Hunan Institute of Engineering (HIE)

Programme Handbook

Civil Engineering

Major Version: V2023

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Programme: Civil Engineering

Programme Code: 081001

Core Discipline: Mechanics, Civil Engineering

Degree Awarded: Bachelor of Engineering

Duration: 4 years

Honors: The First-Class Provincial Undergraduate Programme in Hunan Province

1 Program Overview

The Civil Engineering major, originating from the Industrial and Civil Architecture major established in 1997, currently offers three specializations: Architectural Engineering, Road and Bridge Engineering, and Geotechnical and Urban Underground Engineering. In 2018, it was recognized as an applied characteristic discipline under Hunan Province's "Double First-Class" initiative. In 2019, it was designated as a first-class undergraduate program. The major is supported by one provincial-level key laboratory and two provincial-level engineering research centers. It aligns closely with regional economic and industry development needs, aiming to cultivate highly skilled professionals equipped for careers in engineering geological investigation, design, construction, management, consultation, and operational maintenance.

2 Program Objectives

This major aims to cultivate students with comprehensive development in morality, intelligence, physical health, aesthetics, and labor skills, aligning with national strategic and regional economic needs. Graduates are expected to be well-versed in professional theories and proficient in practical engineering skills. They are prepared for roles in investigation, design, construction, management, consultation, and operational maintenance across various domains such as Architectural Engineering, Road and Bridge Engineering, and Geotechnical and Urban Underground Engineering. The program seeks to produce application-oriented senior professionals capable of tackling complex civil engineering challenges.

Within 5 years after graduation, graduates shall achieve the following objectives:

- Objective 1: Possess the ability to integrate engineering mathematics with multidisciplinary approaches to solve complex civil engineering problems, competent in investigation, design, construction, management, consultation, and operational maintenance.
- Objective 2: Exhibit a high sense of social responsibility and professional ethics, able to evaluate and integrate social, legal, economic and environmental considerations into engineering practices.
- Objective 3: Maintain a healthy body and mind, exhibit strong humanistic qualities, and demonstrate team spirit, as well as effective communication and presentation skills.
- Objective 4: Have the capability to coordinate, make decisions, and implement engineering projects, applying engineering management principles and economic decision-making methods in a multidisciplinary context.

- Objective 5: Proactively adapt to modernization and societal needs, demonstrating capabilities in self-directed and lifelong learning, with a strong grasp of sustainable development concepts and a global perspective.

3 Graduation Requirements

1) Engineering knowledge: Be able to use mathematics, natural sciences, basic and professional engineering knowledge to solve complex civil engineering problems.
2) Problem analysis: Be able to apply fundamental principles of mathematics, natural sciences, and engineering sciences to identify, articulate and analyze complex civil engineering problems, achieving effective conclusions through literature research.
3) Design/develop solutions: Be able to design solutions for complex civil engineering problems, create components (nodes), structures, systems, or technical schemes tailored to specific needs, incorporating innovation and considering social, health, safety, legal, cultural and environmental factors.
4) Research: Be able to conduct research on complex civil engineering problems using scientific principles and methods, including experiment design, data collection, processing, analysis, and interpretation; synthesize information to derive practical and effective conclusions for application in engineering practice.
5) Use of modern tools: Be able to develop, select, and utilize appropriate technologies, resources, and modern engineering and IT tools for analyzing, designing, calculating, simulating and predicting complex civil engineering issues, while understanding their limitations.
6) Engineering and society: Be able to evaluate the impact of engineering practices, including geological investigation, design, construction, management, consultation, and operational maintenance, on society, health, safety, law, and culture, based on civil engineering background knowledge and technical standards, and understand their associated responsibilities.
7) Environment and sustainable development: Be able to understand and evaluate the environmental and societal impacts of engineering practices in the context of sustainability.
8) Professional codes: Be able to possess literacy in humanistic and social sciences, a strong sense of social responsibility, and can abide by civil engineering ethics and professional standards, serving society and fulfilling their duties.
9) Individuals and teams: Be able to take on roles as individuals, team members, and leaders within multidisciplinary teams when addressing complex civil engineering challenges.
10) Communication: Be able to effectively communicate with industry peers and the public on complex civil engineering issues, including writing reports and designing documentation, presenting speeches, and clearly expressing or responding to instructions. Possess a global perspective and be able to communicate effectively across cultural boundaries.
11) Project management: Be able to understand and apply principles of engineering management

and economic decision-making within multidisciplinary settings.

12) Lifelong learning: Be able to possess a strong commitment to independent and lifelong learning, with the ability to continuously learn and adapt to advancements in professional and technical disciplines, as well as societal changes.

4 The Relationship between Program Objectives and Graduation Requirements

Program Objectives / Graduation Requirements	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
1 Engineering knowledge	●				
2 Problem analysis	●				
3 Design/develop solutions	●				
4 Research	●				
5 Use modern tools	●				
6 Engineering and society		●			
7 Environment and sustainable development		●			
8 Professional codes		●			
9 Individuals and teams			●	●	
10 Communication			●	●	
11 Project management				●	
12 Lifelong learning					●

5 Major Disciplines and Professional Core Courses

According to the talent training plan, the curriculum system can be divided into four modules: general education basic courses, subject basic courses, professional courses, practice courses, involving course clusters: mathematics and natural science, informatics, engineering foundation, engineering application, practice, foreign language, general studies, quality development, Bachelor Thesis.

Correspondence between course modules and cluster is as shown in the table.

