



# **Undergraduate Talent Training Program for Civil Engineering Major**



# Undergraduate Talent Training Program for Civil Engineering Major

## 1. Training Objectives

This program is based on the regional economic and social development needs, aiming at the construction of new-type urbanization and rural revitalization. It trains professionals who meet the national infrastructure development needs, with solid engineering practice skills, autonomous learning ability, cooperative communication skills, and innovation capabilities. These professionals are prepared to work in construction, management, and design roles in areas such as road and bridge engineering, building engineering, and urban rail transit engineering, possessing strong professional ethics and social responsibility.

The knowledge, skills, and abilities of the program's graduates are designed to achieve the following objectives:

**Training Objective 1:** Master basic knowledge in mathematics, natural sciences, and information technology to lay a solid foundation for subsequent coursework, applying the learned knowledge to solve engineering problems.

**Training Objective 2:** Master fundamental knowledge in civil engineering and use this knowledge to identify and analyze complex engineering problems, building a solid foundation for further solving complex civil engineering issues.

**Training Objective 3:** Master professional knowledge in civil engineering, capable of investigating, designing, and analyzing complex engineering problems in related fields, and proposing solutions that meet the specific needs of complex civil engineering challenges.

**Training Objective 4:** Master cutting-edge knowledge and skills in civil engineering, able to track the development trends in the field and pursue further self-development.

**Training Objective 5:** Master cross-cultural and international cooperation and communication skills that are adaptable to social development and globalization.

**Training Objective 6:** Understand China's current social model and norms, demonstrating good social behavior, teamwork spirit, and humanistic care. Develop



comprehensively in moral, intellectual, physical, and psychological aspects.

## 2. Learning Outcomes

### (1) Basic Scientific Literacy and Engineering Abilities

- Ability to understand and apply mathematics and natural sciences to solve practical engineering problems;
- Ability to understand and participate in general industry processes, meeting potential job and technical requirements;
- Ability to track the development trends of modern science and technology and their application prospects.

### (2) Civil Engineering Professional Knowledge and Abilities

- Ability to acquire and apply civil engineering professional knowledge;
- Possession of strong professional practice skills and vocational abilities;
- Ability for further study, advanced degree pursuit, and research.

### (3) International Communication Ability

- Possession of sufficient English language knowledge to communicate with international peers;
- Ability to work and collaborate in foreign countries or multinational companies ; supported by a solid foreign language and cross-cultural background.

### (4) Computer and Information Application Ability

- Ability to use computer software and networks;
- Familiarity with common methods of literature, information, and data retrieval, with the ability to acquire and utilize information (including literature);
- Ability to integrate professional knowledge with computers, such as computer-aided design and simulation.

### (5) Engineering and Professional Practice Ability

- Ability to design solutions to complex engineering problems in the field of civil engineering;
- Ability to design buildings, bridges, and rail systems that meet specific needs, incorporating innovation in the design process and considering social, health, safety, legal, cultural, and environmental factors;
- Ability to design, construct, and operate building, road, bridge, and rail



engineering systems according to regulations, as well as to analyze and evaluate practical engineering problems and provide valuable solutions.

(6) Teamwork and Management Ability

- Good mental health and personal integrity;
- Strong legal awareness and social responsibility;
- Teamwork spirit and some management abilities;
- Ability to thrive in competitive environments and challenging work conditions.

### 3. Graduation Requirements

Adherence to the leadership of the Communist Party of China, love for the socialist motherland, mastery of Marxism, Mao Zedong Thought, and the theoretical system of socialism with Chinese characteristics, possessing correct worldviews, life philosophies, and values, observing laws and regulations, promoting unity and cooperation, showing dedication and willingness to contribute.

#### Requirement 1: **Engineering Knowledge**

Ability to apply mathematics, natural sciences, engineering fundamentals, and professional knowledge to solve complex engineering problems in civil engineering.

#### Requirement 2: **Problem Analysis**

Capability to identify, express, and analyze complex engineering problems in civil engineering through literature research, using basic principles of mathematics, natural sciences, and engineering sciences to obtain effective conclusions.

#### Requirement 3: **Design (Development) Solutions**

Capability to consider factors such as society, health, safety, law, culture, and environment, designing structures and components that meet specific requirements of civil engineering, devising solutions for complex engineering problems, collaborating to complete virtual design and construction of a project, and demonstrating innovation throughout the process.

#### Requirement 4: **Research**

Ability to conduct research on complex engineering problems in civil engineering based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, and deriving reasonable and effective conclusions through information synthesis.



**Requirement 5: Use of Modern Tools**

Ability to develop, select, and use appropriate technologies, resources, modern engineering tools, and information technology tools for complex engineering problems, including prediction and simulation of complex engineering problems, and understanding their limitations.

