Graduate Major in Civil Engineering

【Master's Degree Program】

1. Outline

Civil engineering is the practice of developing a civilized built environment in harmony with our natural and social 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.

In the Master's Degree Program, students systematically study more advanced knowledge and technology based on the latest research in the fields of structural mechanics, structural engineering, construction material technology, earthquake engineering, water and environmental engineering, geotechnical engineering, infrastructure and transportation planning, building on fundamental knowledge of civil engineering gained in the Bachelor's Degree Program. Furthermore, the curriculum is structured to enable students to deepen their specialization and increase their creativity by performing research independently.

2. Competencies Developed

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.

3. Learning Goals

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 and 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 specific 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.

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 31 credits or more from 400- and 500-level courses.
2. From the courses specified in the Graduate Major in Civil Engineering curriculum,
   - 8 credits acquired from Research Seminars;
   - a minimum of 16 credits acquired from Major Courses; and
   - a minimum of 5 credits acquired from Liberal Arts and Basic Science Courses
     (3 credits from Humanities and Social Science Courses of which 2 credits must be from 400-level courses and 1 credit from 500-level courses, and 2 credits from Career Development Courses).
3. Pass the master's thesis 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 Civil Engineering Completion Requirements

<table>
<tr><th colspan="2">Course category</th><th><Required courses>
Required credits</th><th><Electives>
Minimum credits required</th><th>Minimum credits required</th><th>Associated learning goals</th><th>Comments</th></tr>
<tr><td rowspan="3">Liberal arts and basic science courses</td><td>Humanities and social science courses</td><td></td><td>•2 credits from 400-level
•1 credit from 500-level</td><td rowspan="4">5 credits</td><td>C,D</td><td></td></tr>
<tr><td>Career development courses</td><td></td><td>2 credits</td><td>C,D</td><td>All Graduate Attributes (GA) should be acquired. (Refer to Section 7 for the definition of GA.)</td></tr>
<tr><td>Other courses</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="4">Core courses</td><td>Research seminars</td><td>Seminar in Civil Engineering S1
Seminar in Civil Engineering F1
Seminar in Civil Engineering S2
Seminar in Civil Engineering F2

A total of 8 credits, 2 credits each from the above courses.</td><td></td><td>C,D</td><td></td></tr>
<tr><td>Research-related courses</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Major courses</td><td></td><td>16 credits</td><td>A,B,C,D</td><td></td></tr>
<tr><td>Major courses and Research-related courses <u>outside</u> the Graduate Major in Civil Engineering standard curriculum</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Total required credits</td><td colspan="5">A minimum of 31 credits including those attained according to the above conditions</td></tr>
<tr><td colspan="2">Note</td><td colspan="5">• 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.</td></tr>
</table>

