工程技术学院

School of Engineering and Technology

机械设计制造及其自动化专业培养方案

一、专业培养目标

本专业致力于培养具有工程科学基础、工程专业技术及管理等知识，具有分析问题、解决问题、组织管理、合作交流和自主学习的能力，具有创新意识、社会责任感、职业道德及人文素养，能在机械工程及其相关领域从事生产运行与技术管理、工程设计、技术开发和科学研究等工作，能解决复杂机械工程问题的工程技术人才，期待毕业生五年左右达到以下目标：

（1）具备良好的人文社会科学素养、职业道德及社会责任感，能够正确理解和评价复杂机械工程问题解决方案和机械工程实践对社会、安全、法律、文化及环境与可持续发展的影响，具备建设可持续发展社会的责任感。

（2）能有效应用机械工程学科领域工程科学基础、工程专业技术及管理等知识，解决复杂工程问题；具备较丰富的工程经验，深刻了解所属工程部门的特点、管理体系和质量标准，能提出专业独立技术见解，能承担机械工程复杂问题研究、机械系统设计与开发、工程管理工作；

（3）具备管理工作团队及协调项目的活动能力，能正确认识项目团队中的角色定位，能够组织制定工作计划并有效实施；

（4）能应对科技发展挑战，掌握新兴技术，实施技术创新，具备可持续发展理念和国际化视野。

二、毕业要求

本专业主要学习机械工程的基础理论、专业技术和工程技能，接受工程实践训练，注重实践能力和工程创新能力的培养，达到下列培养要求：

（1）工程知识：能够将数学、自然科学、工程基础和专业知识用于解决复杂机械工程问题。

（2）问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析复杂机械工程问题，以获得有效结论。

（3）设计／开发解决方案：能够设计针对复杂机械工程问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

（4）研究：能够基于科学原理并采用科学方法对复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

（5）使用现代工具：能够针对复杂机械工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。

（6）工程与社会：能够基于工程相关背景知识进行合理分析，评价专业工程实践和复杂机械工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

（7）环境和可持续发展：能够理解和评价针对复杂机械工程问题的工程实践对环境、社会可持续发展的影响。

（8）职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

（9）个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

（10）沟通：能够就复杂机械工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

（11）项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。

（12）终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

三、主干学科

机械工程。

四、学制与学位

学制四年。学生修满所规定的最低毕业学分，达到毕业要求后，授予工学学士学位。

五、核心课程

高等数学、大学物理、大学英语、机械制图、理论力学、材料力学、机械原理、机械设计、机械制造工程、电工电子技术、机械工程控制基础、机电系统设计基础、工程机械传动系统设计。

Undergraduate Program in Mechanical Design, Manufacturing and Automation

1. Academic Objectives

This major is dedicated to cultivating engineering and technical professionals who have knowledge of engineering science, engineering expertise, and management. They have the ability to analyze problems, solve problems, management, communication, and independent learning. In addition, they have a sense of innovation, social responsibility, professional ethics, and humanities. They can be engaged in production operation and technical management, engineering design, technology development, and scientific research in mechanical engineering and related fields. Complex mechanical engineering problems can be solved by them. The students are expected to achieve the following goals in five years after they graduated:

(1) Possess good humanities and social science literacy, professional ethics, and a sense of social responsibility. Can correctly understand and evaluate the impact of complex mechanical engineering problem solutions and mechanical engineering practices on society, safety, law, culture, environment, and sustainable development. Have a sense of social responsibility for sustainable development.

(2) Be able to effectively apply knowledge of engineering science foundation, engineering expertise and management in mechanical engineering to solve complex engineering problems; have rich engineering experience, have a deep understanding of the characteristics of the engineering department, management system and quality standards, and be able to propose professional independent technologies insights, be able to study complex problems of mechanical engineering, mechanical system design and development, and engineering management.

(3) Have the ability to manage work teams and coordinate project activities, be able to understand the role positioning in the project team correctly, be able to organize and formulate work plans and implement them effectively.

(4) Be able to deal with the challenges of technological development, master emerging technologies, implement technological innovation, and possess the concept of sustainable development and a global vision.

2. Graduation Requirements

This major mainly teaches the fundamental theories, professional technology, and engineering skills of mechanical engineering. Students will undergo engineering practice training. The teaching process focuses on the cultivation of practical ability and engineering innovation ability. The following training requirements will be achieved:

(1) Engineering knowledge: be able to use mathematics, natural sciences, engineering foundations, and professional knowledge to solve complex mechanical engineering problems.

(2) Problem analysis: be able to apply basic mathematics, natural sciences, and engineering sciences to identify, express, and analyze complex mechanical engineering problems through literature research to obtain practical conclusions.

(3) Design/development solutions: be able to design solutions to complex mechanical engineering problems, design systems, units (components), or technological processes that meet specific needs; and be able to reflect the sense of innovation in the design process, considering society, health, safety, law, cultural and environmental factors.

(4) Research: be able to study complex engineering problems based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, and obtaining reasonable and practical conclusions through information synthesis.

(5) Use modern tools: be able to develop, select and use appropriate technologies, resources, modern engineering tools, and information technology tools for complex mechanical engineering problems, including the prediction and simulation of complex engineering problems, and be able to understand their limitations.

(6) Engineering and society: be able to conduct rational analysis based on engineering-related background knowledge, evaluate the impact of professional engineering practices and complex mechanical engineering problem solutions on society, health, safety, law, and culture, and understand the responsibilities to be undertaken.

(7) Environment and sustainable development: be able to understand and evaluate the impact of engineering practice on complex mechanical engineering problems on society's environment and sustainable development.

(8) Professional norms: Have humanities and social science literacy, a sense of social responsibility; understand and abide by engineering professional ethics and standards in engineering practice, and perform responsibilities.

(9) Individuals and teams: be able to play the roles of individuals, team members, and leaders in a team with a multi-disciplinary background.

(10) Communication: be able to effectively communicate and communicate with industry colleagues and the public on complex mechanical engineering issues, including writing reports and design manuscripts, making statements, expressing clearly, or responding to instructions. And have a specific international perspective, able to communicate and exchange in a cross-cultural context.

(11) Project management: understand and master the principles of engineering management and economic decision-making methods and apply them in a multi-disciplinary environment.

(12) Lifelong learning: Have the consciousness of independent learning and lifelong learning, and have the ability to learn and adapt continuously.

3. Main disciplines

Mechanical engineering.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Advanced Mathematics, College Physics, College English, Mechanical Drawing, Theoretical Mechanics, Material Mechanics, Theory of Machines and Mechanisms, Mechanical Design, Mechanical Manufacturing Engineering, Electrical and Electronic Technology, Control Principle of Mechanical Engineering, Fundamentals of Mechanical and Electrical System Design, Design of Transmission System of Engineering Machinery.