NO.	Modules	Cluster
1	general education basic courses	mathematics and natural science(C1), informatics(C2), foreign language(C6), general courses(C7), quality expansion courses(C8)
2	subject basic courses	engineering foundation(C3)

3	professional courses	engineering application(C4)
4	practice courses	practical training(C5), Bachelor Thesis(C9)

The correspondence between course groups and courses is as shown in the table

Cluster	Cluster	
C1	Advanced Mathematics A (1) (2), Linear Algebra, Probability Theory and Mathematical Statistics, University Physics (1) (2), University Physics Experiment (1) (2), University Chemistry, Operations Research B.	
C2	Fundamentals of Computer Science, C Language Programming	
C3	Drawing geometry B, Introduction to civil engineering, Graphing of Engineering, CAD Technological base, Theoretical mechanics, Mechanics of materials, Civil engineering materials, Engineering Survey A, Structural Mechanics (1) (2), Engineering geology, Design principle of concrete structure, Soil mechanics and foundation, Design principle of steel structure, Construction technology and organization of civil engineering	
C4	Construction Engineering Direction	Building Architecture, Design of steel structure, Concrete and masonry structure design, Seismic Design of Building, High-rise buildings, Estimated budget for construction projects
	Road and bridge engineering	Road survey and design, Roadbed and pavement engineering, Hydrology for bridge and culvert, Bridge Engineering (1) (2), Highway project budget estimate
	Geotechnical and Urban Underground Engineering	Rock mechanics, Geotechnical investigation and testing, Underground structures, Slope engineering and foundation treatment, Subway and tunnel engineering, Estimates for underground engineering
C5	National defense education entrance education, Voluntary labour, Comprehensive Practice in Ethics and Moral Cultivation, English application ability practice, Acquaintanceship Practice, "C language programming" practicum, Practicum of engineering graphing, Social Survey (Summer), Engineering measuring practice, Construction organization practicum, Corporate Professional Practice (1) (2)	
	Construction Engineering Direction	Practicum of Building Architecture, Foundation engineering practicum A, Steel structure practicum, Practicum of concrete and masonry structure, Construction engineering budget practicum
	Road and bridge engineering	Practicum of road survey, Concrete practicum A, Roadbed and pavement practicum, Foundation engineering practicum A, Bridge engineering practicum, Highway engineering budget practicum
	Geotechnical and Urban Underground Engineering	Concrete practicum B, Geotechnical investigation and testing practicum, Foundation engineering practicum B, Practicum of underground building structure, Practicum of slope and foundation treatment, Subway and tunnel

		engineering practicum, Underground engineering budget practicum
C6	College English (1)(2)(3)(4)	
C7	Ideology, morality and rule of law, Basic principle of Marxism, Outline of Chinese Modern History, Introduction to MAO Zedong Thought and the theoretical system of socialism with Chinese characteristics, Introduction to Xi Thought on socialism with Chinese characteristics in the new era, Situation and Policy (1) (2), College Chinese A(including Technical Writing)	
C8	Physical Education (1) (2) (3) (4), Cultural quality education (Chinese culture, natural science, etc.), Cultural Quality Education (Public Art), Psychological and health education of college students, Military theory and national security education, Career Development and Guidance for College Students (1) (2), Innovation and Entrepreneurship Education (1) (2)	
C9	Bachelor Thesis	

Professional Core Courses (Specialization in Architectural Engineering): Theoretical Mechanics, Mechanics of Materials, Structural Mechanics, Soil Mechanics and Foundation Engineering, Design Principles of Concrete Structures, Design Principles of Steel Structures, Building Construction, Design of Concrete and Masonry Structures, Design of Steel Structures, Seismic Design of Buildings, Structural Design of High-rise Building.

Professional Core Courses (Specialization in Road and Bridge Engineering): Theoretical Mechanics, Mechanics of Materials, Structural Mechanics, Soil Mechanics and Foundation Engineering, Design Principles of Concrete Structures, Design Principles of Steel Structures, Bridge Culvert Hydrology, Road Survey and Design, Pavement and Roadbed Engineering, Bridge Engineering.

Professional Core Courses (Specialization in Geotechnical and Urban Underground Engineering): Theoretical Mechanics, Mechanics of Materials, Structural Mechanics, Soil Mechanics and Foundation Engineering, Design Principles of Concrete Structures, Design Principles of Steel Structures, Rock Mechanics, Underground Structures, Slope Engineering and Ground Improvement, Subway and Tunnel Engineering, Geotechnical investigation and Testing.

6 Program Duration and Degree

Duration: 4 years

Degree conferred: Bachelor of Engineering

7 Credits

Total Credits: 170

Course categories	In-class instruction				Engineering practice and graduation design
	Courses in mathematics and natural	Fundamental engineering courses, Core professional courses, and	Humanities and social sciences	Personal development courses	

	sciences curriculum	specialized courses	general education courses (including English)		
Credits	26	54.5	39	7.5	43
Percentage	15.30%	32.06%	22.94%	4.41%	25.29%

8 Teaching Schedule

8.1 Schedule of Teaching Weeks

Project / Week / Semester	Orientation and military training	Classroom instruction	Curriculum design	Intensive technical training	Comprehensive experimentation weeks	Practical training	Integrated practice in ethics	Final project (thesis)	Graduation preparation	Final examinations	Flexible instruction weeks	Total per semester
Architectural Engineering												
I	2	13					1			2	2	20
II		16		1		1				2		20
III		16	2							2		20
IV		13	3			2				2		20
V		15	3							2		20
VI		10	4			4				2		20
VII		13	1			4				2		20
VIII								15	3		2	20
Road and Bridge Engineering												
I	2	13					1			2	2	20

Project / Week / Semester	Orientation and military training	Classroom instruction	Curriculum design	Intensive technical training	Comprehensive experimentation weeks	Practical training	Integrated practice in ethics	Final project (thesis)	Graduation preparation	Final examinations	Flexible instruction weeks	Total per semester
II		16		1		1				2		20
III		16	2							2		20
IV		14	2			2				2		20
V		13	5							2		20
VI		13	1			4				2		20
VII		11	3			4				2		20
VIII								15	3		2	20
Geotechnical and Urban Underground Engineering												
I	2	13					1			2	2	20
II		16		1		1				2		20
III		16	2							2		20
IV		16				2				2		20
V		14	4							2		20

Project / Week / Semester	Orientation and military training	Classroom instruction	Curriculum design	Intensive technical training	Comprehensive experimentation weeks	Practical training	Integrated practice in ethics	Final project (thesis)	Graduation preparation	Final examinations	Flexible instruction weeks	Total per semester
VI		10	4			4				2		20
VII		11	3			4				2		20
VIII								15	3		2	20
Total	2	96	13	1		11	1	15	3	14	4	160