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 Civil Engineering

Course category		Course number	Course title			Credits	Competencies	Learning goals	Comments
Research seminars	400 level	CVE.Z491.R	◎		Seminar in Civil Engineering S1	0-2-0	1,2,3,4,5	C,D	
		CVE.Z492.R	◎		Seminar in Civil Engineering F1	0-2-0	1,2,3,4,5	C,D	
	500 level	CVE.Z591.R	◎		Seminar in Civil Engineering S2	0-2-0	1,2,3,4,5	C,D	
		CVE.Z592.R	◎		Seminar in Civil Engineering F2	0-2-0	1,2,3,4,5	C,D	
Major courses	400 level	CVE.D441.L			Theory of Regional Planning and Process	2-0-0	1,3,4,5	B	【Urban Design and Built Environment】(UDE.P402)
		CVE.D442.L		J	Urban Planning	2-0-0	1,4,5	B	【Urban Design and Built Environment】(UDE.P403)
		CVE.D443.L			City/Transport Planning and the Environment	1-0-0	1,5	B	【Urban Design and Built Environment】(UDE.P404)
		CVE.A441.L			Basics of Stochastic Process for Earthquake Engineering	1-0-0	1,4,5	B	【Urban Design and Built Environment】(UDE.S431)
		CVE.A401.L			Introduction to Solid Mechanics	2-0-0	1,4,5	B	
		CVE.A402.L			Nonlinear Solid Mechanics	2-0-0	1,4,5	B	
		CVE.A403.L			Analysis of Vibrations and Elastic Waves	2-0-0	1	B	
		CVE.A431.L		E	Fracture Control Design of Steel Structures	2-0-0	1,3,5	B	
		CVE.A432.L		J	Practical Seismic Design I	1-0-0	1,5	B,C	
		CVE.A433.L		J	Practical Seismic Design II	1-0-0	1,5	B,C	
		CVE.B401.L			Water Resource Systems	2-0-0	1,2,3,4	B	
		CVE.C401.L			Mechanics of Geomaterials	2-0-0	1,5	B	
		CVE.C402.L			Stability Problems in Geotechnical Engineering	2-0-0	1,4,5	B	
		CVE.C403.L			Geo-environmental Engineering	2-0-0	1,4,5	B	
		CVE.C431.L			Physical Modeling in Geotechnics	2-0-0	1,3,4,5	B,C	
		CVE.C432.L		J O	Rock Engineering	2-0-0	1,4,5	B	
		CVE.D402.L			Transportation Network Analysis	2-0-0	1	B	
		CVE.D405.L			Transportation Science and Simulation	2-0-0	1	**B**	
		CVE.D445.L		J	Topics of Sustainable urban and rural areas	1-0-0	1,4,5	A,B	【Urban Design and Built Environment】

									(UDE.D404)
		CVE.D446.L		J	Topics of Landscape Planning	1-0-0	1,4,5	A,B	【Urban Design and Built Environment】 UDE.D445)
		CVE.E401.L		O	Mechanics of Structural Concrete	2-0-0	1,5	B	
		CVE.E431.L		O	Integrated Modeling of Reinforced Concrete Structure	2-0-0	1	B	
		CVE.F431.L		E	Maintenance of Infrastructure	2-0-0	1,4,5	B	
		CVE.F432.L			Principles of Construction Management	2-0-0	1,2	B	
		CVE.F441.L			Project Evaluation for Sustainable Society	1-0-0	1,4,5	B	【Global Engineering for Development, Environment and Society】 (GEG.P411)
		CVE.G401.L			Aquatic Environmental Science	2-0-0	1,4,5	B	
		CVE.G402.L			Environmental Statistics	2-0-0	4,5	A,B	
		CVE.G403.L			Water Chemistry for Environmental Engineering	2-0-0	1,4,5	B	
		CVE.M401.L			Civil Engineering Analysis	2-0-0	1,5	A	
		CVE.M431.L		O	Probabilistic Concepts in Engineering Design	2-0-0	1,3,5	A,B	
		CVE.N421.L			Environment Design in Japan	1-0-0	1,2,5	B	
		CVE.N431.L			Teaching Skills in Civil Engineering A	0-0-1	3,5	C,D	
		CVE.N432.L			Teaching Skills in Civil Engineering B	0-0-1	3,5	C,D	
		CVE.N433.L			Teaching Skills in Civil Engineering C	0-0-1	3,5	C,D	
		CVE.N434.L			Teaching Skills in Civil Engineering D	0-0-1	3,5	C,D	
		CVE.P432.L			International Collaboration	0-1-0	2,3,4,5	D	
		CVE.P433.L			International Internship	0-1-0	1,2,3,5	D	
		CVE.P461.L			Civil Engineering Project for Minor	0-0-2	1,3,4,5	C,D	
		CVE.Q431.L			Internship in Civil Engineering	0-0-1	1,2,3,5	C,D	
		CVE.G441.L			Global Environmental System and Ecosystem Dynamics	2-0-0	1,4,5	B	【Global Engineering for Development, Environment and Society】 (GEG.E401)
		CVE.B441.L			Atmospheric Environment in Megacities	2-0-0	1	B	【Global Engineering for Development, Environment and Society】 (GEG.E411)
		CVE.B442.L			Hydrology and Water Resources Conservation	2-0-0	1,2,3,5	B	【Global Engineering for Development, Environment and Society】 (GEG.E412)
	500	CVE.A541.L			Microtremor Survey Techniques using	1-0-0	1,4,5	B	【Urban Design