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification	学时数 Hours	学分 Credits	学 期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	40	11.25	13.25		4.25	5.25	1	3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	976	61	13	12		10	14		5	5		2	
	专业核心课程 Specialized Fundamental Courses	432	27					4		10	7		6	
	专业拓展课程 Specialized Development	64	4											
实践教育 Practical Education	课程实践 Course Practice	32 周＋176 学时	34		3	5	1	4	3	3	2	5	2	6
	课外实践 Extracurricular practice	96	6											
必修课总学分 Required course credits				162										
选修课总学分 Elective course credits				22										
最低毕业总学分 Total Credits				184										

七、课程设置 (Curriculum)

1、通识教育必修课程 (Required Courses of General Education)：730 学时 (730 Hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR183004	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	64	4	48	16		考试 Exam	4	
GR181012	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形势与政策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形势与政策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形势与政策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形势与政策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形势与政策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形势与政策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形势与政策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育(1) Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303005	大学生心理素质教育(2) Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	2 夏	
GR081071	大学英语（1） College English(1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English(2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education(2)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education(3)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education(4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	40	492	222	16			

2、**通识教育选修** (Selective Courses of General Education)：192 **学时** (192Hours)，12 **学分** (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类（含在线课程） Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5-6	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-4	
总计 Total			12			

3、学科基础课程 (Disciplinary Fundamental Courses)：976 学时 (976 Hours)，61 学分 (61 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR020006	机械设计制造及其自动化专业导论 Introduction to Mechanical major	16	1	16			考查 Term Paper	1	
DR191001	高等数学 A（1） Advanced Mathematics A (1)	96	6	96			考试 Exam	1	
DR191002	高等数学 A（2） Advanced Mathematics A (2)	96	6	96			考试 Exam	2	
DR191008	大学物理（1） College Physics (1)	48	3	48			考试 Exam	2	
DR192009	大学物理（2） College Physics (2)	48	3	48			考试 Exam	3	
DR191010	大学化学 College Chemistry	48	3	48			考试 Exam	1	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematical Statistics	48	3	48			考试 Exam	4	
DR022201	理论力学 B Theoretical Mechanics B	48	3	48			考试 Exam	3	
DR022202	材料力学 B Mechanics of Materials B	48	3	44	4		考试 Exam	4	
DR022005	工程流体力学 Engineering Fluid Mechanics	32	2	28	4		考试 Exam	4	
DR022203	热力学 Thermodynamics	32	2	32			考试 Exam	3	
DR023020	机械工程控制基础 Control Principle of Mechanical Engineering	48	3	44	4		考试 Exam	6	
DR023204	工程材料 A Engineering Materials A	48	3	42	6		考试 Exam	5	
DR021021	机械制图（1） Mechanical Drawing (1)	48	3	48			考试 Exam	1	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR021205	机械制图（2） Mechanical Drawing (2)	48	3	48			考试 Exam	2	
DR023023	数控技术与系统 Numerical Controlled Machines and Processing Techniques	32	2	28	4		考试 Exam	6	
DR023026	互换性与测量技术 Tolerance and Verification of Geometrical Quantity	32	2	24	8		考查 Term paper	5	
DR024027	材料成型技术基础 Foundation of Material Forming Technology	32	2	24	8		考查 Term paper	7	
DR022024	计算机辅助机械设计 Computer Aided Mechanical Design	32	2	32			考试 Exam	4	
DR042126	电工电子技术 A Electrical and Electronic Technology A	64	4	50	14		考试 Exam	4	
总计 Total		976	61	924	52				

4、**专业核心课程** (Specialized Core Courses)：432 **学时** (432 Hours)，27 **学分** (27 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR023258	机械设计 A Mechanical Design A	64	4	56	8		考试 Exam	5	
SR023078	机械制造工程 Mechanical Manufacture Engineering	64	4	58	6		考试 Exam	5	
SR023207	机械原理 A Theory of Machines and Mechanisms A	64	4	58	6		考试 Exam	4	
SR023080	摩擦学及表面工程 Tribology and Surface Engineering	32	2	26	6		考试 Exam	6	
SR024208	机电系统设计基础 Fundamentals of Mechanical and Electrical System Design	48	3	44	4		考试 Exam	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR024209	工程机械传动系统设计 Design of Transmission System of Engineering Machinery	48	3	48			考试 Exam	7	
SR023083	液压与气动传动 Hydraulic and Pneumatic Transmission	32	2	28	4		考试 Exam	5	
SR023210	测试技术 A Measuring and Testing Technology A	48	3	40	8		考试 Exam	6	
SR023211	先进制造与智能制造技术 Advanced Manufacturing and Intelligent Manufacturing Technology	32	2	32			考试 Exam	6	
总计 Total		432	27	390	42				

5、**专业拓展课程** (Specialized Development Courses)：**任选 64 学时** (64 Hours)，**4 学分** (4 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR024025	机械工程专业英语 Specialty English for Mechanical Engineering	32	2	32			考查 Term paper	7	
DR022028	金属工艺学 Metal Technology	32	2	32			考查 Term paper	4	
SS024212	工程伦理 Engineering Ethics	16	1	16			考查 Term paper	7	
SS023213	机械工程项目管理 Mechanical Engineering Project Management	16	1	16			考查 Term paper	6	
SS022214	信息化与智能制造 Information and Intelligent Manufacturing	32	2	32			考查 Term paper	4	
SS020023	机械创新设计及理论 Mechanical Innovative Design and Theory	16	1	16			考查 Term paper	6	
SS020069	绿色制造学科前沿 Green Manufacturing Discipline Frontier	16	1	16			考查 Term paper	5	
SS024215	工程机械设计 Engineering Machine Design	32	2	32			考查 Term paper	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS023216	机器人技术 Robotics	32	2	26	6		考查 Term paper	6	
SS022217	单片机与接口技术 Single Chip and Interface Technology	32	2	26	6		考查 Term paper	3	
SS024218	物联网与大数据 Internet of Things and Large Data	32	2	32			考查 Term paper	7	
总计 Total		64	4						

6、**课程实践** (Course Practice)：32 **周** +176 **学时** (32 weeks and 176 hours)，34 **学分** (34 Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理（1） Physics Experiments (1)	24 学时	1	考查 Term Paper	2	
PR192046	实验物理（2） Physics Experiments (2)	24 学时	1	考查 Term Paper	3	
PR191047	实验化学 Chemistry Experiments	48 学时	2	考查 Term Paper	2	
PR022219	机械 CAD 绘图 Mechanical CAD Drawing	48 学时	2	考查 Term Paper	4	
PR021131	金工实习（1） Metal Processing Practice (1)	1 周	1	考查 Term Paper	1 夏	
PR022152	金工实习（2） Metal Processing Practice (2)	3 周	3	考查 Term Paper	2 夏	
PR023132	机械设计课程设计 Course Design of Mechanical Design	1 周	1	考查 Term Paper	5	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR023220	专业实习（机械） Production Practice (Mechanical Engineering)	5 周	5	考查 Term paper	3 夏	
PR023133	液压传动课程设计 Course Design of Hydraulic Transmission	1 周	1	考查 Term paper	5	
PR024134	机电系统综合实践 Comprehensive Practice of Electromechanical System	1 周	1	考查 Term paper	5	
PR024135	传动系统课程设计 Course Design of Transmission System	1 周	1	考查 Term paper	7	
PR022136	机械原理课程设计 Course Design of Mechanical Principle	2 周	2	考查 Term paper	4	
PR023137	先进制造综合实践 Comprehensive Practice of Advanced Manufacturing	1 周	1	考查 Term paper	6	
PR024221	机械创新设计综合实践 Comprehensive Practice of Mechanical Innovative Design	1 周	1	考查 Term paper	7	
PR023222	传感器与电子技术综合实践 Comprehensive Practice of Sensor and Electronic Technology	1 周	1	考查 Term paper	6	
PR024110	机械工程毕业设计（论文） Mechanical Engineering Graduation Project (Thesis)	12 周	6	考查 Term paper	8	
总计 Total		32 周 +176 学时	34			

7、**课外实践** (Extracurricular practice)：6 **学分** (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

土木工程专业培养方案

一、专业培养目标

面向国家建设需求和土木工程未来行业发展方向，以立德树人为根本任务，培养具有“品德优良、基础厚实、知识广博、专业精深”品质，德、智、体、美、劳全面发展的土木工程应用型和创新研究型人才。毕业生应具备优良的思想素质、良好的人文科学素养、扎实的自然科学与土木工程专业基础，掌握土木工程专业知识与规范，获得土木工程执业工程师的基本训练，具备实践能力、社会适应能力、创新创业能力和终身学习能力，具有国际视野、团队精神和环境协调发展意识。能够从事土木工程领域的勘察设计、施工、项目管理、教育、科研等工作，毕业 5 年左右达到土木工程师执业资格相当水平，成为土木工程及相关领域的技术骨干或后备管理人才。具体目标如下：