**Requirement 6: Engineering and Society**

Capability to evaluate designs, construction, and operation schemes of civil engineering projects, as well as solutions to complex engineering problems, based on relevant background knowledge and standards in civil engineering, understanding their impact on society, health, safety, law, and culture, and understanding the responsibilities of civil engineers.

**Requirement 7: Environment and Sustainable Development**

Ability to understand and evaluate the impact of engineering practices on the environment and social sustainable development regarding complex engineering problems in civil engineering.

**Requirement 8: Professional Norms**

Possession of humanities and social science literacy and social responsibility, ability to understand and adhere to engineering professional ethics and behavioral norms, and fulfil responsibilities in engineering practice.

**Requirement 9: Individual and Team**

Ability to take on roles as individuals, team members, and leaders in multidisciplinary teams when addressing complex engineering problems in civil engineering.

**Requirement 10: Communication**

Possession of an international perspective, and ability to effectively communicate and exchange views with peers in the industry and the public on complex engineering problems in civil engineering in cross-cultural contexts.

**Requirement 11: Project Management**

Understanding and mastery of engineering management principles and economic decision-making methods, and application in multidisciplinary environments.

**Requirement 12: Lifelong Learning**

Awareness of self-directed learning and lifelong learning, possessing the ability to enhance self-directed learning and adapt to new developments in civil



engineering.

#### **4. Special Features of the Major**

(1) The Civil Engineering major is a first-class major in Hunan Province, a characteristic major in Hunan Province, and a pilot major for comprehensive reform during the "14th Five - Year Plan" period.

(2) Emphasis is placed on cultivating students' practical skills, experimental innovation abilities, and diversified practical teaching. The major has unique advantages and features in school-enterprise cooperation, integration of production and education, and teaching of construction industrialization and informatization.

#### **5. Based on Key Disciplines**

Civil Engineering, Mechanics

#### **6. Core Courses of the Major**

Principles of Concrete Structure Design, Basic Principles of Steel Structure, Engineering Geology, Foundation Engineering, Engineering Economy and Building Regulations, Construction Principles and Methods, Architectural Design, High-rise Building Structures, Road Survey and Design, Roadbed and Pavement Engineering, Bridge Engineering, Urban Rail Transit Network Planning and Route Design, Rail Engineering, Tunnel and Underground Engineering.

#### **7. Main Practical Teaching Segments**

Main Professional Experiments: Mechanics of Materials Experiment, Building Materials Experiment, Soil Mechanics Experiment, Civil Engineering Structural Testing Technology, Civil Engineering Structural Inspection Technology.

Main Professional Internships: Surveying Internship, Engineering Geology Internship, Awareness Internship, Construction Internship, Graduation Internship.

Main Professional Designs:

(1) Direction of Architectural Engineering: Course Design of Architectural Design, Course Design of Single-story Industrial Plant, Course Design of Steel Structure, Course Design of Budget Estimation, Course Design of Construction Organization, Comprehensive Training for Graduation

(2) Direction of Road and Bridge Engineering: Course Design of Road Survey



and Design, Course Design of Roadbed and Pavement Engineering, Course Design of Beam Bridge, Course Design of Bridge Construction Organization, Comprehensive Training for Graduation

(3) Direction of Urban Rail Transit Engineering: Course Design of Urban Rail Transit Route Design, Course Design of Rail Engineering, Course Design of Railway Bridge, Course Design of Tunnel and Underground Engineering, Course Design of Urban Rail Transit Station, Course Design of Urban Rail Transit Engineering Construction Organization, Comprehensive Training for Graduation

## 8. Duration of Study and Degree Awarded

Standard Duration of Study: 4 years, with a study period of 3-6 years; those who meet the requirements specified in the "Implementation Rules for Conferring Bachelor's Degrees of Hunan City University" are awarded a Bachelor of Engineering degree.

## 9. Distribution of Total Graduation Hours

Module	Contact Hours	Self-Study Hours	Total Hours	Percentage
Mathematics and Physics	432	348	780	11.21%
Information Technology	80	40	120	1.72%
Engineering Fundamentals	640	515	1155	16.59%
Professional Foundation	240	225	465	6.68%
Professional Application	384	336	720	10.35%
Professional Practice	328	302	630	9.05%
Professional Development	144	81	225	3.23%
Integrated Application	590	670	1260	18.1%
Foreign Language	240	180	420	6.04%
Humanities and Social Sciences	718	467	1185	17.03%
<b>Total Hours</b>	<b>3796</b>	<b>3164</b>	<b>6960</b>	