8.2 Schedule of Practicum Courses

Course Code	Practical Training	Course Name	Semester	Weeks	Credits
1602000	Orientation and Military Training	National Defense and Entrance Education	1	2	1
0502000	Ethics and Ideology Practice	Volunteer Labor	1	1	1
0502001	Ideological and Political Theory Practice	Internet + Xi Thought on Socialism with Chinese Characteristics for a New Era	2	(1)	1
0402000	English Application Practice	English Application Ability	2	1	1
0902200	Introductory Professional Practice	Acquaintanceship Practice	2	1	1
0302900	Practicum	C Programming Language Practicum	3	1	1

Course Code	Practical Training	Course Name	Semester	Weeks	Credits
0902205	Practicum	Engineering Graphics Practicum	3	1	1
0502002	Fieldwork for Social Investigation	Social Investigation	summer vacation	（4）	（4）
0902201	Practice	Engineering Surveying Practice	4	2	2
0902206	Practicum	Construction Organization Design Project	6	1	1
0902202	Enterprise-based Professional Practice	Production Practice Teaching in Enterprise (1)	6	4	4
0902203	Enterprise-based Professional Practice	Production Practice Teaching in Enterprise (2)	7	4	4
0905204	Undergraduate Thesis (Graduation Project)	Undergraduate Thesis (Graduation Project)	8	15	15
Specialization in Architectural Engineering					
0902210	Practicum	Building Construction Practicum	4	3	3
0902211	Practicum	Foundation Engineering Practicum A	5	1	1
0902212	Practicum	Steel Structures Practicum	5	2	2
0902213	Practicum	Concrete and Masonry Structures Practicum	6	3	3
0902214	Practicum	Construction Engineering Budget and Estimation Practicum	7	1	1
Specialization in Road and Bridge Engineering					
0902220	Practicum	Roadway Survey and Design Practicum	4	2	2

Course Code	Practical Training	Course Name	Semester	Weeks	Credits
0902221	Practicum	Concrete Structures Practicum A	5	2	2
0902222	Practicum	Pavement and Roadbed Design Practicum	5	2	2
0902211	Practicum	Foundation Engineering Practicum A	5	1	1
0902223	Practicum	Bridge Engineering Practicum	7	2	2
0902224	Practicum	Highway Engineering Budget Practicum	7	1	1
Specialization in Geotechnical and Urban Underground Engineering					
0902230	Practicum	Concrete Structures Practicum B	5	1	1
0902231	Practicum	Geotechnical Investigation and Testing Practicum	5	1	1
0902232	Practicum	Foundation Engineering Practicum B	5	2	2
0902233	Practicum	Underground Structures Practicum	6	2	2
0902234	Practicum	Slope Engineering and Ground Improvement Practicum	6	1	1
0902235	Practicum	Subway and Tunnel Engineering Practicum	7	2	2
0902236	Practicum	Underground Construction Engineering Budget and Estimation Practicum	7	1	1
Subtotal				43	43

8.3 Schedule of Theoretical Courses

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
Basic courses in general education	required	Ideology and Politics Module														
		0500000	Ethics and Law	2.5	40	32	8	4								examination
		0500001	Basic Theory of Marxism	3	48	40	8		3							examination
		0500002	Survey of Modern Chinese History	2.5	40	32	8				3					examination
		0500003	Overview of Mao Zedong Thought and the Theory of Socialism with Chinese Characteristics	2	32	32				2						examination
		0500004	Comprehensive Practice in Ethics and Moral Cultivation	3	48	40	8				4					examination
		0500005	Situation and Policy (1)	1.5	24	24		*	*	*	*					assessment
		0500008	Situation and Policy (2)	0.5	8	8						*	*			assessment
		Mathematics and Natural Sciences Module														

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
Basic courses in general education	required	1000000	Advanced Mathematics A(1)	4.5	72	72		6								examination
		1000001	Advanced Mathematics A(2)	6	96	96			6							examination
		1000004	Linear Algebra	2	32	32			2							examination
		1000006	Probability and Mathematical Statistics	2	32	32				2						examination
		1000008	Physics (1)	2.5	40	40			3							examination
		1000009	Physics (2)	3	48	48				3						examination
		1001000	University Physics Experiments (1)	1	16		16		2							assessment
		1001001	University Physics Experiments (2)	1	16		16			2						assessment
		0600900	University Chemistry	2	32	24	8	3								assessment
		0900220	Operations Research B	2	32	32					3					assessment
		Comprehensive Application Ability Module														

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
	required	0400000	College English (1)	3	48	48		4								examination
		0400001	College English (2)	2	32	32			2							examination
		0400002	College English (3)	3	48	48				3						examination
		0400003	College English (4)	3	48	48					4					examination
		0300900	Fundamentals of Computer Science	2.5	40	24	16	4								assessment
		0300901	C Programming Language	4	64	44	20		4							assessment
		0500006	College Chinese A (Including Technical Writing)	2	32	32		3								assessment
		Quality Expansion Module														
		1100000	Physical Education (1)	1	36	32	4	2								assessment
		1100001	Physical Education (2)	1	36	32	4		2							assessment
		1100002	Physical Education (3)	1	36	32	4			2						assessment
		1100003	Physical Education (4)	1	36	32	4				2					assessment

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
	required	0000000	Cultural Studies (Chinese culture, Natural sciences, etc)	1	16	16										assessment
		0000001	Cultural Quality Education (Public Art)	2	32	32										assessment
		1800000	University Students' Mental Health and Wellness Education	1	16+ (16)	16	(16)		*							assessment
		1600000	Military Theory and National Security	2	36	24	12		*							assessment
		0000002	Second Classroom	*												assessment
		Entrepreneurship and Innovation Education Module														
		0010000	Students Career Development and Employment Guidance (1)	1	8+ (8)	8	(8)		*							assessment
		0010001	Students Career Development and Employment Guidance (2)	1	8+ (14)	8	(14)						*			assessment
		5210000	Education of Creation and Innovation (1)	1	8+ (8)	8	(8)			2						assessment