（1）具有优良的思想政治素质、良好的人文科学素养、职业道德和社会责任感，具有环保和可持续发展意识，能够承担和履行社会责任。

（2）掌握数学、自然科学以及土木工程基础知识，能够综合运用土木工程专业知识与工程技术，发现、研究和解决实际工程中的复杂工程问题。

（3）具有团队协作意识和交流与合作能力，能够在跨职能团队中发挥骨干作用并具备承担领导角色的能力。

（4）具有国际视野，能够通过自主学习提升专业持续发展能力，适应土木工程行业科学技术的发展需求，具备获得注册执业资格的能力。

二、毕业要求

（1）工程知识：能够将数学、自然科学、工程基础和土木工程专业知识用于解决土木工程专业的复杂工程问题。掌握数学、自然科学、工程科学等方面的基础理论和知识，用于土木工程问题的表述；能针对工程项目的具体研究对象建立数学模型并求解，应用专业知识采集并处理工程数据，将相关知识和数学模型方法用于推演、分析土木工程专业复杂工程问题；能够提出解决土木工程专业复杂工程问题的可行方案，并进行比较与综合。

（2）问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析土木工程专业的复杂工程问题，以获得有效结论。能够将数学、自然科学、工程科学的原理和逻辑思维，识别和判断土木工程专业复杂工程问题的关键环节，并给予相关科学原理和数学模型正确表达；能够通过信息检索、文献研究分析和相关科学、工程原理，认识到土木工程专业复杂工程问题具有多种解决方案，并能够寻求解决问题的有效途径和可替代的解决方案；借助数学、自然科学、工程科学知识和文献资料，能够研究分析土木工程专业复杂工程方案中的影响因素、关键环节和方案可行性，并进行多方案的技术经济对比分析和获得有效结论。

（3）设计 / 开发解决方案：能够设计针对土木工程专业复杂工程问题的解决方案，设计满足特定需求的体系、结构、构件（节点）或施工方案，绘制图纸及编撰技术文档，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。面向解决土木工程专业复杂工程问题的需求，能够掌握工程实践的勘察方法、设计方法和施工技术，了解影响设计目标和技术方案的各种因素；能够针对土木工程实践的特定需求，完成构件及系统设计方案、施工技术方案等关键环节的设计，正确绘制施工图纸并撰写设计文档，能够在设计环节考虑新工艺、新材料和新技术，体现创新意识；能够针对不同的土木工程实践需求在设计方案中考虑社会、安全、健康、法律、文化以及环境等因素，制定出满足国家及社会经济建设需求的合理方案。

（4）研究：能够基于科学原理并采用科学方法对土木工程专业的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。能够运用科学原理，通过文

献研究或相关方法，调研、分析土木工程专业复杂工程问题的关键技术和解决方案；基于土木工程专业理论、针对土木工程专业复杂工程问题选择合理的研究路线、设计实验方案，进行创新性实验，包括实验组织、数据获取、数据处理；能够对实验数据进行分析与解释，并通过信息综合得到合理有效的结论。

（5）使用现代工具：能够针对土木工程专业复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。掌握现代土木工程仪器、设备和先进信息处理技术工具，能够针对勘察、设计和施工等方面的复杂工程问题，选择并使用恰当的技术和工具，理解其局限性，能对土木工程专业复杂工程问题进行分析、计算和设计；针对勘察、设计和施工等方面的方案优化设计，能够选择、使用专业软硬件工具，开发满足特定需求的专门工具，用于工程方案的优化、预测和模拟，并理解其局限性。

（6）工程与社会：能够基于土木工程相关背景知识进行合理分析，评价土木工程专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。理解土木工程的社会作用及土木工程活动对社会、健康、安全、法律及文化的影响；在土木工程实践中具备综合考虑多种制约因素的意识，能够合理地分析、评价和解决土木工程活动对社会、健康、安全、法律以及文化等方面可能产生的风险，对所实施的工程质量负责，并理解应承担的责任。

（7）环境和可持续发展：能够理解和评价针对土木工程专业复杂工程问题的工程实践对环境、社会可持续发展的影响。理解和评价土木工程实践对环境保护、社会可持续发展的影响，认识工程实践在环境保护和可持续发展中的地位和作用；了解土木工程实践与环境保护和可持续发展等方面相关的方针政策、法律法规，理解和评价工程实践对环境、社会可持续发展造成的损害和隐患，并制定合理策略降低对人类和环境造成的损害和隐患。

（8）职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。了解中国国情，具有爱国主义情怀和人文社会科学素养，理解个人与社会的关系，树立正确的世界观、人生观、价值观；具备法律意识和社会责任感，理解土木工程师的职业性质，掌握土木行业相关的规范和法规，在工程实践中自觉遵守职业道德和法律法规；理解土木工程师对公共安全、健康、福祉、环境保护的社会责任，理解工程实践对维护国家安全、社会稳定的重要性，能够在工程实践中自觉履行社会责任。

（9）个人和团队：能够在解决土木工程专业的复杂工程问题时，在多学科背景下的团队中承担个体、团队成员以及负责人的角色。具备良好的组织协调能力、表达能力和人际交往能力，能够与其他学科的成员有效沟通与合作；能够独立承担土木工程的专项任务，能够在多学科组成的团队中承担个体、团队成员或负责人的角色。

（10）沟通：能够就土木工程专业的复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。能够运用土木工程及相关领域的知识，针对土木工程专业复杂工程问题与业界同行及社会公众进行有效沟通、交流和回应质疑，掌握标准工程图纸、设计说明书和研究报告的绘制撰写方法和陈述发言技巧；了解土木工程学科的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性，具备一定的国际视野；熟练使用一门外语，具备外文资料检索、外语沟通与表达能力，能够就土木工程勘察、设计和施工问题在跨文化的背景下进行沟通和交流。

（11）项目管理：理解并掌握土木专业相关的工程管理原理与经济决策方法，并能在多学科环境中应用。掌握土木工程勘察、设计、施工管理与经济决策的基本原理和方法；能够在多学科环境下，综合应用技术、管理和经济等决策方法，设计土木工程项目的实施方案，并组织和领导多学科团队进行项目的实施。

（12）终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。能够正确认识自我探索和学习的必要性，并能显现自我探索和学习成效；具有自主学习的能力，不断学习、

适应土木工程发展，具备对不断变化的技术问题的理解、归纳总结和提出问题等能力。

三、主干学科

土木工程。

四、学制与学位

学制四年。学生修满规定的最低毕业学分，达到毕业要求后，授予工学学士学位。

五、核心课程

核心课程：理论力学、材料力学、结构力学、土力学、木工程材料、工程地质、工程荷载与可靠度设计原理、混凝土结构基本理论、钢结构基本理论、基础工程、混凝土结构设计、土木工程施工、建筑结构抗震与防灾、工程项目管理与法规。

实践课程：房屋建筑学课程设计、混凝土结构课程设计、基础工程课程设计、土木工程施工课程设计、钢结构课程设计、锚固技术与支挡工程课程设计、地下建筑结构课程设计、土木工程造价课程设计、测量实习、北戴河地质认识实习、工程地质实习、土木工程认识实习、土木工程生产实习、毕业实习。

Undergraduate Program in Civil Engineering

1. Academic Objectives

Facing the needs of national construction and the future development direction of civil engineering industry, with the fundamental task of establishing moral education, the university aims to cultivate applied and innovative research talents in civil engineering with the qualities of good moral character, solid foundation, extensive knowledge and profound expertise and comprehensive development of moral, intellectual, physical, aesthetic and labor. Graduates should have excellent ideological quality, good humanities, solid natural science and civil engineering professional foundation, master civil engineering professional knowledge and specifications, obtain the basic training of civil engineering practicing engineers, have practical ability, social adaptability, innovation and entrepreneurship and lifelong learning ability, have international vision, team spirit and environmental coordination and development awareness. They are able to engage in civil engineering field of survey and design, construction, project management, education, scientific research and other work, about 5 years after graduation to achieve a level equivalent to the civil engineer practice qualification, become the backbone of civil engineering and related fields of technology or reserve management personnel. Specific objectives are as follows:

(1) Students will have an excellent ideological and political quality, good humanities and scientific literacy, professional ethics and social responsibility, a sense of environmental protection and sustainable development, and ability to assume and fulfill social responsibility.