## 9. Personnel training program schedule

### 1. Teaching Plan Schedule

Module	Curriculum	Chinese credits	ECTS	Total class hours	Contact hours	Self-study hours	Remarks
Mathematical physics	Advanced Mathematics A (1)	4.5	4.5	135	72	63	
	Advanced Mathematics A (2)	5	5	150	80	70	
	Linear Algebra A	2	2	60	32	28	
	Probability Theory and mathematical Statistics A	2.5	2.5	75	40	35	
	University Physics (1)	3	3	90	48	42	
	University Physics (2)	3	3	90	48	42	
	General Chemistry A	2.5	2.5	75	40	35	
	Mathematical Modeling	1.5	1.5	45	24	21	
Information technology	University physics Experiment	2	2	60	48	12	
	College students Computer Foundation	1.5	1.5	45	32	13	
Engineering foundation	Computer Language	2.5	2.5	75	48	27	
	Descriptive geometry	3	3	90	48	42	
	Civil Engineering Drawing (including CAD)	1.5	1.5	45	24	21	
	Rational Mechanics	4	4	120	64	56	
	Mechanics of Materials	3.5	3.5	105	56	49	
	Structural Mechanics (1)	3	3	90	48	42	
	Structural Mechanics (2)	2.5	2.5	75	40	35	
	Soil Mechanics	2.5	2.5	75	40	35	
	Hydrodynamics	2	2	60	32	28	
Civil Engineering Materials	2.5	2.5	75	40	35		



Undergraduate Talent training Program for Civil Engineering Major



	Engineering Survey B	3	3	90	56	34	
	Engineering Geology	2	2	60	32	28	
	Electrical and Electronic Training A	1	2	60	32	28	
	Engineering Geology Internship	1	2	60	32	28	
	Measurement Internship	2	3	90	64	26	
	Goldsmithing Practice A	1	2	60	32	28	
Professional foundation	Foundation Work	2	2	60	32	28	
	Principles of Concrete Structure Design	4	4	120	64	56	
	Engineering Economy and Building Regulations	2	2	60	32	28	
	Introduction to Civil Engineering	1.5	1.5	45	24	21	
	Basic Principles of Steel Structure	2.5	2.5	75	40	35	
	Introduction to Seismic Engineering	1	1	30	16	14	
	Intensive Study	1	2.5	75	32	43	
Professional applications	Project Management	1	1	30	16	14	
	Construction Principles and Methods	3.5	3.5	105	56	49	
	Engineering Structure Load and Reliability Theory	1.5	1.5	45	24	21	
	High-rise Building Structure	2	2	60	32	28	Construction
	Building Construction	2.5	2.5	75	40	35	
	Design of Steel Structure	3	3	90	48	42	
	Masonry Structure	2	2	60	32	28	
	Concrete Structure Design	3.5	3.5	105	56	49	
	Modular Construction	1.5	1.5	45	24	21	
	Construction Project Estimate and Budget	1.5	1.5	45	24	21	
	Construction of Building Works	2	2	60	32	28	

Undergraduate Talent training Program for Civil Engineering Major



	Hydrology of Bridge and Culvert	1.5	1.5	45	24	21	Road bridge	
	Road Survey and Design	2.5	2.5	75	40	35		
	Roadbed Pavement Works	3	3	90	48	42		
	Bridge Engineering (I)	3.5	3.5	105	56	49		
	Bridge Engineering (II)	2.5	2.5	75	40	35		
	Road and Bridge Construction Technology	2	2	60	32	28		
	Road Bridge Project Estimate and Budget	1.5	1.5	45	24	21		
	Traffic Engineering	1.5	1.5	45	24	21		
		Urban rail Transit Network Planning and Line Design	3	3	90	48	42	URban rail
		Orbital Engineering	3	3	90	48	42	
		Tunnels and Underground Works	3	3	90	48	42	
		Railroad Bridge	2	2	60	32	28	
		Urban Rail Transit Station	1.5	1.5	45	24	21	
		Railroad Bed	2	2	60	32	28	
		Urban Rail Project Estimate and Budget	1.5	1.5	45	24	21	
		Road and Railway Engineering Construction Technology	2	2	60	32	28	
Professional practice	Course Design of Architectural Engineering	1	2	60	32	28	Construction	
	Ribbed Beam Floor Course Design (including masonry)	1	2	60	32	28		
	Single Layer Industrial Plant Course Design	1	2	60	32	28		
	Steel Structure Course Design	1	2	60	32	28		
		Road survey and Design Course Design	1	2	60	32	28	Road bridge
		Roadbed Pavement Engineering Course Design	1	2	60	32	28	
		Trench Wall Course Design	1	2	60	32	28	
		Bridge Engineering Course Design	1	2	60	32	28	