	level				Theory of Stochastic Process				and Built Environment】(UDE.S531)
		CVE.N531.L			Advanced Topics in Civil Engineering I	1-0-0	1, 5	B	
		CVE.N532.L			Advanced Topics in Civil Engineering II	2-0-0	1,2,3,4,5	B	
		CVE.B541.L			Environmental Hydraulics	1-0-0	1	B	【Global Engineering for Development, Environment and Society】(GEG.E502)
		CVE.B542.L			Coastal Disaster Mitigation for Engineers and Planners	1-0-0	1,2,5	B	【Global Engineering for Development, Environment and Society】(GEG.I501)
		CVE.M541.L			Numerical Simulation of Environments	1-0-0	1	B	【Urban Design and Built Environment】(UDE.E506)

Note:
• ◎: Required course, ○: Restricted elective, O: Odd academic years, E: Even academic years, J：in Japanese
· Competencies: 1 = Specialist skills, 2 = Liberal arts skills, 3 = Communication skills, 4 = Applied skills (inquisitive thinking and/or problem-finding skills), 5 = Applied skills (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 CVE.D400.R): A: Structural Engineering, B: Water Resources, C: Geotechnical Engineering, D: Infrastructure and Transportation Planning, E: Construction Material Technology, F: Management, G: Environment, L: Language, M: Fundamentals, N: Others, P: Project-based learning, Z: Research Seminar.

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 can be counted towards the completion requirements of master's degree program, either for the Major Courses or for the Career Development Courses (i.e., not for both). Nevertheless, even in the cases from those mentioned above where attained credits pertaining to these courses are not considered as Career Development Courses, their associated GAs are always considered to have been acquired.

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:

GA0M: You can clearly plan your own career and recognize the abilities necessary for realizing it while considering ethics and relevance to societal problems.

GA1M: You can acquire the knowledge, skills, and ethics necessary for realizing your planned career and contribute to societal problem-solving while collaborating with other experts

Table M3. Courses of the Graduate Major in Civil Engineering recognized as equivalent to Career Development Courses

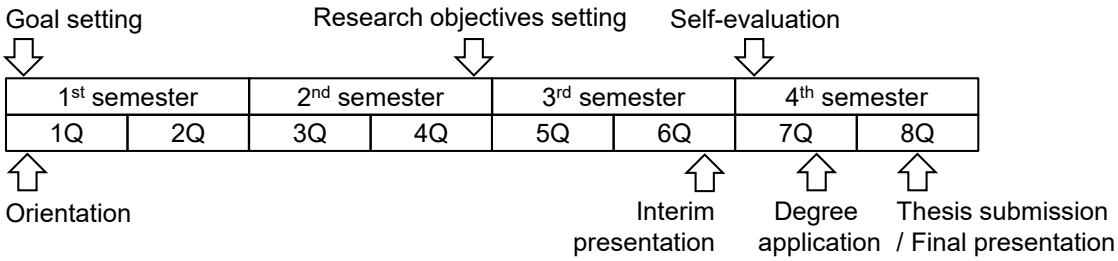
Course category	Course number	Course title			Credits	GA*	Learning goals	Comments
Courses that can be counted as Career Development Courses	CVE.N431.L			Teaching Skills in Civil Engineering A	0-0-1	GA1M	C,D	
	CVE.N432.L			Teaching Skills in Civil Engineering B	0-0-1	GA1M	C,D	
	CVE.N433.L			Teaching Skills in Civil Engineering C	0-0-1	GA1M	C,D	
	CVE.N434.L			Teaching Skills in Civil Engineering D	0-0-1	GA1M	C,D	

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. Research Related to the Completion of Master Thesis

In Master's degree study, by engaging in original research focused on a specific problem, students learn to work independently and proactively, and to communicate their results convincingly. The chart below shows the chronological sequence of the study program.



Interim presentation (6Q)

Through presentation of research progress, students review their research. This presentation helps students plan half a year ahead and work towards the final thesis submission.