(2) Students will acquire basic knowledge of mathematics, natural sciences and civil engineering, and integrate civil engineering expertise and engineering techniques to identify, investigate and solve complex civil engineering problems.

(3) Students will have the sense of teamwork and the ability to communicate and cooperate and can play a key role in cross-functional teams and to assume leadership roles.

(4) Students will have an international outlook to be able to enhance continuous professional development through independent study, to adapt to the scientific and technological development needs of the civil engineering industry and to have the ability to obtain a registered practice qualification.

2. Graduation Requirements

(1) Engineering knowledge: Students are required to apply mathematics, natural sciences, engineering fundamentals and civil engineering expertise to solve complex civil engineering problems. Students are required to acquire basic theory and knowledge of mathematics, natural science and engineering science for the formulation of civil engineering problems. Students are required to establish mathematical models and solve them for specific research objects of engineering projects, apply professional knowledge to collect and process engineering data, and apply relevant knowledge and mathematical modelling methods to derive and analyse complex civil engineering problems. Students are required to propose feasible solutions to complex civil engineering problems, and compare and synthesise them.

(2) Problem Analysis: Students are required to apply basic principles of mathematics, natural and engineering sciences to identify, express, and analyse complex engineering problems in civil engineering through literature research in order to obtain valid conclusions. Students are required to apply principles and logical thinking from mathematics, natural science and engineering science to identify and judge key aspects of complex civil engineering problems, and give correct expression to relevant scientific principles and mathematical models. Students are required to recognise that complex civil engineering problems have multiple solutions through information retrieval, literature research and analysis and relevant scientific and engineering principles, and seek effective ways to solve problems and alternative solutions. Students are

required to research and analyse the influencing factors, key aspects and feasibility of solutions in complex civil engineering solutions with the knowledge and literature of mathematical, natural and engineering science, and conduct comparative technical and economic analysis of multiple solutions and obtain valid conclusions.

(3) Design/develop solutions: Students are required to design solutions to complex civil engineering problems, design systems, structures, components (nodes) or construction solutions to meet specific needs, produce drawings and compile technical documentation, and be able to demonstrate a sense of innovation in the design process, taking into account social, health, safety, legal, cultural and environmental factors. Students are required to master the survey methods, design methods and construction techniques of engineering practice, and understand the factors that influence design objectives and technical solutions, in order to meet the needs of solving complex civil engineering problems. Students are required to complete the design of key aspects such as component and system design solutions and construction technology solutions for the specific needs of civil engineering practice, correctly draw construction drawings and write design documentation, and are able to consider new processes, materials and technologies in the design process, reflecting a sense of innovation. Students are required to consider social, safety, health, legal, cultural and environmental factors in their design solutions to meet the needs of different civil engineering practices, and develop reasonable solutions that meet the needs of the state and social and economic construction.

(4) Research: Students are required to study complex civil engineering problems based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, synthesizing information to obtain reasonable and effective conclusions, and applying them to engineering practice. Students are required to apply scientific principles to research and analyse key technologies and solutions to complex civil engineering problems through literature research or related methods. Students can choose a reasonable research route and design an experimental programme based on civil engineering professional theories and for complex civil engineering problems, and conduct innovative experiments, including experimental organisation, data acquisition and data processing. Students are required to analyse and interpret experimental data and obtain reasonable and valid conclusions through information synthesis.

(5) Use modern tools: Students are required to develop, select and use appropriate techniques, resources, modern engineering tools and information technology tools for complex civil engineering problems, including prediction and simulation of complex engineering problems, and are able to understand their limitations. Students are required to master modern civil engineering instruments, equipment and advanced information processing technology tools to select and use appropriate techniques and tools for complex engineering problems in surveying, design and construction, and are able to analyse, calculate and design complex civil engineering problems and understand their limitations. Students are required to select and use specialist hardware and software tools to develop specialised tools to meet specific needs for the optimisation, prediction and simulation of engineering solutions for the optimal design of solutions in survey, design and construction and understand their limitations.

(6) Engineering and Society: Students are required to undertake sound analysis based on relevant background knowledge of civil engineering and evaluate the social, health, safety, legal and cultural implications of professional engineering practice and solutions to complex civil engineering problems, and understand the responsibilities involved. Students are required to understand the social role of civil engineering and the social, health, safety, legal and cultural impacts of civil engineering activities. Students are required to have an awareness of the multiple constraints in civil engineering practice, be able to reasonably analyse, evaluate and address the social, health, safety, legal and cultural risks that may arise from civil engineering activities, and be responsible for the quality of the work carried out and understand their responsibilities.

(7) Environment and Sustainable Development: Students are required to understand and evaluate the

environmental, socially sustainable impacts of engineering practices that address complex civil engineering problems. Students are required to understand and evaluate the impact of civil engineering practice on environmental protection and sustainable development of society, and recognise the status and role of engineering practice in environmental protection and sustainable development. Students are required to understand the policies, laws and regulations related to civil engineering practice and environmental protection and sustainable development, etc, understand and evaluate the damage and potential hazards caused by engineering practice to the environment and sustainable development of society, and develop reasonable strategies to reduce the damage and potential hazards caused to humans and the environment.

(8) Professional norms: Students will have humanities and social science literacy, social responsibility, and the ability to understand and comply with engineering professional ethics and norms in the practice of engineering and fulfill their responsibilities. Students are required to understand China's national conditions, have patriotism and humanities and social science literacy, understand the relationship between the individual and society, and establish a correct world view, outlook on life and values. Students are required to possess a sense of legal awareness and social responsibility, and understand the professional nature of civil engineers, and master the relevant codes and regulations of the civil engineering industry, and consciously abide by professional ethics and laws and regulations in engineering practice. Students are required to understand the social responsibility of civil engineers for public safety, health, well-being, environmental protection, and understand the importance of engineering practice in maintaining national security and social stability, and be able to consciously fulfill their social responsibility in engineering practice.

(9) Individual and team: Students are required to assume the role of individual, team member and leader in a multidisciplinary context when solving complex civil engineering problems. Students are required to good organizational and coordination skills, presentation and interpersonal skills, and the ability to communicate and cooperate effectively with members of other disciplines. Students are required to ability to independently undertake special tasks in civil engineering and to assume the role of individual, team member or leader in a multidisciplinary team.

(10) Communication: Students will have the ability to communicate and interact effectively with industry peers and the public on complex civil engineering issues, including writing reports and designing submissions, presenting statements, and articulating or responding to instructions clearly. Students should have the international perspective and are able to communicate and interact in a cross-cultural context. Students are required to be able to apply knowledge of civil engineering and related fields, to communicate effectively with industry peers and the public on complex engineering problems in civil engineering, to communicate and respond to questions, and master the methods of drawing and writing standard engineering drawings, design specifications, research reports and presentation skills. Students are required to understand the international development trends and research hotspots of civil engineering disciplines, understand and respect the differences and diversity of different cultures in the world, and have a certain international perspective. Students are required to be proficient in a foreign language, and have the ability to retrieve foreign language materials, communicate and express themselves in a foreign language, and communicate and exchange ideas on civil engineering investigation, design and construction issues in a cross-cultural context.