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
		5210001	Education of Creation and Innovation (2)	1	8+ (8)	8	(8)						2			assessment
		Subtotal		74.5	1244 +(54)	1108	136 +(54)	25	26	16	16		2			
Basic Disciplinary Courses	required	0900200	Descriptive Geometry B	2	32	32			2							examination
		0900201	Introduction to Civil Engineering	1.5	24	24			2							assessment
		0900202	Engineering Graphics	1.5	24	24				3/						examination
		0900203	Basic CAD Techniques	1.5	24	16	8			/3						examination
		0900204	Theoretical Mechanics	2	32	32				5/						examination
		0900205	Mechanics of Materials	3	48	48				/5						examination
		0900206	Civil Engineering Materials	2	32	24	8			2						examination
		0900207	Engineering Surveying A	2	32	24	8				3					examination
		0900208	Structural Mechanics (1)	3.5	56	56					5					examination
		0900209	Structural Mechanics (2)	1.5	24	24						2				examination

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
		0900210	Engineering Geology	1.5	24	20	4					2				examination
		0900211	Design Principles of Concrete Structures	3.5	56	52	4					4				examination
		0900212	Soil Mechanics and Foundation	3	48	40	8					4				examination
		0900214	Design Principles of Steel Structures	2	32	32						4/				examination
		0900215	Civil Engineering Construction and Management	3	48	48							5			examination
		Subtotal		33.5	536	496	40		2	10	8	19	5			
		Specialization in Architectural Engineering														
		0900230	Building Construction	3	48	48					4					examination
		0900231	Steel Structure Design	2.5	40	40						/6				examination
		0900232	Concrete and Masonry Structure Design	3.5	56	56							6			examination

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
specialized Courses	required	0900233	Seismic Design of Buildings	1.5	24	24								5/		examination
		0900234	Structural Design of High-Rise Buildings	2	32	32								/4		examination
		0900235	Construction Engineering Budget and Estimation	2	32	32								3		examination
		Subtotal		14.5	232	232					4	6	6	8		
		Specialization in Road and Bridge Engineering														
		0900240	Road Survey and Design	3	48	48					3					examination
		0900241	Pavement and Roadbed Engineering	3	48	48						4				examination
		0900242	Bridge Culvert Hydrology	1.5	24	24							2			examination
		0900243	Bridge Engineering (1)	2.5	40	40							3			examination
		0900244	Bridge Engineering (2)	2.5	40	40								4		examination
		0900245	Highway Engineering Budget	2	32	32								3		examination

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
specialized Courses	required	Subtotal		14.5	232	232					3	4	5	7		
		Specialization in Geotechnical and Urban Underground Engineering														
		0900250	Rock Mechanics	2	32	26	6				2					examination
		0900251	Geotechnical Investigation and Testing	2	32	28	4					2				examination
		0900252	Underground Structures	3	48	48							5			examination
		0900253	Slope Engineering and Ground Improvement	2.5	40	40							4			examination
		0900254	Subway and Tunnel Engineering	3	48	48								5		examination
		0900255	Underground Engineering Budget	2	32	32								3		examination
		Subtotal		14.5	232	222	10				2	2	9	8		
	Elective	0900260	Holistic Structural Design Methods	1.5	24	20	4						2			assessment

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
		0900261	Technical English for Civil Engineering	1.5	24	24						2				assessment
		0900262	BIM and Structural Design Software	2	32	16	16						3			assessment
		0900263	Engineering Accident Analysis and Safety	1.5	24	24								3		assessment
		0900268	Structural Engineering Testing and Inspection	1.5	24	16	8						3			assessment
		0900272	Geological Hazard Prevention and Control	1.5	24	24								3		assessment
		0900273	Prefabricated Building	1.5	24	24							2			assessment
		0900274	Fluid Mechanics	1.5	24	20	4					3				assessment
		0900275	Engineering Economics and Project management	1.5	24	24								4		assessment
		0900276	Construction Regulations	1	16	16								2		assessment

course type	required/ elective	course code	course name	credits	credit hours			Weeks in each semester								examination mode
					total	teaching	experiment and practice	1	2	3	4	5	6	7	8	
								13 w	16 w	16 w	13 (14) (16)w	15 (13) (14)w	10 (13) (10)w	13 (11) (11)w		
		Subtotal	At least 4.5 credits	4.5	72	52	20					5	6	9		
		Total (Specialization in Architectural Engineering)		127	2084 +(54)	1888 +(54)	196	25	28	26	28	23	21	17		
		Total (Specialization in Road and Bridge Engineering)		127	2084 +(54)	1888 +(54)	196	25	28	26	27	25	20	16		
		Total (Specialization in Geotechnical and Urban Underground Engineering)		127	2084 +(54)	1878 +(54)	206	25	28	26	26	23	24	17		

Note:

1. If the weekly credit hours are listed as “n/” or “/n”, this indicates that the course serves as either a prerequisite or a subsequent course within the same semester.

2. In the table header, A(B)(C) corresponds to the specialization of Architectural Engineering, Road and Bridge Engineering, and Geotechnical and Urban Underground Engineering, respectively.

9 Indicators of Graduation Requirements and Their Supporting Courses

Graduation requirements	Indicators of graduation requirements	Supporting courses
1. Engineering	1.1 Ability to apply mathematical, natural	Advanced Mathematics A (1)(2), Linear Algebra, Physics (1)(2), University Chemistry

Graduation requirements	Indicators of graduation requirements	Supporting courses
knowledge	science, and engineering fundamentals to express complex engineering problems in civil engineering.	
	1.2 Ability to apply mathematics, natural sciences, engineering fundamentals, and professional knowledge to establish mechanical models for complex engineering problems.	Probability and Mathematical Statistics, Operations Research B, Theoretical Mechanics, Mechanics of Materials, Structural Mechanics (1)(2)
	1.3 Ability to analyze and judge through mechanical models to obtain ways to solve complex engineering problems.	Soil Mechanics and Foundation Specialization in Architectural Engineering ： High-Rise Building and Seismic Design, Foundation Engineering Practicum A Specialization in Road and Bridge Engineering ： Hydraulics and Bridge Culvert Hydrology, Foundation Engineering Practicum A Specialization in Geotechnical and Urban Underground Engineering ： Rock Mechanics, Foundation Engineering Practicum B
	1.4 Ability to evaluate the advantages and disadvantages of multiple solutions to complex engineering problems and provide optimization methods.	Design Principles of Concrete Structures, Design Principles of Steel Structures, Load and structural design methods Specialization in Architectural Engineering ： Concrete Structures Practicum A Specialization in Road and Bridge Engineering ： Concrete Structures Practicum B Specialization in Geotechnical and Urban Underground Engineering ： Concrete Structures Practicum C
2. Problem analysis	2.1 Ability to apply the basic principles of mathematics, natural science, and engineering science to identify complex civil engineering	Advanced Mathematics A(1)(2), Linear Algebra, Probability and Mathematical Statistics, Theoretical Mechanics, Mechanics of Materials, Structural Mechanics (1)(2)