Undergraduate Talent training Program for Civil Engineering Major



	Urban rail Transit Line Course Design	1	2	60	32	28	Urban rail
	Orbital Engineering Course Design	1	2	60	32	28	
	Railway Bridge Course Design	1	2	60	32	28	
	Course Design of Tunnel and Underground Engineering	1	2	60	32	28	
	Experiments of Mechanics of Material	0.5	1	30	12	18	
	Building Materials test	0.5	1	30	16	14	
	Soil mechanics Experiment	0.5	1	30	12	18	
	Course Design of Concrete Structure Design Principle	1	2	60	32	28	
	Basic Engineering Course Design	1	2	60	32	28	
	Overview of Budgeting Course Design	1	2	60	32	28	
	Construction Organization Curriculum Design	1	2	60	32	28	
	Graduating Education	0	2	60	32	28	
Professional development category	Foundation of Innovation and Entrepreneurship	1	1.5	45	32	13	
	Literature Search and Research Methods	0.5	1	30	8	22	
	BIM Foundation	1	1	30	24	6	
	New Technology in Civil Engineering	0.5	1	30	16	14	
	Civil Engineering Structure Test Technology	1.5	1.5	45	32	13	
	Civil engineering Structure Testing Technology	1.5	1.5	45	32	13	
Comprehensive Application	Production Internship	4	10	300	120	180	
	Graduation Intership	2	4	120	50	70	
	Graduation comprehensive training	14	28	840	420	420	
Foreign Languages	College English (1)	3	3	90	48	42	
	College English (2)	3	3	90	48	42	
	College English Extension Series (1)	1.5	1.5	45	24	21	

Undergraduate Talent training Program for Civil Engineering Major



	College English Extension Series (2)	1.5	1.5	45	24	21	
	College English Practice (1)	0	1.5	45	32	13	
	College English Practice (2)	0	1.5	45	32	13	
	special English	2	2	60	32	28	
Humanities and social sciences	Ideological Morality and Rule of Law	3	3	90	48	42	
	Essentials of Chinese Modern History	3	3	90	48	42	
	Basic principles of Marxism	3	3	90	48	42	
	An overview of MAO Zedong Thought and the Theoretical System of Socialism With Chinese Characteristics	5	5	150	80	70	
	Situation and Policy	2	2	60	32	28	
	Mental Health Education for College Students	1	1.5	45	32	13	
	Career development and Employment Guidance for College Students (1)	0.5	1	30	20	10	
	Career development and Employment Guidance for College Students (2)	0.5	1	30	18	12	
	Military theory for college students	2	2	60	36	24	
	University Physical Education and Health (1)	1	1.5	45	32	13	
	University Physical Education and Health (2)	1	1.5	45	32	13	
	University Physical Education and Health (3)	0.5	1	30	16	14	
	University Physical Education and Health (4)	0.5	1	30	16	14	
	Introduction to Life Sciences	1	1	30	16	14	
	Introduction to Environmental Science	1	1	30	16	14	
Enrollment education and Military Training	0	4	120	96	24		

**Undergraduate Talent training Program for Civil Engineering Major**



	<b>Social practice and Volunteer Service</b>	<b>1</b>	<b>2</b>	<b>60</b>	<b>32</b>	<b>28</b>	
	<b>An overview of Xi Jinpings Thought on Socialism with Chinese Characteristics for a New Era</b>	<b>3</b>	<b>3</b>	<b>90</b>	<b>40</b>	<b>50</b>	
	<b>Voluntary Work</b>	<b>0</b>	<b>2</b>	<b>60</b>	<b>60</b>	<b>0</b>	



## 2 Semester start schedule

First academic year											
	Course Code	Course Name	Total Duration	contact hours	self - study hours		Course Code	Course Name	Total Duration	contact hours	self - study hours
	<b>First Semester</b>	9123311031	Ethics and Rule of Law	90	48		42	<b>Second Semester</b>	9124311041	Outline of Modern Chinese History	90
9054311011		University English (1)	90	48	42	9054311021	University English (2)		90	48	42
9132311020		Military theory for university students	60	36	24	9163311010	Foundations of Innovation and Entrepreneurship		45	32	13
9063311011		Computer fundamentals for university students	45	32	13	9063311021	Computer Language		75	48	27
9103811010		University Physical Education and Health (1)	45	32	13	9103811020	University Physical Education and Health (2)		45	32	13
9092112011		Advanced Mathematics A (1)	135	72	63	9092112021	Advanced Mathematics A (2)		150	80	70
9112112071		Descriptive Geometry	90	48	42	9065112011	University Physics (1)		90	48	42
9036124360		Literature Search and Research Methods	30	8	22	9112112081	Civil Engineering Drawing (with CAD)		45	24	21
9132311030		Orientation and Military Training	120	96	24	9034112011	Theoretical Mechanics		120	64	56
9141315010		Social Practice and Volunteerism	60	32	28	9036112021	Engineering Geology		60	32	28
						9032113010	Introduction to Civil Engineering		45	24	21