(11) Project Management: Students are required to understand and master the principles of engineering management and economic decision-making methods relevant to the civil engineering profession, and to apply them in a multidisciplinary environment. Students are required to master the basic principles and methods of civil engineering survey, design, construction management and economic decision making. Students are required to apply a combination of technical, managerial, and economic decision-making methods in a multidisciplinary environment to design the implementation of civil engineering projects and

to organize and lead multidisciplinary teams in the implementation of the projects.

(12) Lifelong learning: Students will have the sense of self-directed and lifelong learning, and the ability to continuously learn and adapt to development. Students are required to have a sound understanding of the need for self-exploration and learning, and be able to demonstrate the effectiveness of self-exploration and learning. Students are required to have the ability to learn on their own, to continuously learn and adapt to civil engineering developments, and to have the ability to understand, summarize, and ask questions about changing technical issues.

3. Main disciplines

Civil Engineering.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Core Courses: Theoretical Mechanics, Mechanics of Materials, Structural Mechanics, Soil Mechanics, Civil Engineering Material, Engineering Geology, Design of Engineering Principles Load and Reliability, Basic Reinforced Concrete Structures, Basic Steel Structure Fundamentals , Foundation Engineering, Design of Reinforced Concrete, Civil Engineering Construction, Building Construction Structure Aseismatic and Disaster Prevention, Engineering Project Management and Regulations

Practical Courses: Architectural Engineering Direction: Design of Building Architecture, Design of Reinforced Concrete Structure, Design of Foundation Engineering, Design of Civil Engineering Construction, Design of Steel Structures, Design of Anchor Technology and Retaining Engineering, Design of Underground Construction Structures, Design of Civil Engineering Cost, Surveying Practice, Geological Survey Field Trip in Beidaihe, Engineering Geology Practice, Civil Engineering Awareness Practice, Civil Engineering Production Practice, Graduation Practice

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification		学时数 Hours	学分 Credits	学 期 Semester										
					1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education		730	40	11.25	13.25		4.25	5.25	1	3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education		192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses		896	55.5	13	20.5		9	8.5		4.5				
	专业核心课程 Specialized Fundamental Courses		344	21.5					7		3.5	9		2	
	专业拓展课程 Specialized Development	必选课程 Required Courses	184	11.5							2	5.5		4	
		任选课程 Optional Courses	56	3.5											
实践教育 Practical Education	课程实践 Course Practice	建筑工程方向 Construction engineering	37 周 +128 学时	31		4	6	2		2	1	4	4	2	6
		岩土与地下工程方向 Geotechnical engineering				4	6	2		2		4	4	3	6
	课外实践 Extracurricular practice		96	6											
必修课总学分 Required course credits					148										
选修课总学分 Elective course credits					33										
最低毕业总学分 Total Credits					181										

七、课程设置 (Curriculum)

1、通识教育必修课程 (Required Courses of General Education)：730 学时 (730 Hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR183004	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	64	4	48	16		考试 Exam	4	
GR181012	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形势与政策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形势与政策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形势与政策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形势与政策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形势与政策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形势与政策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形势与政策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育(1) Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303005	大学生心理素质教育(2) Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	2 夏	
GR081071	大学英语（1） College English(1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English(2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education(2)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education(3)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education(4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	40	492	222	16			

2、**通识教育选修** (Selective Courses of General Education)：192 **学时** (192Hours)，12 **学分** (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类（含在线课程） Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5-6	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-4	
总计 Total			12			

3、学科基础课程 (Disciplinary Fundamental Courses)：896 学时（896 Hours），55.5 学分 (55.5 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR191003	高等数学 A（1） Advanced Mathematics A(1)	96	6	96			考试 Exam	1	
DR191004	高等数学 A（2） Advanced Mathematics A(2)	96	6	96			考试 Exam	2	
DR192005	线性代数 Linear Algebra	32	6	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	
DR191008	大学物理（1） College Physics (1)	48	3	48			考试 Exam	2	
DR192009	大学物理（2） College Physics (2)	48	3	48			考试 Exam	3	
DR191010	大学化学 College Chemistry	48	3	48			考试 Exam	1	
DR011036	地球科学概论 Geosciences	64	4	32	32	8	考试 Exam	2	
DR122001	测量学 A Surveying A	40	2.5	24	16		考试 Exam	2	
DR021002	工程图学 Engineering Drawing	48	3	48			考试 Exam	1	
DR021225	土木工程制图 Civil Engineering Drawing	32	2	16	16		考查 Term paper	2	
DR022201	理论力学 B Theoretical Mechanics B	48	3	48			考试 Exam	2	
DR022126	材料力学 A Mechanics of Materials A	64	4	58	6		考试 Exam	3	
DR022227	结构力学 A（1） Structural Mechanics A（1）	56	3.5	56			考试 Exam	4	
DR023228	结构力学 A（2） Structural Mechanics A（2）	24	1.5	24			考试 Exam	5	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR022005	工程流体力学 Engineering Fluid Mechanics	32	2	28	4		考试 Exam	4	
DR023229	土力学 Soil Mechanics	48	3	40	8		考试 Exam	5	
DR020008	土木工程专业导论	16	1	16			考查 Term paper	1	
总计 Total		896	55.5	806	82	8			

4、**专业核心课程** (Specialized Core Courses)：344 **学时** (344 Hours)，21.5 **学分** (21.5 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR022230	工程荷载与可靠度设计原理 Design of Engineering Principles Load and Reliability	24	1.5	24			考试 Exam	4	
SR022231	工程地质 Engineering Geology	40	2.5	40			考试 Exam	4	
SR022232	土木工程材料 A Civil Engineering Material A	48	3	36	12		考试 Exam	4	
SR023233	混凝土结构基本原理 A Reinforced Concrete Structures Fundamentals A	56	3.5	52	4		考试 Exam	5	
SR023234	钢结构基本原理 Steel Structures Fundamentals	40	2.5	40			考试 Exam	6	
SR023235	基础工程 Foundation Engineering	32	2	32			考试 Exam	6	
SR023236	土木工程施工 Civil Engineering Construction	48	3	48			考试 Exam	6	
SR023237	建筑结构抗震与防灾 Building Construction Structure Aseismatic and Disaster Prevention	24	1.5	24			考试 Exam	6	
SR024238	工程项目管理与法规 Engineering Project Management and Regulations	32	2	32			考查 Term paper	7	
总计 Total		344	21.5	328	16				