Graduation requirements	Indicators of graduation requirements	Supporting courses
	problems and analyze the key factors causing them.	
	2.2 Ability to accurately and effectively express complex civil engineering problems using drawings, charts, and text.	Descriptive Geometry B, Engineering Graphics, Basic CAD Techniques, Engineering Graphics Practicum Specialization in Architectural Engineering ： High-Rise Building and Seismic Design Specialization in Road and Bridge Engineering ： Hydraulics and Bridge Culvert Hydrology Specialization in Geotechnical and Urban Underground Engineering ： Rock Mechanics
	2.3 Ability to apply the basic principles of engineering fundamentals and professional knowledge, and analyze complex civil engineering problems with the help of literature, specifications, standards, or atlases to obtain effective conclusions.	Engineering Geology Specialization in Architectural Engineering ： Building Construction, Design of Concrete Structures and Masonry Structures, Design of Steel Structures, Building Construction Practicum Specialization in Road and Bridge Engineering ： Road Survey and Design, Pavement and Roadbed Engineering, Bridge Engineering (1)(2), Bridge Engineering Practicum Specialization in Geotechnical and Urban Underground Engineering ： Underground Structures, Subway and Tunnel Engineering, Geotechnical investigation and Testing, Underground Structures Practicum
3. Design/develop solutions	3.1 Ability to design components (nodes), structures, systems, or technical solutions that meet specific needs for complex civil engineering problems.	Design Principles of Concrete Structures, Design Principles of Steel Structures, Load and Structural Design Methods, Graduation Project Specialization in Architectural Engineering ： Steel Structures Practicum Specialization in Road and Bridge Engineering ： Bridge Engineering Practicum Specialization in Geotechnical and Urban Underground Engineering ： Underground Structures Practicum
	3.2 Ability to understand and evaluate the impact	Soil Mechanics and Foundation, Civil Engineering Construction and Management,

Graduation requirements	Indicators of graduation requirements	Supporting courses
	of engineering and technical solutions on society, health, safety, law, culture, and the environment, and fully utilize these factors to optimize engineering solutions.	Graduation Project Specialization in Architectural Engineering ： Foundation Engineering Practicum A Specialization in Road and Bridge Engineering ： Foundation Engineering Practicum A Specialization in Geotechnical and Urban Underground Engineering ： Slope Engineering and Ground Improvement, Foundation Engineering Practicum B
	3.3 Ability to demonstrate innovative awareness in the design process of solving complex civil engineering problems.	Graduation Project Specialization in Architectural Engineering ： Design of Steel Structures, Concrete Structures Practicum A Specialization in Road and Bridge Engineering ： Concrete Structures Practicum B, Pavement and Roadbed Engineering Building Construction Practicum Specialization in Geotechnical and Urban Underground Engineering ： Concrete Structures Practicum C, Subway and Tunnel Engineering Practicum
4. Research	4.1 Ability to conduct basic engineering experiments based on scientific principles and methods, and to collect and preliminarily analyze experimental data accurately.	University Physics Experiments (1)(2), Civil Engineering Materials, Structural Engineering Testing and Inspection
	4.2 Ability to design experimental schemes according to scientific principles, and to explore and analyze complex civil engineering problems through experiments.	University Physics Experiments (1)(2),Soil Mechanics and Foundation Specialization in Architectural Engineering ： Foundation Engineering Practicum A Specialization in Road and Bridge Engineering ： Foundation Engineering Practicum A Specialization in Geotechnical and Urban Underground Engineering ： Foundation Engineering Practicum B
	4.3 Ability to synthesize theoretical analysis with	Design Principles of Concrete Structures

Graduation requirements	Indicators of graduation requirements	Supporting courses
	experimental results, obtain reasonable and effective conclusions, and apply them to engineering practice.	Specialization in Architectural Engineering ： Concrete Structures Practicum A, Steel Structures Practicum Specialization in Road and Bridge Engineering ： Concrete Structures Practicum B、Roadway Survey and Design Practicum Specialization in Geotechnical and Urban underground engineering ： Concrete Structures Practicum C, Geotechnical investigation and Testing Practicum
5. Use modern tools	5.1 Ability to analyze, design, and calculate complex civil engineering problems using appropriate technologies and modern engineering tools.	C Programming Language, Basic CAD Techniques, Structural Engineering Testing and Inspection, Graduation Project, Engineering Surveying Practice
	5.2 Ability to develop, select, and use information technology tools, resources, and modern engineering tools for simulation and prediction.	C Programming Language, Engineering Surveying A, C Programming Language Practicum
	5.3 Ability to understand the advantages and limitations of various engineering tools and information technologies in addressing complex engineering problems.	Fundamentals of Computer Science, Civil Engineering Construction and Management Specialization in Architectural Engineering ： Building Construction Specialization in Road and Bridge Engineering ： Bridge Engineering (1)(2) Specialization in Geotechnical and Urban Underground Engineering ： Underground Structures

