, the student in Department of Civil Engineering should acquire at least two courses from the field which she/he specializes. The student should also acquire at least one course from each of the other four fields, in which the category (7) is compulsory.

【Doctoral degree】

For a Doctoral degree a doctoral candidate must satisfy the following requirements:

(1) Seminar in each term must be taken.

(2) If the student enrolls the Integrated Doctoral Educational Program, he/she is required to complete one Off-Campus Project.

(3) The intermediate examination in the 4th semester and the prefinal examination in the beginning of the 6th semester must be approved.

(4) The candidate must complete and upload a thesis for the degree, and take the final examination and evaluation of his/her thesis.

The candidate who satisfies the above requirements and passes the final examination is awarded a Doctoral degree. Students should consult with their own supervisors about the study plan.

5. Tables of Courses

Research Courses (研究科目群)

Course	Dept. offering course* ¹	Registration number	Credit	Semester S: Spring A:Autumn	Opening year a: Annually e: Even o: Odd	Category, Remarks
Seminar Courses (講究科目)						
Seminar of Civil and Environmental Engineering I, II, III, IV	CE	61701 61702 61703 61704	2	S A S A	a	Required for Master degree
Seminar of Development and Environmental Engineering (CE) I II, III, IV	CE	61705 61706 61707 61708	2	A S A S	a	Required for Master degree in SEP* ²
Seminar of Civil and Environmental a Engineering V, VI, VII, VIII, IX , X	CE	61801 61802 61803 61804 61805 61806	2	S A S A S A	a	Required for Doctoral degree
Seminar of Development and Environmental Engineering (CE) V, VI, VII, VIII, IX , X	CE	61851 61852 61853 61854 61855 61856	2	A S A S A S	a	Required for Master degree in SEP* ²
Graduate Research Courses (研究関連科目)						
Special Lecture on Civil and Environmental Engineering I –VI	CE	61851 61852 61853 61854 61855 61856	1 or 2	S A S A S A	a	For Doctoral student

*1 CE: Dept. Civil Engineering

*2 SEP: Sustainable Engineering Program (IGP(A))

Courses by Departments (専門科目群)

Course	Dept. offering course* ¹	Registration number	Credit	Semester S: Spring A:Autumn	Opening year a: Annually e: Even o: Odd	Category, Remarks
Fracture Control Design of Steel Structures	CE	61005	2 0 0	A	e	(1)
Introduction to Solid Mechanics	CE	61065	2 0 0	S	a	(1) (3) (5) (6)
Advanced Course on Elasticity Theory	CE	61048	2 0 0	A	a	(1) (3) (5) (6)
Analysis of Vibration and Elastic Wave	MEI	77019	2 0 0	S	o	(1)
Advanced Course on Coastal Environments	MEI	77048	2 0 0	S	e	(2)
Regional Atmospheric Environment	IDE	70009	1 0 0	A	a	(2)
Aquatic Environmental Science	CE	61073	2 0 0	S	e	(2)
Environmental Statistics	CE	61074	2 0 0	S	o	(2) (7)
Water Quality Dynamics	CE	61082	2 0 0	A	e	(2)
GIS in Water Resources Engineering	CE	61080	1 1 0	A	a	(2)

