



**Appendix 1-1: 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



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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



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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



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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



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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% |
| Total Hours | 3796 | 3164 | 6960 | |



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 | | |



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|--|---|-----|-----|-----|----|----|--------------|
| | 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 | |
| Professional applications | Intensive Study | 1 | 2.5 | 75 | 32 | 43 | |
| | 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 | | |



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|-----------------------|--|-----|-----|-----|----|----|--------------|
| | 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 | UArban 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 | |



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|-----------------------------------|--|-----|-----|-----|-----|-----|------------|
| | Bridge Engineering Course Design | 1 | 2 | 60 | 32 | 28 | Urban rail |
| | Urban rail Transit Line Course Design | 1 | 2 | 60 | 32 | 28 | |
| | 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 | Construction Internship | 4 | 10 | 300 | 120 | 180 | |
| | graduation Field work | 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 | |



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|--|--|-----|-----|-----|----|----|--|
| | College English Extension Series (1) | 1.5 | 1.5 | 45 | 24 | 21 | |
| | 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 | | |



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



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2 Semester start schedule

| First academic year | | | | | | | | | | | |
|---------------------|----------------|---|----------------|---------------|------------------|-----------------|-----------------|--|----------------|---------------|------------------|
| | First Semester | | | | | Second Semester | Second Semester | | | | |
| | Course Code | Course Name | Total Duration | contact hours | self-study hours | | Course Code | Course Name | Total Duration | contact hours | self-study hours |
| | 9123311031 | Ethics and Rule of Law | 90 | 48 | 42 | | 9124311041 | Outline of Modern Chinese History | 90 | 40 | 42 |
| | 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 |



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|-----------------------------|-------------|--|----------------|---------------|--------------------|------------------------|-------------|---|----------------|---------------|--------------------|
| | | | | | | | | 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 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Second academic year | | | | | | | | | | | |
| First Semester | Course Code | Course Name | Total Duration | contact hours | self - study hours | Second Semester | 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 |



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|-------------|--|-----|----|----|------------|--|----|----|----|
| 09092112091 | Linear algebra A | 60 | 32 | 28 | 9151311010 | Career development and employment guidance for university students (1) | 30 | 20 | 10 |
| 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 |
| | | | | | | | | | |



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| Third academic year | | | | | | | | | | | |
|---------------------|-------------|--|----------------|---------------|--------------------|------------------------------------|-------------|--|----------------|---------------|--------------------|
| First Semester | Course Code | Course Name | Total Duration | contact hours | self - study hours | Second Semester | Course Code | Course Name | Total Duration | contact hours | self - study hours |
| | 9034112041 | Structural Mechanics (2) | 75 | 40 | 35 | | 903211120 | Mathematical Modelling | 45 | 24 | 21 |
| | 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 | | |



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|------------|--|----|----|----|------------|---|-----|-----|-----|
| 9039314040 | Civil Engineering Structural Testing Techniques | 45 | 32 | 13 | 9039314050 | Civil Engineering Structural Inspection Technology | 45 | 32 | 13 |
| 9054325010 | University English Practicum (1) | 45 | 32 | 13 | 9054325020 | 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 | | | | | |



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|-----------------------------|-------------|--|----------------|---------------|--------------------|------------------------|-------------|---------------------------------------|----------------|---------------|--------------------|
| | 9033413020 | Railway Engineering Programme Design (City Rail) | 60 | 32 | 28 | | | | | | |
| | 9141315010 | Social Practice and Volunteer Service | 60 | 32 | 28 | | | | | | |
| | 9036124660 | New Technologies in Civil Engineering | 60 | 32 | 28 | | | | | | |
| | | | | | | | | | | | |
| Fourth academic year | | | | | | | | | | | |
| First Semester | Course Code | Course Name | Total Duration | contact hours | self - study hours | Second Semester | 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 | | | | | | |



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|------------|---|-----|----|----|--|--|--|--|--|--|
| 9035113041 | Estimates of construction works (Building and Engineering) | 45 | 24 | 21 | | | | | | |
| 9031113051 | Building Construction (Building and Engineering) | 60 | 32 | 28 | | | | | | |
| 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 | | | | | | |



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| | | | | | | | | | | |
|------------|---|----|----|----|--|--|--|--|--|--|
| 9031415070 | Construction Organisation Course Design | 60 | 32 | 28 | | | | | | |
| 9032415140 | Course design for roadbed and pavement engineering (Road and Bridge) | 60 | 32 | 28 | | | | | | |
| 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 | | | | | | |



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| | | | | | | | | | | | |
|--|------------|--|----|----|----|--|--|--|--|--|--|
| | 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 |
|--|--|
| (1) Engineering Knowledge: 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. |
| (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. | 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. |

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| Graduation Requirements | Secondary Indicator Points |
|---|--|
| <p>(3) Design (Development) Solutions:</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>(4) Research:</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>(5) Use of Modern Tools:</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>(6) Engineering and Society:</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> |

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| Graduation Requirements | Secondary Indicator Points |
|--|--|
| <p>knowledge and standards in civil engineering, understanding their impact on society, health, safety, law, and culture, and understanding the responsibilities of civil engineers.</p> | <p>6.3 Understanding the legal and social responsibilities that civil engineers should undertake in engineering practice.</p> |
| <p>(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.</p> | <p>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.</p> |
| <p>(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.</p> | <p>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.</p> |
| <p>(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.</p> | <p>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.</p> |
| <p>(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.</p> | <p>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.</p> |
| <p>(11) Project Management: Understanding and mastery of engineering management principles and economic decision-making methods, and</p> | <p>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.</p> |



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| 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. |
| (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. | 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 | | | |



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| | 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 |



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| | 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 | | |



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| | 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 | | |