**Undergraduate Talent training Program for Civil Engineering Major**



								Introduction to Life Sciences	30	16	14
								Introduction to Environmental Studies	30	16	14
							9036615250	Engineering Geology Internship	60	32	28
							9131311010	Mental health education for university students	45	32	13
<b>Second academic year</b>											
<b>First Semester</b>	Course Code	Course Name	Total Duration	contact hours	self - study hours	<b>Second Semester</b>	Course Code	Course Name	Total Duration	contact hours	self - study hours
	9121311011	Basic Principles of Marxism	90	48	42		9122311021	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	150	80	70
		University English Extension Series (1)	45	24	21			University English Extension Series (2)	45	24	21
	9103811030	University Physical Education and Health (3)	30	16	14		9133315010	Labour Class	60	60	0
	09092112091	Linear algebra A	60	32	28		9151311010	Career development and	30	20	10

**Undergraduate Talent training Program for Civil Engineering Major**



							employment guidance for university students (1)			
9065112021	University Physics (2)	90	48	42		9103811040	University Physical Education and Health (4)	30	16	14
9065212030	University Physics Laboratory	60	48	12		9092112081	Probability Theory and Mathematical Statistics A	75	40	35
9080312010	General Chemistry A	75	40	35		9034112031	Structural Mechanics (1)	90	48	42
9034112021	Material Mechanics	105	56	49		9036112011	Geotechnics	75	40	35
9034112051	Fluid Mechanics	60	32	28		9031112010	Civil engineering materials	75	40	35
9039212010	Experiments in the mechanics of materials	30	12	18		9039314083	Engineering Survey B	90	56	34
9161715010	Electrical and Electronic Practical Training A	60	32	28		9039212020	Building Materials Experiment	30	16	14
9162715010	Metallurgical Training A	60	32	28		9039212030	Soil mechanics experiment	30	12	18
						9031112021	Engineering Structural Loads and Reliability Theory	45	24	21
						9031113060	Building Science	75	40	35
						9032615190	Apprenticeship	75	32	43
						9024715800	Surveying Practice	90	64	26
						9125111050	Situation and Policy	60	32	28
<b>Third academic year</b>										



**Undergraduate Talent training Program for Civil Engineering Major**



	Course Code	Course Name	Total Duration	contact hours	self - study hours		Course Code	Course Name	Total Duration	contact hours	self - study hours
	<b>First Semester</b>	9034112041	Structural Mechanics (2)	75	40		35	<b>Second Semester</b>	9032111120	Mathematical Modelling	45
9036112031		Foundation Work	60	32	28	9031113031	Construction Principles and Methods		105	56	49
9031112031		Principles of Concrete Structural Design	120	64	56	9031113071	Structural Steel Design (Building and Engineering)		90	48	42
9031113021		Engineering Economics and Building Regulations	60	32	28	9031113091	Design of Concrete Structures (Building and Engineering)		105	56	49
9031112041		Basic Principles of Steel Structure	75	40	35	9032113031	Roadbed and Pavement Works (Road and Bridge)		90	48	42
9032113041		Bridge and culvert hydrology (Road Bridges)	45	24	21	9032113051	Bridge Engineering (I) (Road Bridges)		105	56	49
9032113021		Road survey and design (Road and Bridge)	75	40	35	9032113111	Traffic Engineering (Road and Bridge)		45	24	21
9033113011		Urban Railway Network Planning and Line Design (City Rail)	90	48	42	9036113041	Tunnelling and Underground Works (City Railway))		90	48	42
9033113021		Railway Engineering (City Rail)	90	48	42	9033113031	Railway Bridges (City Railway)		60	32	28
9031114140		BIM Basics	30	24	6	9033113051	Railway Foundations (City Railway)		60	32	28
9039314040		Civil Engineering	45	32	13	9039314050	Civil Engineering		45	32	13

**Undergraduate Talent training Program for Civil Engineering Major**



		Structural Testing Techniques					Structural Inspection Technology				
	9054325010	University English Practicum (1)	45	32	13		University English Practicum (2)	45	32	13	
	9031113110	Introduction to Earthquake Engineering (Building and Engineering、City Rail)	30	16	14		9032615200	Construction Practice	300	120	180
	9031415010	Housing Architecture Programme Design (Building and Engineering)	60	32	28		9151311020	Career Development and Employment Guidance for University Students (2)	30	18	12
	9031415020	Principles of Concrete Structural Design Course Design	60	32	28						
	9036415310	Foundation Engineering Course Design	60	32	28						
	9032415130	Road Surveying and Design Course Design (Roads and Bridges)	60	32	28						
	9033413010	Course Design of Urban Railway Lines (City Railway)	60	32	28						
	9033413020	Railway Engineering Programme Design (City Rail)	60	32	28						