Advanced Hydrology and Water Resources Management	CE	61079	2	0	0	A	a	(2)
Water Resource Systems	CE	61085	2	0	0	S	a	(2)
Open Channel Hydraulics	EST	98053	1	0	0	S	a	(2)
Environmental Hydraulics	EST	98067	1	0	0	S	a	(2)
Watershed Hydrology	EST	98060	1	0	0	S	a	(2)
Geo-Environmental Engineering	CE	61049	2	0	0	S	a	(2) (3)
Physical Modelling in Geotechnics	CE	61061	2	0	0	A	a	(3) (6)
Stability Problems in Geotechnical Engineering	CE	61034	2	0	0	A	a	(3) (6)
Mechanics of Geomaterials	CE	61038	2	0	0	S	a	(3)
Advanced Mathematical Methods for Infrastructure and Transportation Planning	CE	61014	2	0	0	S	o	(4) (7)
Transportation Network Analysis	CE	61081	2	0	0	A	e	(4)
Transportation Economics	CE	61066	1	0	0	A	e	(4)
Project Evaluation for Sustainable Infrastructure	IDE	70030	2	0	0	S	a	(4)
Theory of Regional Planning Process	BE	92047	2	0	0	S	e	(4)
Environmental Transportation Engineering	BE	92048	1	0	0	A	o	(4)
City/Transport Planning and the Environment	BE	92035	1	0	0	A	a	(4)
Advanced Concrete Technology	IDE	70043	2	0	0	A	a	(5)
Mechanics of Structural Concrete	CE	61003	2	0	0	S	o	(5)
Utilization of Resources and Wastes for Environment	IDE	70041	2	0	0	A	a	(5)
Maintenance of Infrastructure	CE	61083	2	0	0	S	e	(1) (5) (6)
Basics and Applications of Stochastic Processes	BE	92008	1	1	0	A	a	(6)
Earthquake and Tsunami Disaster Reduction	BE	92046	1	0	0	A	a	(6)
Civil Engineering Analysis	CE	61013	1	0	0	A	o	(7)
Principles of Construction Management	CE	61046	2	0	0	A	o	(1) ~ (6)
Probabilistic Concepts in Engineering Design	CE	61047	2	0	0	A	o	(1) (3) (5) (6)
Advanced Topics in Civil Engineering I	CE	61084	2	0	0	S	a	(1) ~ (6)
Advanced Topics in Civil Engineering II	CE	61055	2	0	0	A	a	(1) ~ (6)
Advanced Technical Communication Skills I	CE	61062	1	1	0	S	a	—
Advanced Technical Communication Skills II	CE	61063	1	1	0	A	a	—
International Collaboration I	CE	61071	0	1	0	S	a	—
International Collaboration II	CE	61072	0	1	0	A	a	—
International Internship 1	CE	61077	0	1	0	S	a	—
International Internship 2	CE	61078	0	1	0	A	a	—
Civil and Environmental Engineering Off-Campus Project I, II	CE	61511 61512	0	0	4	S A	a	Required for IDEP* ²
Environmental Engineering Off-Campus Project (CE)I, II	CE	61551 61552	0	0	4	S A	a	Required for SEP* ³
Off Campus Project in Civil Engineering A, B, C, D	CE	61088 61089 61090 61091	0	0	1	S A	a	Courses for IIDP* ⁴
Teaching and Training Skills in Civil Engineering A, B, C, D	CE	61092 61093 61094 61095	0	0	1	S A	a	Courses for IIDP* ⁴
Collaborative Project in Civil Engineering A, B, C, D	CE	61096 61097 61098 61099	0	0	1	S A	a	Courses for IIDP* ⁴

* CE: Dept. Civil Engineering

IDE: Dept. International Development Engineering

MEI: Dept. Mechanics and Environmental Informatics

- BE: Dept. Built Environment
- *2 IDEP: Integrated Doctoral Educational Program
 - *3 SEP: Sustainable Engineering Program (IGP(A))
 - *4 IIDP: Innovator and Inventor Development Platform

Descriptions of the courses listed above except for the courses for IIDP are provided at those either for “Development and Environmental Engineering Course of Sustainable Engineering Program: IGP(A)” (refer to III.International Graduate Program (IGP-A) Sustainable Engineering Program 5.1 Development and Environmental Engineering Course) or “Earthquake Engineering Program: IGP(A)” (refer to III.International Graduate Program (IGP-A) International Program on Earthquake Engineering 5. Syllabus of Course Subjects). The descriptions of the courses for IIDP are provided below.

61088

61089

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61091

Off Campus Project in Civil Engineering A, B, C, D

Spring Semester(1)(2) Autumn Semester(1)(2) (0-0-1) (Every Year) for Doctor Degree

Academic Advisor

[Aims and Scope]

The student will take part in an actual project done by an institution or private company. Project period is within one month. Through this internship project the student will experience the actual practice in her/his own field and have proper prospects of her/his future profession. Finally, enrolled students are required to make the presentation of their internship.

61092

61093

61094

61095

Teaching and Training Skills in Civil Engineering A, B, C, D

Spring Semester(1)(2) Autumn Semester(1)(2) (0-0-1) (Every Year) for Doctor Degree

Academic Advisor

[Aims and Scope]

The student will act as a teaching assistant in an institution. The student will experience the actual practice in her/his own field to enhance the teaching and training skills for her/his future profession.

61096

61097

61098

61099

Collaborative Project in Civil Engineering A, B, C, D

Spring Semester(1)(2) Autumn Semester(1)(2) (0-0-1) (Every Year) for Doctor Degree

Academic Advisor

[Aims and Scope]

Through collaborative works on group projects and presentations on specific issues, the student will enhance the ability of mutual communication, negotiation, and collaboration.