Requirements for Master's thesis

The thesis should be original and should contain either (1) new findings in the civil engineering or (2) useful findings that contribute to the civil engineering practice. The extended abstract of the thesis should be written in English.

Assessment of Master's thesis

Three or more examiners review the thesis prior to the final presentation. The candidate revises the thesis according to the examiners' comments and defends the work in the final presentation (8Q). The thesis final presentation is in English. For those who hope to apply for the doctoral program, the number of examiners is five or more.

【Doctoral Degree Program】

1. Outline

Civil engineering is the practice of developing a civilized built environment in harmony with our natural and social 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.

In the Doctoral Degree Program, students study cutting-edging knowledge and technology based on the latest research, building on the basic and specialized civil engineering knowledge learned in the Bachelor's and Master's Degrees Programs. Furthermore, the curriculum is structured to enable students to further deepen their specialization and increase their creativity by performing cutting-edge research independently during Research Seminars and doctoral thesis research.

2. Competencies Developed

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 the 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. Learning Goals

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 international 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. 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. From the courses specified in the Graduate Major in Civil Engineering curriculum,
   - 12 credits acquired from Research Seminars;
   - a minimum of 6 credits acquired from Major Courses; and
   - a minimum of 6 credits acquired from Liberal Arts and Basic Science Courses
     (2 credits from Humanities and Social Science Courses, and 4 credits from Career Development Courses).
3. Pass the doctoral thesis 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 Civil Engineering Completion Requirements

<table>
<tr><th colspan="2">Course category</th><th><Required courses>
Required credits</th><th><Electives>
Minimum credits required</th><th>Minimum credits required</th><th>Associated learning goals</th><th>Comments</th></tr>
<tr><td rowspan="3">Liberal arts and basic science courses</td><td>Humanities and social science courses</td><td></td><td>2 credits</td><td rowspan="3">6 credits</td><td>B,C</td><td></td></tr>
<tr><td>Career development courses</td><td></td><td>4 credits</td><td>B,C</td><td>All Graduate Attributes (GA) should be acquired. (Refer to Section 7 for the definition of GA.)</td></tr>
<tr><td>Other courses</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="5">Core courses</td><td>Research seminars</td><td>Seminar in Civil Engineering S3
Seminar in Civil Engineering F3
Seminar in Civil Engineering S4
Seminar in Civil Engineering F4
Seminar in Civil Engineering S5
Seminar in Civil Engineering F5

A total of 12 credits, 2 credits each from the above courses.</td><td></td><td rowspan="3">18 credits</td><td>A,B,C</td><td></td></tr>
<tr><td>Research-related courses</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Major courses</td><td>6 credits</td><td></td><td>A,B,C</td><td></td></tr>
<tr><td colspan="2">Major courses and Research-related courses <u>outside</u> the Graduate Major in Civil Engineering standard curriculum</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Total required credits</td><td colspan="5">A minimum of 24 credits including those attained according to the above conditions</td></tr>
<tr><td colspan="2">Note</td><td colspan="5">・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.</td></tr>
</table>