5、**专业拓展课程** (Specialized Development Courses)：

建筑工程方向 (Architectural Engineering)：**选修** 240 **学时** (240 Hours)，15 **学分** (15Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
方向选修课									
SS023240	房屋建筑学 Building Architecture	32	2	32			考试 Exam	5	必选
SS023241	混凝土结构设计 Design of Reinforced Concrete	32	2	32			考试 Exam	6	
SS023242	结构设计通用软件 Structure Design Software	32	2	20	12		考试 Exam	6	
SS023243	土木工程造价 Civil Engineering Cost	24	1.5	24			考试 Exam	6	
SS024244	钢结构房屋设计 Design of Steel Structure	32	2	32			考试 Exam	7	
SS024245	高层建筑结构设计 Design of High-rise Structures	32	2	32			考试 Exam	7	
SS024246	建筑结构试验原理 Experimenta principle of building structure	16	1	16			考试 Exam	7	任选
SS024247	钢－混凝土组合结构 Steel-Concrete Combined Structures	24	1.5	24			考查 Term paper	7	
SS024248	砌体结构 Masonry Structure	16	1	16			考查 Term paper	7	
SS024249	装配式建筑结构概论 Introduction to Structure of Assembled Buildings	24	1.5	24			考查 Term paper	7	
SS024250	大跨结构 Large span structure	24	1.5	24			考查 Term paper	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
专业选修课									
DR023251	弹性力学 Elasticity	32	2	32			考查 Term paper	5	任选
SS022252	土木工程专业英语 Specialty English for Civil Engineering	16	1	16			考查 Term paper	4	
SS023253	建筑信息模型技术（BIM）概论 Introduction to Building Information Modeling (BIM) Technology	24	1.5	24			考查 Term paper	6	
SS023254	智慧基础设施（双语、研究生课程） Smart Infrastructure (Bilingual, Graduate Program)	32	2	32			考查 Term paper	6	
IS024291	智能建造导论 Introduction to Intelligent Construction	24	1.5	24			考查 Term paper	7	
SS024255	道桥工程概论 Introduction to Road and Bridge Engineering	32	2	32			考查 Term paper	7	
SS024259	地基处理 Foundation treatment	24	1.5	24			考查 Term paper	7	
SS024257	非开挖技术概论 Introduction to Trenchless Technology	32	2	32			考查 Term paper	7	
SS020024	地下能源储存工程地质前沿 Underground Energy Storage Engineering Geological Frontiers	16	1	16			考查 Term paper	7	
SS020070	灾害工程地质学前沿 Disaster Engineering Geology Frontiers	16	1	16			考查 Term paper	7	
IS020005	地下工程新进展 Underground Engineering Frontiers	16	1	16			考查 Term paper	7	
SS024320	地质灾害监测预警理论与方法 Geological Disaster Monitoring and Early Warning Theories and Methods	16	1	16			考查 Term paper	7	
SS024260	土木工程经济学概论 Urban and Real Estate Economics	24	1.5	24			考查 Term paper	7	

岩土与地下工程方向 (Geotechnical and Underground Engineering)：选修 240 学时 (240 Hours)，15 学分 (15Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
方向选修课									
SS023261	地下水科学基础 B Fundamentals of Groundwater Science B	32	2	32			考试 Exam	5	必选
DR023017	岩体力学 Rockmass Mechanics	32	2	28	4		考试 Exam	6	
SS023241	混凝土结构设计 Design of Reinforced Concrete	32	2	32			考试 Exam	6	
SS023243	土木工程造价 Civil Engineering Cost	24	1.5	24			考试 Exam	6	
SS024262	地下建筑结构设计 Design of Underground Construction Structures	32	2	32			考试 Exam	7	
SR024053	锚固技术与支挡工程 Anchor Technology and Retaining Engineering	32	2	32			考试 Exam	7	
SS024263	岩土工程勘察 Geotechnical Engineering Investigation	24	1.5	16	8		考试 Exam	7	任选
SS024264	地质灾害防治 B Prevention and control of geological disasters B	24	1.5	24			考查 Term paper	7	
SS024265	三维地质建模技术 3D Geological Modeling Technology	16	1	16			考查 Term paper	7	
SS024266	岩土工程测试与监测技术 Geotechnical Testing and Monitoring Technology	24	1.5	16	8		考查 Term paper	7	
SS024267	隧道工程概论 Introduction to Tunnel Engineering	32	2	32			考查 Term paper	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
专业选修课									
DR023251	弹性力学 Elasticity	32	2	32			考查 Term paper	5	任选
SS022252	土木工程专业英语 Specialty English for Civil Engineering	16	1	16			考查 Term paper	4	
SS023253	建筑信息模型技术（BIM）概论 Introduction to Building Information Modeling (BIM) Technology	24	1.5	24			考查 Term paper	6	
SS023254	智慧基础设施（双语、研究生课程） Smart Infrastructure (Bilingual, Graduate Program)	32	2	32			考查 Term paper	6	
IS024291	智能建造导论 Introduction to Intelligent Construction	24	1.5	24			考查 Term paper	7	
SS024255	道桥工程概论 Introduction to Road and Bridge Engineering	32	2	32			考查 Term paper	7	
SS024259	地基处理 Foundation treatment	24	1.5	24			考查 Term paper	7	
SS024257	非开挖技术概论 Introduction to Trenchless Technology	32	2	32			考查 Term paper	7	
SS020024	地下能源储存工程地质前沿 Underground Energy Storage Engineering Geological Frontiers	16	1	16			考查 Term paper	7	
SS020070	灾害工程地质学前沿 Disaster Engineering Geology Frontiers	16	1	16			考查 Term paper	7	
IS020005	地下工程新进展 Underground Engineering Frontiers	16	1	16			考查 Term paper	7	
SS024260	土木工程经济学概论 Urban and Real Estate Economics	24	1.5	24			考查 Term paper	7	

6、课程实践 (Course Practice)：

建筑工程方向 (Architectural Engineering)：37 周 +128 学时 (37 weeks and 128 hours)，31 学分 (31Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践 Political Social Practice	32	2	考查 Term Paper	1 夏	
PR191045	实验物理（1） Physics Experiments(1)	24 学时	1	考查 Term Paper	2	
PR192046	实验物理（2） Physics Experiments(2)	24 学时	1	考查 Term Paper	3	
PR191047	实验化学 Chemistry Experiments	48 学时	2	考查 Term Paper	2	
PR024268	工程结构试验 Engineering Structural Experiments	1 周	1	考查 Term Paper	7	
PR023269	房屋建筑学课程设计 Design of Practice of Buildings	2 周	1	考查 Term Paper	5	
PR023270	混凝土结构课程设计 Design of Reinforced Concrete Structures	1 周	1	考查 Term Paper	6	
PR023271	基础工程课程设计 Design Practice of Foundation Engineering	1 周	1	考查 Term Paper	6	
PR023272	土木工程施工课程设计 Design Practice of Civil Engineering Construction	2 周	1	考查 Term Paper	6	
PR023273	土木工程造价课程设计 Design of Civil Engineering Cost	1 周	1	考查 Term Paper	6	
PR024274	钢结构课程设计 Design Practice of Steel Structures	1 周	1	考查 Term Paper	7	
PR122059	测量实习 Surveying Practice	1 周	1	考查 Term Paper	2	
PR011044	北戴河地质认识实习 Geological Survey Field Trip in Beidaihe	2 周	2	考查 Term Paper	1 夏	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR022275	工程地质实习 Engineering Geology Practice	2 周	2	考查 Term Paper	2 夏	
PR023276	土木工程认识实习 Civil Engineering Awareness Practice	1 周	1	考查 Term Paper	3	
PR023277	土木工程生产实习 Civil Engineering Production Practice	4 周	4	考查 Term Paper	3 夏	
PR024278	土木工程毕业实习 Civil Engineering Graduation Practice	4 周	6	考查 Term Paper	8	
PR024111	土木工程毕业设计（论文） Civil Engineering Graduation Design(Thesis)	12 周				
总计 Total		37 周 +128 学时	31			

岩土与地下工程方向 (Geotechnical and Underground Engineering)：37 **周** +128 **学时** (37 weeks and 128 hours)，31 **学分** (31Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理（1） Physics Experiments(1)	24 学时	1	考查 Term Paper	2	
PR192046	实验物理（2） Physics Experiments(2)	24 学时	1	考查 Term Paper	3	
PR191047	实验化学 Chemistry Experiments	48 学时	2	考查 Term Paper	2	
PR024268	工程结构试验 Engineering Structural Experiments	1 周	1	考查 Term Paper	7	
PR023271	基础工程课程设计 Design Practice of Foundation Engineering	1 周	1	考查 Term Paper	6	
PR023270	混凝土结构课程设计 Design of Reinforced Concrete Structures	1 周	1	考查 Term Paper	6	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR023272	土木工程施工课程设计 Design Practice of Civil Engineering Construction	2 周	1	考查 Term Paper	6	
PR023273	土木工程造价课程设计 Design of Civil Engineering Cost	1 周	1	考查 Term Paper	6	
PR024279	地下建筑结构课程设计 Design of Underground Building Structures	2 周	1	考查 Term Paper	7	
PR024280	锚固技术与支挡工程课程设计 Design Practice of Anchor Technology and Retaining Engineering	1 周	1	考查 Term Paper	7	
PR122059	测量实习 Surveying Practice	1 周	1	考查 Term Paper	2	
PR011044	北戴河地质认识实习 Geological Survey Field Trip in Beidaihe	2 周	2	考查 Term Paper	1 夏	
PR023275	工程地质实习 Engineering Geology Practice	2 周	2	考查 Term Paper	2 夏	
PR023276	土木工程认识实习 Civil Engineering Awareness Practice	1 周	1	考查 Term Paper	3	
PR023277	土木工程生产实习 Civil Engineering Production Practice	4 周	4	考查 Term Paper	3 夏	
PR024278	土木工程毕业实习 Civil Engineering Graduation Practice	4 周	6	考查 Term Paper	8	
PR024111	土木工程毕业设计（论文） Civil Engineering Graduation Design(Thesis)	12 周	6	考查 Term Paper	8	
总计 Total		37 周 +128 学时	31			