**Undergraduate Talent training Program for Civil Engineering Major**



	9141315010	Social Practice and Volunteer Service	60	32	28						
	9036124660	New Technologies in Civil Engineering	60	32	28						
<b>Fourth academic year</b>											
<b>First Semester</b>	Course Code	Course Name	Total Duration	contact hours	self - study hours	<b>Second Semester</b>	Course Code	Course Name	Total Duration	contact hours	self - study hours
	9031113011	Engineering Project Management	30	16	14		9032615220	Comprehensive Training for Graduation	840	420	420
	9032113101	Professional English	60	32	28		9032111230	Graduation Education	60	32	28
	9031113051	High-rise Building Structures (Building and Engineering)	60	32	28						
	9031113081	Masonry (Building and Engineering)	60	32	28						
	9031114100	Assembly Building (Building and Engineering)	45	24	21						
	9035113041	Estimates of construction works (Building and Engineering)	45	24	21						
	9031113051	Building Construction (Building and	60	32	28						

**Undergraduate Talent training Program for Civil Engineering Major**



	Engineering)									
9036124660	New Civil Engineering Technologies	30	16	14						
9032113061	Bridge Engineering (II) (Road Bridges)	75	40	35						
9032113081	Road and Bridge Engineering Construction Technology (Road and Bridge)	60	32	28						
9032113091	Estimates for Road and Bridge Works (Roads and bridges)	45	24	21						
9033113041	City Rail Stations ( City Rail )	45	24	21						
9033113061	City Railway Engineering Estimates (City Railway)	45	24	21						
9033113071	Road and Railway Engineering Construction Technology (City Railway)	60	32	28						
9032615210	Graduation Practice	120	50	70						
9031415060	Budget Course Design	60	32	28						
9031415070	Construction Organisation Course Design	60	32	28						
9032415140	Course design for roadbed and pavement engineering (Road and Bridge)	60	32	28						



**Undergraduate Talent training Program for Civil Engineering Major**

9032415150	Retaining Wall Course Design (Road Bridge)	60	32	28						
9032415160	Bridge Engineering Programme Design (Road Bridge)	60	32	28						
9031415030	Course design for ribbed beam floor coverings (including masonry) (Building Engineering)	60	32	28						
9031415040	Course design for single-storey Industrial Buildings (Building Engineering)	60	32	28						
9031415050	Steel Structure Course Design (Building Engineering)	60	32	28						
9033413030	Railway Bridge Course Design (City Rail)	60	32	28						
9036415350	Course Design for Tunnelling and Underground Engineering (City Railway)	60	32	28						



## 10. Decomposition of Graduation Requirements and Achievement Matrix of Talent Training Standards

The decomposition of graduation requirements is shown in Table 10-1. Based on the training objectives and basic requirements of graduates, a curriculum system is constructed, and the implementation of the curriculum system achieves the training objectives and basic requirements. The correspondence between the basic requirements of graduates and the training objectives of this major is shown in Table 10-2. Table 10-3 shows the correspondence between the teaching segments and graduation requirements formed after the analysis of indicators for graduation requirements in this major, which is the matrix of correspondence between the professional curriculum system and the basic requirements of graduates.

**Table 10-1 Decomposition of Graduation Requirements**

Graduation Requirements	Secondary Indicator Points
<b>(1) Engineering Knowledge:</b> Ability to apply mathematics, natural sciences, engineering fundamentals, and professional knowledge to solve complex engineering problems in civil engineering.	1.1 Ability to apply mathematical and natural science knowledge to perform calculations and deductions in conjunction with engineering problems.
	1.2 Ability to use engineering fundamentals, combined with mathematical, natural science, and engineering scientific language, to express complex engineering problems in civil engineering in a standardized manner.
	1.3 Ability to analyze, model, and solve complex engineering problems in civil engineering using professional knowledge and other acquired knowledge. Possess the ability to compare and synthesize solutions, utilizing literature research to analyze various factors affecting problem-solving processes and reach effective conclusions.
<b>(2) Problem Analysis:</b> Capability to identify, express, and analyze complex engineering problems in civil engineering through literature research, using basic principles of mathematics, natural sciences, and engineering sciences to obtain effective conclusions.	2.1 Ability to identify complex engineering problems in civil engineering based on fundamental principles of mathematics, natural sciences, and engineering sciences.
	2.2 Ability to analyze complex engineering problems in civil engineering, and identify critical stages in problem-solving processes.
	2.3 Ability to recognize the diversity and substitutability of solution alternatives for critical stages of problem-solving, utilizing literature research and various methods to analyze factors influencing problem-solving processes and derive effective conclusions.
	2.4 Ability to effectively express analysis processes and conclusions using engineering principles and mathematical models to guide the development of solutions.