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 Civil Engineering

Course category		Course number	Course title			Credits	Competencies	Learning goals	Comments
Research seminars	600 level	CVE.Z691.R	◎		Seminar in Civil Engineering S3	0-2-0	1,2,3,4,5	A,B,C	
		CVE.Z692.R	◎		Seminar in Civil Engineering F3	0-2-0	1,2,3,4,5	A,B,C	
		CVE.Z693.R	◎		Seminar in Civil Engineering S4	0-2-0	1,2,3,4,5	A,B,C	
		CVE.Z694.R	◎		Seminar in Civil Engineering F4	0-2-0	1,2,3,4,5	A,B,C	
		CVE.Z695.R	◎		Seminar in Civil Engineering S5	0-2-0	1,2,3,4,5	A,B,C	
		CVE.Z696.R	◎		Seminar in Civil Engineering F5	0-2-0	1,2,3,4,5	A,B,C	
Major courses	600 level	CVE.N601.R	◎		Frontiers in Civil Engineering	2-0-0	1,3,4	A	
		CVE.N611.L			Special Lecture on Civil Engineering A	2-0-0	1,2,3,4,5	A	
		CVE.N612.L			Special Lecture on Civil Engineering B	1-0-0	1,2,3,4,5	A	
		CVE.N613.L			Special Lecture on Civil Engineering C	2-0-0	1,2,3,4,5	A	
		CVE.N614.L			Special Lecture on Civil Engineering D	1-0-0	1,2,3,4,5	A	
		CVE.N631.L			Teaching and Training Skills in Civil Engineering A	0-0-1	3,5	A,B,C	
		CVE.N632.L			Teaching and Training Skills in Civil Engineering B	0-0-1	3,5	A,B,C	
		CVE.N633.L			Teaching and Training Skills in Civil Engineering C	0-0-1	3,5	A,B,C	
		CVE.N634.L			Teaching and Training Skills in Civil Engineering D	0-0-1	3,5	A,B,C	
		CVE.N635.L			Disaster Investigation and Restoration Practice A	0-0-1	1,3,4,5	A,B,C	
		CVE.N636.L			Disaster Investigation and Restoration Practice B	0-0-1	1,3,4,5	A,B,C	
		CVE.N637.L			Disaster Investigation and Restoration Practice C	0-0-1	1,3,4,5	A,B,C	
		CVE.N638.L			Disaster Investigation and Restoration Practice D	0-0-1	1,3,4,5	A,B,C	
		CVE.P601.R	◎		Collaborative Project in Civil Engineering S3	0-0-1	1,2,3,4,5	A,B,C	
		CVE.P602.R	◎		Collaborative Project in Civil Engineering F3	0-0-1	1,2,3,4,5	A,B,C	
		CVE.P603.R	◎		Collaborative Project in Civil Engineering S4	0-0-1	1,2,3,4,5	A,B,C	
		CVE.P604.R	◎		Collaborative Project in Civil Engineering F4	0-0-1	1,2,3,4,5	A,B,C	
		CVE.P611.L			Off Campus Project in Civil Engineering A	0-0-1	1,3,4,5	A,B,C	
		CVE.P612.L			Off Campus Project in Civil Engineering B	0-0-1	1,3,4,5	A,B,C	
		CVE.P613.L			Off Campus Project in Civil Engineering C	0-0-1	1,3,4,5	A,B,C	
		CVE.P614.L			Off Campus Project in Civil Engineering D	0-0-1	1,3,4,5	A,B,C	
		CVE.P621.L			Off Campus Project in Civil Engineering I	0-0-4	1,3,4,5	A,B,C	
		CVE.P622.L			Off Campus Project in Civil Engineering II	0-0-4	1,3,4,5	A,B,C	
		CVE.P631.L		J	Cooperative Education through Research Internships of Civil Engineering	0-0-4	1,3,4,5	C	

Note:
• ◎: Required course, ○: Restricted elective, O: Odd academic years, E: Even academic years
· Competencies: 1 = Specialist skills, 2 = Liberal arts skills, 3 = Communication skills, 4 = Applied skills (inquisitive thinking and/or problem-

finding skills), 5 = Applied skills (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 CVE.D600.R): N: Others, P: Project-based learning, Z: Research Seminar.

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 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 below.

However, it must be noted that credits attained from these courses can be counted towards the completion requirements of doctoral degree program, either for the Major Courses or for the Career Development Courses (i.e., not for both). Nevertheless, even in the cases from those mentioned above where attained credits pertaining to these courses are not considered as Career Development Courses, their associated GAs are always considered to have been acquired.

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

GA0D: You can clearly design your own career and contribute to realizing scientific, technological, or social innovation through a comprehensive understanding of the knowledge, skills, social responsibilities and ethics required to become an active member of academia and/or industry.

GA1D: You can lead in realizing scientific, technological, or social innovation by acquiring the advanced leadership skills, entrepreneurial skills, knowledge and expertise, and by developing social responsibility necessary for materializing your designed career.