7、**课外实践** (Extracurricular practice)：6 **学分** (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

八、毕业要求与培养目标矩阵（工程教育认证类专业）

毕业要求	培养目标			
	目标 1	目标 2	目标 3	目标 4
毕业要求 1		√		
毕业要求 2		√		
毕业要求 3		√		√
毕业要求 4		√		√
毕业要求 5		√		√
毕业要求 6	√	√		
毕业要求 7		√		√
毕业要求 8	√		√	√
毕业要求 9	√		√	
毕业要求 10	√	√	√	
毕业要求 11		√		√
毕业要求 12	√			√

九、课程与毕业要求关系矩阵（工程教育认证专业类专业）

课程名称 \ 毕业要求	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
思想道德与法治						L	L	H		H		M
中国近现代史纲要						L		M		L		H
马克思主义基本原理								H	M		H	H
毛泽东思想和中国特色社会主义理论体系概论							M	H				H
习近平新时代中国特色社会主义思想概论						L	M	H				H
形势与政策						M	H	H				L
大学生职业生涯规划与就业指导（1-2）								M	M	L		H
大学生心理素质教育（1-2）						M			L	M		L
军事理论									M	L		
大学英语（1-4）				M	M					H		L
大学英语素质拓展课				M	L					M		
体育（1-4）									H	M		
大学计算机	L				M					M		L
程序设计基础 A	L				H					H		M
高等数学 B（1-2）	H											
线性代数	M											
概率论与数理统计	M											
大学物理（1-2）	H		M									
大学化学	M											

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
土木工程专业导论						H	M	H		H		L
地球科学概论	H						M					
测量学 A	H	M	L	H	H							
工程图学		L			M					M		
土木工程制图		M			H					H		
理论力学 B	H	L		M								
材料力学 A	H	L		M								
结构力学 A（1）（2）	M	H	H	H	L							
工程流体力学		M	L		M							
土力学		H		H		L	M					
工程荷载与可靠度设计原理	M		M									
工程地质		H	M	H			H					
土木工程材料 A	M					L	H					
混凝土结构基本原理 A		H	M	H								
钢结构基本原理		H	M	H								
基础工程		H	M				H					
土木工程施工		M			L	H		H		H		
建筑结构抗震与防灾		H	H	M	H		L					
工程项目管理与法规		M	H			H	H	H	L		H	
房屋建筑学	H					M	H	L				
混凝土结构设计	H	L	M	H		H				H		
结构设计通用软件	H	M		H	H				L			

毕业要求 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
钢结构房屋设计		H	H	H		H	M	L				
高层建筑结构设计	H		H	L	M		M					
土木工程造价			H		M		L			H	H	
地下水科学基础 B	H		H	L	M		M					
岩体力学	H	M		H	H				L			
地下建筑结构设计		H	H	H		H	M	L				
锚固技术与支挡工程	H					M	H	L				
专业任选课	M		L							M		L
房屋建筑学课程设计			H	L	M	H	M		H			
混凝土结构课程设计		H	H		M		M			H		
基础工程课程设计		H	H		M		L					
钢结构课程设计		H			M			L		H		
土木工程施工课程设计			H		M	M						
土木工程造价课程设计		L	M		H						M	
地下建筑结构课程设计		H				L	M			H		
锚固技术与支挡工程课程设计			H		M	H	M		H			
思想政治社会实践						M			H			
军事理论及训练									M	L		
实验物理（1）（2）	M	M										
实验化学	M	M										
工程结构试验		M	H	H	H	L			H			

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
测量实习	H		M		H			M	H	L		
北戴河地质认识实习		L					L				M	
工程地质实习		M					M				H	
土木工程认识实习				M	L	H		H		M		L
土木工程生产实习	H		M		H	H	H	H	H		H	M
毕业实习与毕业设计（论文）		H	H	H	H	M	M	H	H	H	H	H
社会实践						H	M		H	M		
科研训练		M		H							L	M
创业活动		M				L	M		H	L	H	

注：H 表示课程对毕业要求指标支撑度高；M 表示课程对毕业要求指标支撑度中等；L 表示课程对毕业要求指标支撑度低。

城市地下空间工程专业培养方案

一、专业培养目标

面向国家建设需求和城市地下空间工程未来行业发展方向，以立德树人为根本任务，培养具有“品德优良、基础厚实、知识广博、专业精深”品质，德、智、体、美、劳全面发展的城市地下空间工程应用型和创新研究型人才。毕业生应具备优良的思想素质、良好的人文科学素养、扎实的自然科学与城市地下空间工程专业基础，掌握城市地下空间工程专业知识与规范，获得土木工程执业工程师的基本训练，具备实践能力、社会适应能力、创新创业能力和终身学习能力，具有国际视野、团队精神和环境协调发展意识。能够从事城市地下空间工程领域的勘察设计、施工、项目管理、教育、科研等工作，毕业5年左右达到土木工程师执业资格相当水平，成为城市地下空间工程及相关领域的技术骨干或后备管理人才。具体目标如下：

（1）具有优良的思想政治素质和人文素养，具有艰苦朴素、求真务实的优良品质，具有强烈的社会责任感与崇高的职业道德精神。

（2）掌握数学、自然科学以及城市地下空间工程基础知识，能够综合运用城市地下空间工程专业知识与工程技术，发现、研究和解决实际工程中的复杂工程问题。

（3）具有团队协作意识和交流与合作能力，能够在跨职能团队中发挥骨干作用并具备承担领导角色的能力。

（4）具有国际视野，能够通过自主学习提升专业持续发展能力，适应城市地下空间工程行业科学技术的发展需求，具备获得注册执业资格的能力。

二、毕业要求

（1）工程知识：能够将数学、自然科学、工程基础和土木工程专业知识用于解决城市地下空间工程专业的复杂工程问题。掌握数学、自然科学、工程科学等方面的基础理论和知识，用于城市地下空间工程问题的表述；能针对工程项目的具体研究对象建立数学模型并求解，应用专业知识采集并处理工程数据，将相关知识和数学模型方法用于推演、分析城市地下空间工程专业复杂工程问题；能够提出解决城市地下空间工程专业复杂工程问题的可行方案，并进行比较与综合。

（2）问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析城市地下空间工程专业的复杂工程问题，以获得有效结论。能够将数学、自然科学、工程科学的原理和逻辑思维，识别和判断城市地下空间工程专业复杂工程问题的关键环节，并给予相关科学原理和数学模型正确表达；能够通过信息检索、文献研究分析和相关科学、工程原理，认识到城市地下空间工程专业复杂工程问题具有多种解决方案，并能够寻求解决问题的有效途径和可替代的解决方案；借助数学、自然科学、工程科学知识和文献资料，能够研究分析城市地下空间工程专业复杂工程方案中的影响因素、关键环节和方案可行性，并进行多方案的技术经济对比分析和获得有效结论。