Graduation Requirements	Secondary Indicator Points
<p><b>(3) Design (Development) Solutions:</b></p> <p>Capability to consider factors such as society, health, safety, law, culture, and environment, designing structures and components that meet specific requirements of civil engineering, devising solutions for complex engineering problems, collaborating to complete virtual design and construction of a project, and demonstrating innovation throughout the process.</p>	<p>3.1 Ability to design individual structures and components (nodes) that meet specific requirements of civil engineering, fully considering factors such as society, health, safety, law, culture, and environment in the design process, reflecting innovation.</p> <p>3.2 Ability to develop construction and management plans for specific complex engineering problems in civil engineering. Ability to consider factors such as society, health, safety, law, culture, and environment in plan development, reflecting innovation.</p> <p>3.3 Familiarity with the basic construction process, able to collaborate or independently complete virtual design and construction of a specific engineering project. Ability to fully consider factors such as society, health, safety, law, culture, and environment in the design and construction process, reflecting innovation.</p>
<p><b>(4) Research:</b></p> <p>Ability to conduct research on complex engineering problems in civil engineering based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, and deriving reasonable and effective conclusions through information synthesis.</p>	<p>4.1 Ability to conduct research on complex engineering problems in civil engineering based on scientific principles, through literature research or relevant methods, and analyze solution options.</p> <p>4.2 Proficiency in experimental (testing) operation, able to scientifically design experimental plans for civil engineering based on object characteristics, construct experimental systems, conduct experiments safely, and collect data accurately.</p> <p>4.3 Ability to process, analyze, and interpret experimental data, integrate information to obtain rational and effective conclusions, and apply them to engineering practice.</p>
<p><b>(5) Use of Modern Tools:</b></p> <p>Ability to develop, select, and use appropriate technologies, resources, modern engineering tools, and information technology tools for complex engineering problems, including prediction and simulation of complex engineering problems, and understanding their limitations.</p>	<p>5.1 Familiarity with modern tools related to civil engineering, understanding their principles and methods of use, and recognizing their limitations. Ability to develop or select tools.</p> <p>5.2 Ability to analyze, calculate, and design complex engineering problems in civil engineering using modern tools, and analyze the effectiveness and limitations of the results.</p> <p>5.3 Ability to operate basic software required for the development of information technology in the construction industry, and the ability to construct and apply information models.</p>
<p><b>(6) Engineering and Society:</b></p> <p>Capability to evaluate designs, construction, and operation schemes of civil engineering projects, as well as solutions to complex engineering problems, based on relevant background</p>	<p>6.1 Familiarity with professional standards, policies, and laws and regulations related to civil engineering, and understanding the impact of different social cultures on engineering activities.</p> <p>6.2 Ability to analyze and evaluate the impact of civil engineering project design and construction, and solutions to complex engineering problems on society, health, safety, law, and culture.</p>



Graduation Requirements	Secondary Indicator Points
knowledge and standards in civil engineering, understanding their impact on society, health, safety, law, and culture, and understanding the responsibilities of civil engineers.	6.3 Understanding the legal and social responsibilities that civil engineers should undertake in engineering practice.
<b>(7) Environment and Sustainable Development:</b> Ability to understand and evaluate the impact of engineering practices on the environment and social sustainable development regarding complex engineering problems in civil engineering.	7.1 Understanding and understanding the concept and connotation of environmental protection and sustainable development.
	7.2 Ability to evaluate the sustainability of engineering practices from the perspective of environmental protection and sustainable development, and assess the potential harm and risks that engineering practices may cause to humans and the environment.
	7.3 Awareness of using energy-saving and environmentally friendly materials and conducting green construction.
<b>(8) Professional Norms:</b> Possession of humanities and social science literacy and social responsibility, ability to understand and adhere to engineering professional ethics and behavioral norms, and fulfil responsibilities in engineering practice.	8.1 Understanding and consciously adhering to the professional ethics and behavioral norms of engineers in engineering practice.
	8.2 Possession of humanities and social science literacy, understanding of the national conditions of China, correct values, ability to understand the social responsibility of engineers to the safety, health, and welfare of the public, and environmental protection. Ability to fulfil responsibilities in engineering practice.
<b>(9) Individual and Team:</b> Ability to take on roles as individuals, team members, and leaders in multidisciplinary teams when addressing complex engineering problems in civil engineering.	9.1 Ability to communicate effectively and collaborate in multidisciplinary teams, fulfil roles as team members, and independently or cooperatively complete tasks assigned by the team.
	9.2 Ability to listen to suggestions from other team members, organize, coordinate, and direct teamwork.
<b>(10) Communication:</b> Possession of an international perspective, and ability to effectively communicate and exchange views with peers in the industry and the public on complex engineering problems in civil engineering in cross-cultural contexts.	10.1 Understanding the differences in communication between industry peers and the general public, and the ability to communicate effectively with industry peers and the general public on complex engineering problems in civil engineering.
	10.2 Understanding the international status of the civil engineering profession and related industries, respecting the differences and diversity of world cultures, and being able to communicate and exchange basic ideas on professional issues in a cross-cultural context.
<b>(11) Project Management:</b> Understanding and mastery of engineering management principles and economic decision-making methods, and	11.1 Ability to understand the engineering management issues involved in the full life cycle of civil engineering projects and the ability to develop project management plans for common engineering projects in a multidisciplinary environment using engineering management principles.