Table D3. Courses of the Graduate Major in Civil Engineering recognized as equivalent to Career Development Courses

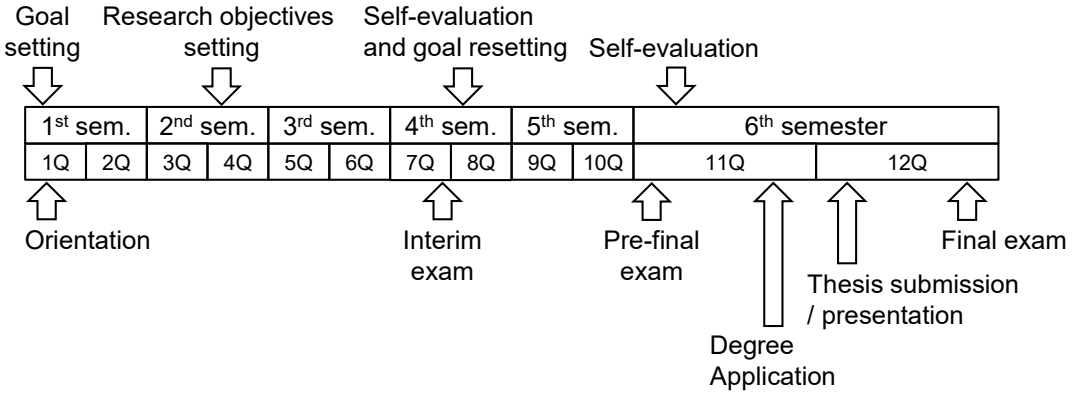
Course category	Course number	Course title	Credits	GA*	Learning goals	Comments
Courses that can be counted as Career Development Courses	CVE.N631.L	Teaching and Training Skills in Civil Engineering A	0-0-1	GA1D	A,B,C	
	CVE.N632.L	Teaching and Training Skills in Civil Engineering B	0-0-1	GA1D	A,B,C	
	CVE.N633.L	Teaching and Training Skills in Civil Engineering C	0-0-1	GA1D	A,B,C	
	CVE.N634.L	Teaching and Training Skills in Civil Engineering D	0-0-1	GA1D	A,B,C	
	CVE.P611.L	Off Campus Project in Civil Engineering	0-0-1	GA1D	A,B,C	

				A				
	CVE.P612.L			Off Campus Project in Civil Engineering B	0-0-1	GA1D	A,B,C	
	CVE.P613.L			Off Campus Project in Civil Engineering C	0-0-1	GA1D	A,B,C	
	CVE.P614.L			Off Campus Project in Civil Engineering D	0-0-1	GA1D	A,B,C	
	CVE.P621.L			Off Campus Project in Civil Engineering I	0-0-4	GA1D	A,B,C	
	CVE.P622.L			Off Campus Project in Civil Engineering II	0-0-4	GA1D	A,B,C	
	CVE.P631.L		J	Cooperative Education through Research Internships of Civil Engineering	0-0-4	GA1D	C	
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, the Tokyo Tech Academy for Leadership (ToTAL) or WISE Programs 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. Research Related to the Completion of Doctoral Thesis

In doctoral degree study, by engaging in cutting-edge research focused on a specific problem, students learn to work independently and proactively, and to communicate their results convincingly. The chart below shows the chronological sequence of the study program.



Interim examination and pre-final examination

A doctoral candidate has to pass the interim examination (7Q) and pre-final examination (11Q) prior to the degree application and thesis submission.

Requirements for doctoral thesis

The thesis should be original and should form a distinct contribution to the knowledge of the civil engineering and show evidence of originality by the discovery of new facts and/or the exercise of independent critical power. The major part of the thesis should have been published in internationally recognized academic journals or at least reach the level of work publishable in such journals. The thesis should be written in English.

Assessment of doctoral thesis

Five or more examiners (invitation of an external examiner is preferable) review the thesis. The thesis presentation is in English. The candidate revises the thesis according to the examiners' comments and defends the work in the thesis presentation and final examination (12Q). In the final examination, the review of assigned academic papers is included.