Graduation requirements	Indicators of graduation requirements	Supporting courses
6. Engineering and society	6.1 Ability to evaluate production practices and solutions to complex engineering problems such as engineering survey, design, construction, management, consulting, and operations, based on civil engineering- related background knowledge and standards.	Graduation Project, Civil Engineering Construction and Management Specialization in Architectural Engineering ： Design of Concrete Structures and Masonry Structures Specialization in Road and Bridge Engineering ： Pavement and Roadbed Engineering Building Specialization in Geotechnical and Urban Underground Engineering ： Slope Engineering and Ground Improvement
	6.2 Ability to evaluate the impact of engineering practices on society, health, safety, law, and culture, and to understand the associated responsibilities.	Construction Laws, Production Practice Teaching in Enterprise (1)(2), Integrated Practice of Ideology and Moral Cultivation, Integrated Practice of Ideological and Political Theory Course, Cultural Quality Education(Chinese culture, Natural science, etc), Cultural Quality Education (Public Art)
7. Environment and sustainable development	7.1 Ability to understand the impact of engineering practices on complex civil engineering problems regarding environmental and social sustainability, and to cultivate awareness of environmental protection and social sustainability.	Civil Engineering Materials, Acquaintanceship Practice, Morals & Ethics & Fundamentals of Law Specialization in Architectural Engineering ： Building Construction, Building Construction Practicum Specialization in Road and Bridge Engineering ： Roadway Survey and Design, Roadway Survey and Design Practicum Specialization in Geotechnical and Urban underground engineering ： Geotechnical investigation and Testing, Geotechnical investigation and Testing Practicum
	7.2 Ability to evaluate the impact of engineering practices on environmental and social sustainability concerning complex civil engineering issues.	Engineering Geology, Production Practice Teaching in Enterprise (1)(2) Specialization in Architectural Engineering ： Building Construction Practicum Specialization in Road and Bridge Engineering ： Pavement and Roadbed Engineering Building Practicum

Graduation requirements	Indicators of graduation requirements	Supporting courses
		Specialization in Geotechnical and Urban Underground Engineering ： Slope Engineering and Ground Improvement Practicum
8. Professional codes	8.1 Ability to possess literacy in humanities and social sciences, understand national conditions, practice socialist core values, safeguard national interests, and possess a sense of social responsibility.	Integrated Practice of Ideological and Political Theory Course, Survey of Modern Chinese History, Situation and Policy (1)(2), Military Theory and National Security Education
	8.2 Ability to abide by engineering ethics, professional ethics, and standards in the practice of civil engineering projects, serve society, and fulfill corresponding responsibilities.	Integrated Practice of Ideology and Moral Cultivation, Morals & Ethics & Fundamentals of Law, Mental Health Education for University Students, Students Career Development and Employment Guidance (1)(2), Creation and Innovation (1)(2),Introduction to Civil Engineering
9. Individuals and teams	9.1 Ability to effectively communicate with team members from other disciplines in a multidisciplinary team setting, independently or collaboratively carry out work, and solve complex civil engineering problems.	Engineering Surveying A, Military training, Production Practice Teaching in Enterprise (1)(2), Physical Education (1)(2)(3)(4)
	9.2 Ability to assume roles as an individual, team member, or leader within a multidisciplinary team, and organize and coordinate work.	Engineering Surveying Practice, Students Career Development and Employment Guidance (1)(2), Education of Creation and Innovation (1)(2)

Graduation requirements	Indicators of graduation requirements	Supporting courses
10. Communication	10.1 Ability to effectively communicate and exchange ideas with industry peers and the general public through oral, written, and graphical means regarding complex civil engineering problems. Understands the differences in communication with industry peers and the public.	Fundamentals of Computer Science, Descriptive Geometry B, Engineering Graphics, Graduation Project, Engineering Graphics Practicum, Advanced Chinese (including Technical Writing)
	10.2 Ability to master at least one foreign language, able to read relevant foreign literature in this field smoothly, track and understand the differences, trends, and application prospects in domestic and international contexts. Possesses cross-cultural communication skills, both verbal and written, and can engage in basic communication about complex civil engineering issues in a cross-cultural setting.	College English (1)(2)(3)(4), Advanced Chinese (including Technical Writing),Professional foreign language
11. Project management	11.1 Ability to understand and master the principles of engineering management and economic decision-making methods involved in civil engineering projects, and to apply these to the practice of civil engineering projects.	Engineering Economics and Project Management, Civil Engineering Construction and Management, Construction Organization Design Project Specialization in Architectural Engineering ： Construction Engineering Budget and Estimation Specialization in Road and Bridge Engineering ： Highway Engineering Budget Specialization in Geotechnical and Urban Underground Engineering ： Underground Construction Engineering Budget and Estimation

Graduation requirements	Indicators of graduation requirements	Supporting courses
	11.2 Ability to comprehensively apply principles of engineering management and economic decision-making methods in multidisciplinary engineering practice to design, compare, and optimize civil engineering project plans and construction schemes.	Engineering Economics and Project Management, Construction Organization Design Project Specialization in Architectural Engineering ： Construction Engineering Budget and Estimation, Construction Engineering Budget and Estimation Practicum Specialization in Road and Bridge Engineering ： Highway Engineering Budget, Highway Engineering Budget Practicum Specialization in Geotechnical and Urban Underground Engineering ： Underground Construction Engineering Budget and Estimation, Underground Construction Engineering Budget and Estimation Practicum
12. Lifelong learning	12.1 Ability to recognize the necessity of self-directed and lifelong learning within the context of societal development, possessing awareness for self-directed and lifelong learning.	Basic Theory of Marxism, Overview of Mao Zedong Thought and the Theory of Socialism with Chinese Characteristics, Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, Physical Education (1)(2)(3)(4), Mental Health Education for University Students
	12.2 Ability to acquire knowledge through modern information technology and other means, equipped with a solid foundation in the professional theory of lifelong learning. Capable of mastering independent learning methods and continuously learning to adapt to developments in professional technology and societal changes.	C Programming Language Practicum, College English (1)(2)(3)(4), Professional foreign language, Students Career Development and Employment Guidance (1)(2), Education of Creation and Innovation (1)(2)

10 Curriculum Alignment Matrix for Graduation Requirements

Curriculum Alignment Matrix for Graduation Requirements is as shown in the table.