Graduation Requirements	Secondary Indicator Points
application in multidisciplinary environments.	11.2 Ability to understand the economic decision-making issues involved in the full life cycle of civil engineering projects, and the ability to apply economic decision-making methods in the process of designing and developing solutions in a multidisciplinary context.
<b>(12) Lifelong Learning:</b> Awareness of self-directed learning and lifelong learning, possessing the ability to enhance self-directed learning and adapt to new developments in civil engineering.	12.1 Recognizing the necessity of independent and lifelong learning in the context of social development, possessing an awareness of independent and lifelong learning.
	12.2 Ability to independently learn, including understanding technical issues, summarizing abilities, problem-solving abilities, and adapting to new developments in the civil engineering industry.

Table 10-2 Support Matrix for Graduation Requirements and Training Objectives

	Training Objective 1	Training Objective 2	Training Objective 3	Training Objective 4	Training Objective 5	Training Objective 6
Graduation Requirement 1.1	H					
Graduation Requirement 1.2		H				
Graduation Requirement 1.3			H			
Graduation Requirement 2.1	H					
Graduation Requirement 2.2		H				
Graduation Requirement 2.3		H				
Graduation Requirement 2.4			H			



**Undergraduate Talent training Program for Civil Engineering Major**

	Training Objective 1	Training Objective 2	Training Objective 3	Training Objective 4	Training Objective 5	Training Objective 6
Graduation Requirement 3.1						
Graduation Requirement 3.2			H			
Graduation Requirement 3.3				H		
Graduation Requirement 4.1			M			
Graduation Requirement 4.2			H			
Graduation Requirement 4.3				M		
Graduation Requirement 5.1			M			
Graduation Requirement 5.2				H		
Graduation Requirement 5.3				H		
Graduation Requirement 6.1			M			
Graduation Requirement 6.2			H			
Graduation Requirement 6.3						H



**Undergraduate Talent training Program for Civil Engineering Major**

	Training Objective 1	Training Objective 2	Training Objective 3	Training Objective 4	Training Objective 5	Training Objective 6
Graduation Requirement 7.1						M
Graduation Requirement 7.2						M
Graduation Requirement 7.3				M		
Graduation Requirement 8.1						H
Graduation Requirement 8.2						H
Graduation Requirement 9.1						H
Graduation Requirement 9.2						H
Graduation Requirement 10.1					H	
Graduation Requirement 10.2					H	
Graduation Requirement 11.1				M		
Graduation Requirement 11.2				H		
Graduation Requirement 12.1				M		



**Undergraduate Talent training Program for Civil Engineering Major**

	Training Objective 1	Training Objective 2	Training Objective 3	Training Objective 4	Training Objective 5	Training Objective 6
Graduation Requirement 12.2				H		

**Table 10-2 Support Matrix for Graduation Requirements and Learning Outcomes**

	Learning Outcomes 1	Learning Outcomes 2	Learning Outcomes 3	Learning Outcomes 4	Learning Outcomes 5	Learning Outcomes 6
Graduation Requirement 1	H	M	M			
Graduation Requirement 2		H				
Graduation Requirement 3			H			
Graduation Requirement 4		H				
Graduation Requirement 5			H			
Graduation Requirement 6			L			H
Graduation Requirement 7						H
Graduation Requirement 8						H
Graduation Requirement 9					H	
Graduation Requirement 10					H	
Graduation Requirement 11				H		
Graduation Requirement 12				H		