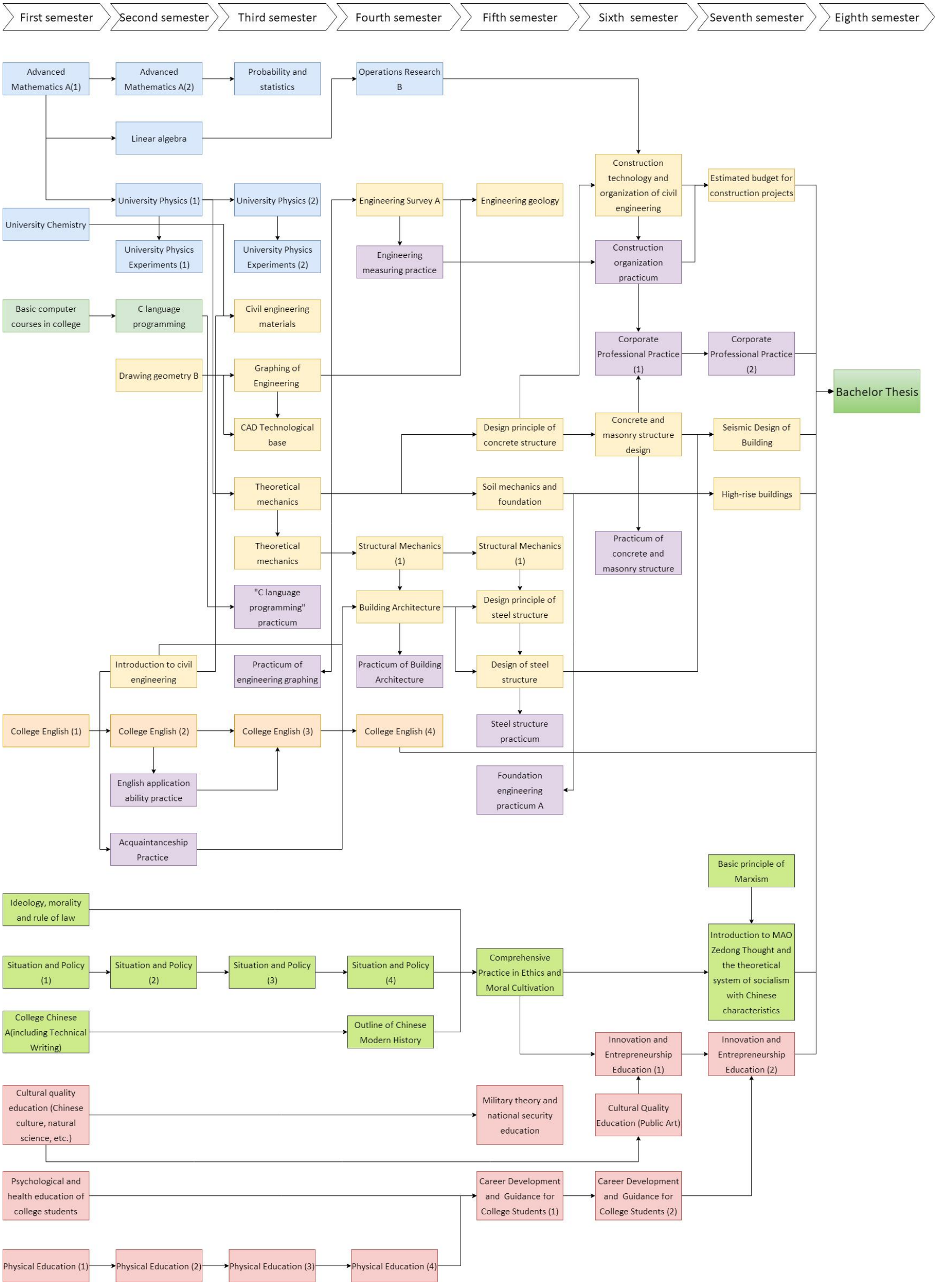
Course Cluster		Modules	Graduation Requirement											
			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
Mathematics and Natural Sciences		Advanced Mathematics A(1)	√	√										
		Advanced Mathematics A(2)	√	√										
		Linear algebra	√	√										
		Probability and statistics	√	√										
		University Physics (1)	√											
		University Physics (2)	√											
		University Physics Experiments (1)				√								
		University Physics Experiments (2)				√								
		University Chemistry	√											
		Operations Research B	√											
Informatics		Basic computer courses in college					√					√		
		C language programming												
Engineering Fundamentals		Drawing geometry B		√								√		
		Introduction to civil engineering								√				
		Graphing of Engineering		√								√		
		CAD Technological base		√			√							
		Theoretical mechanics	√	√										
		Mechanics of materials	√	√										
		Civil engineering materials				√			√					
		Engineering Survey A					√				√			
		Structural Mechanics (1)	√	√										
		Structural Mechanics (2)	√	√										
		Engineering geology		√					√					
		Design principle of concrete structure	√		√	√								
		Soil mechanics and foundation	√		√	√								
		Design principle of steel structure	√		√									
		Construction technology and organization of civil engineering			√		√	√					√	
Engineering Applications	Architectural engineering	Building Architecture		√			√		√					
		Design of steel structure		√	√									
		Concrete and masonry structure design		√				√						
		Seismic Design of Building	√	√										
		High-rise buildings	√	√										
		Estimated budget for construction projects											√	
	Road and bridge engineering	Road survey and design		√					√					
		Roadbed and pavement engineering		√				√						
		Hydrology for bridge and culvert	√	√										
		Bridge Engineering (1)		√			√							
		Bridge Engineering (2)		√			√							
		Highway project budget estimate											√	
	Geotechnical and urban underground engineering	Rock mechanics	√	√										
		Geotechnical investigation and testing		√					√					
		Underground structures		√			√							
		Slope engineering and foundation treatment			√			√						
		Subway and tunnel engineering		√										
		Estimates for underground works											√	
Practical Training	Architectural engineering, road and bridge engineering, geotechnical and urban underground engineering	National defense education entrance education									√			
		Voluntary labour												
		Comprehensive Practice in Ethics and Moral Cultivation												√
		English application ability practice												
		Acquaintanceship Practice							√					
		"C language programming" practicum					√							
		Practicum of engineering graphing		√								√		
		Social Survey (Summer)												
		Engineering measuring practice					√				√			
		Construction organization practicum											√	
		Corporate Professional Practice (1)						√	√		√			
		Corporate Professional Practice (2)						√	√		√			
	Architectural engineering	Practicum of Building Architecture			√				√					
		Foundation engineering practicum A	√		√	√								
		Steel structure practicum			√	√								
		Practicum of concrete and masonry structure	√		√	√								
		Construction engineering budget practicum											√	
	Road and bridge engineering	Practicum of road survey				√			√					
		Concrete practicum A	√		√	√								
		Roadbed and pavement practicum			√				√					
		Foundation engineering practicum A	√		√	√								
		Bridge engineering practicum		√	√									
		Highway engineering budget practicum											√	
	Geotechnical and urban underground engineering	Concrete practicum B	√		√	√								
		Geotechnical investigation and testing practicum												
		Foundation engineering practicum B	√		√	√								
		Practicum of underground building structure			√	√								
		Practicum of slope and foundation treatment							√					
		Subway and tunnel engineering practicum											√	
		Underground engineering budget practicum											√	
Foreign Language		College English (1)										√		√
		College English (2)										√		√
		College English (3)										√		√
		College English (4)										√		√
General		Ideology, morality and rule of law							√	√				
		Basic principle of Marxism												√
		Outline of Chinese Modern History								√				
		Introduction to MAO Zedong Thought and the theoretical system of socialism with Chinese characteristics												√
		Introduction toXi Thought on socialism with Chinese characteristics in the new era												√
		Situation and Policy (1)								√				
		Situation and Policy (2)								√				
		College Chinese A(including Technical Writing)										√		√
Quality Expansion		Physical Education (1)									√			√
		Physical Education (2)									√			√
		Physical Education (3)									√			√
		Physical Education (4)									√			√
		Cultural quality education (Chinese culture, natural science, etc.)						√						
		Cultural Quality Education (Public Art)						√						
		Psychological and health education of college students								√				√
		Military theory and national security education								√				
		Career Development and Guidance for College Students (1)								√	√			√
		Career Development and Guidance for College Students (2)								√	√			√
		Innovation and Entrepreneurship Education (1)									√			√
		Innovation and Entrepreneurship Education (2)												
Bachelor Thesis		Bachelor Thesis			√	√	√	√				√		

11 The Structure Chart of Curriculum Plan and Allocation of Courses in Eight Semesters

The structural relationship of all courses, including prerequisite relationships, is as shown in the chart below:

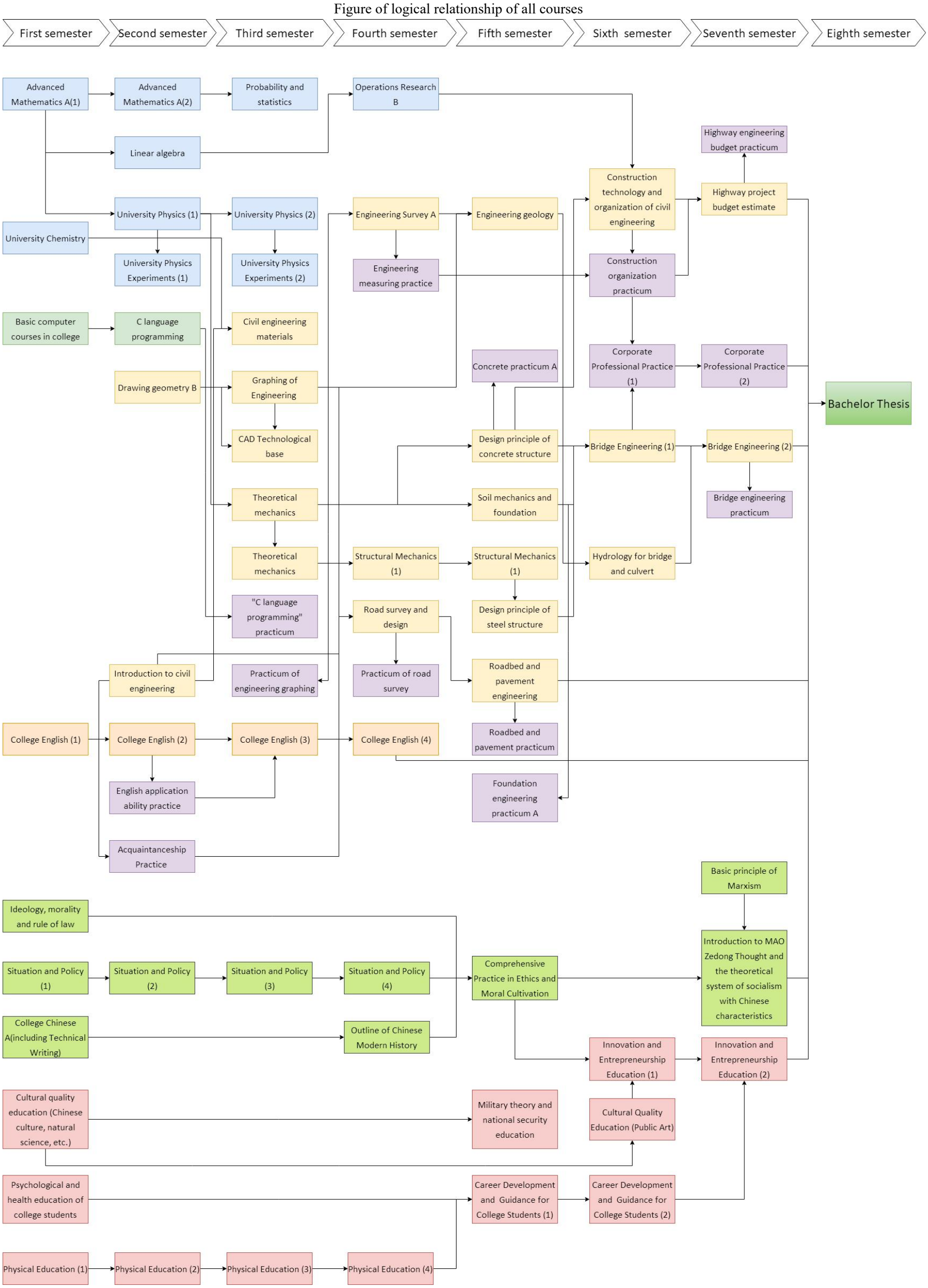
I Specialization in Architectural Engineering

Figure of logical relationship of all courses



II Specialization in Road and Bridge Engineering

Figure of logical relationship of all courses



III Specialization in Geotechnical and Urban Underground Engineering

Figure of logical relationship of all courses