（3）设计／开发解决方案：能够设计针对城市地下空间工程专业复杂工程问题的解决方案，设计满足特定需求的体系、结构、构件（节点）或施工方案，绘制图纸及编撰技术文档，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。面向解决城市地下空间工程专业复杂工程问题的需求，能够掌握工程实践的勘察方法、设计方法和施工技术，了解影响设计目标和技术方案的各种因素；能够针对城市地下空间工程实践的特定需求，完成构件及系统设计方案、施工技术方案等关键环节的设计，正确绘制施工图纸并撰写设计文档，能够在设计环节考虑新工艺、新材料和新技术，体现创新意识；能够针对不同的城市地下空间工程实践需求在设计方案中考虑社会、安全、健康、法律、文化以及环境等因素，制定出满足国家及社会经济建设需

求的合理方案。

（4）研究：能够基于科学原理并采用科学方法对城市地下空间工程专业的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。能够运用科学原理，通过文献研究或相关方法，调研、分析城市地下空间工程专业复杂工程问题的关键技术和解决方案；基于城市地下空间工程专业理论、针对城市地下空间工程专业复杂工程问题选择合理的研究路线、设计实验方案，进行创新性实验，包括实验组织、数据获取、数据处理；能够对实验数据进行分析与解释，并通过信息综合得到合理有效的结论。

（5）使用现代工具：能够针对城市地下空间工程专业复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。掌握现代土木工程仪器、设备和先进信息处理技术工具，能够针对勘察、设计和施工等方面的复杂工程问题，选择并使用恰当的技术和工具，理解其局限性，能对城市地下空间工程专业复杂工程问题进行分析、计算和设计；针对勘察、设计和施工等方面的方案优化设计，能够选择、使用专业软硬件工具，开发满足特定需求的专门工具，用于工程方案的优化、预测和模拟，并理解其局限性。

（6）工程与社会：能够基于城市地下空间工程相关背景知识进行合理分析，评价城市地下空间工程专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。理解城市地下空间工程的社会作用及城市地下空间工程活动对社会、健康、安全、法律及文化的影响；在城市地下空间工程实践中具备综合考虑多种制约因素的意识，能够合理地分析、评价和解决城市地下空间工程活动对社会、健康、安全、法律以及文化等方面可能产生的风险，对所实施的工程质量负责，并理解应承担的责任。

（7）环境和可持续发展：能够理解和评价针对城市地下空间工程专业复杂工程问题的工程实践对环境、社会可持续发展的影响。理解和评价城市地下空间工程实践对环境保护、社会可持续发展的影响，认识工程实践在环境保护和可持续发展中的地位和作用；了解城市地下空间工程实践与环境保护和可持续发展等方面相关的方针政策、法律法规，理解和评价工程实践对环境、社会可持续发展造成的损害和隐患，并制定合理策略降低对人类和环境造成的损害和隐患。

（8）职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。了解中国国情，具有爱国主义情怀和人文社会科学素养，理解个人与社会的关系，树立正确的世界观、人生观、价值观；具备法律意识和社会责任感，理解土木工程师的职业性质，掌握土木行业相关的规范和法规，在工程实践中自觉遵守职业道德和法律法规；理解土木工程师对公共安全、健康、福祉、环境保护的社会责任，理解工程实践对维护国家安全、社会稳定的重要性，能够在工程实践中自觉履行社会责任。

（9）个人和团队：能够在解决城市地下空间工程专业的复杂工程问题时，在多学科背景下的团队中承担个体、团队成员以及负责人的角色。具备良好的组织协调能力、表达能力和人际交往能力，能够与其他学科的成员有效沟通与合作；能够独立承担城市地下空间工程的专项任务，能够在多学科组成的团队中承担个体、团队成员或负责人的角色。

（10）沟通：能够就城市地下空间工程专业的复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。能够运用城市地下空间工程及相关领域的知识，针对城市地下空间工程专业复杂工程问题与业界同行及社会公众进行有效沟通、交流和回应质疑，掌握标准工程图纸、设计说明书和研究报告的绘制撰写方法和陈述发言技巧；了解土木工程学科的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性，具备一定的国际视野；熟练使用一门外语，具备外文资料检索、外语沟通与表达能力，能够就土木工程勘察、设计和施工问题在跨文化的背景下进行沟通和交流。

（11）项目管理：理解并掌握城市地下空间工程专业相关的工程管理原理与经济决策方法，并能在多学科环境中应用。掌握城市地下空间工程勘察、设计、施工管理与经济决策的基本原理和方法；能够在多学科环境下，综合应用技术、管理和经济等决策方法，设计城市地下空间工程项目的实施方案，并组织和领导多学科团队进行项目的实施。

（12）终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。能够正确认识自我探索和学习的必要性，并能显现自我探索和学习成效；具有自主学习的能力，不断学习、适应城市地下空间工程发展，具备对不断变化的技术问题的理解、归纳总结和提出问题等能力。

三、主干学科

土木工程。

四、学制与学位

学制四年。学生修满规定的最低毕业学分，达到毕业要求后，授予工学学士学位。

五、核心课程

核心课程：理论力学、材料力学、结构力学、弹性力学、土力学、工程地质、地下水科学基础、混凝土结构基本理论、钢结构基本理论、城市地下空间规划与设计、城市地下空间工程施工方法、城市地下空间结构设计

实践课程：城市地下空间规划与设计课程设计、城市地下空间结构课程设计、城市地下空间工程数值建模方法课程设计、城市地下空间工程施工方法课程设计、城市地下空间工程造价课程设计、基础工程课程设计、测量实习、北戴河地质认识实习、工程地质实习、毕业实习

Undergraduate Program in Urban Underground Space Engineering

1. Academic Objectives

Facing the needs of national construction and the future development direction of urban underground space engineering industry, with the fundamental task of establishing moral education, the university aims to cultivate applied and innovative research talents in urban underground space engineering with the qualities of good moral character, solid foundation, extensive knowledge and profound expertise and comprehensive development of moral, intellectual, physical, aesthetic and labor. Graduates should have excellent ideological quality, good humanities, solid natural science and urban underground space engineering professional foundation, master urban underground space engineering professional knowledge and specifications, obtain the basic training of civil engineering practicing engineers, have practical ability, social adaptability, innovation and entrepreneurship and lifelong learning ability, have international vision, team spirit and environmental coordination and development awareness. They are able to engage in urban underground space engineering field of survey and design, construction, project management, education, scientific research and other work, about 5 years after graduation to achieve a level equivalent to the civil engineer practice qualification, become the backbone of urban underground space engineering and related fields of technology or reserve management personnel. Specific objectives are as follows:

(1) Students will have an excellent ideological and political quality and humanistic quality, a fine quality of hard work and plain living, realistic and pragmatic and a strong sense of social responsibility and lofty professional ethics.

(2) Students will acquire basic knowledge of mathematics, natural sciences and urban underground space engineering, and integrate urban underground space engineering expertise and engineering techniques to identify, investigate and solve complex urban underground space engineering problems.

(3) Students will have the sense of teamwork and the ability to communicate and cooperate and can play a key role in cross-functional teams and to assume leadership roles.

(4) Students will have an international outlook to be able to enhance continuous professional development through independent study, to adapt to the scientific and technological development needs of the urban underground space engineering industry and to have the ability to obtain a registered practice qualification.

2. Graduation Requirements

(1) Engineering knowledge: Students are required to apply mathematics, natural sciences, engineering fundamentals and civil engineering expertise to solve complex urban underground space engineering problems. Students are required to acquire basic theory and knowledge of mathematics, natural science and engineering science for the formulation of urban underground space engineering problems. Students are required to establish mathematical models and solve them for specific research objects of engineering projects, apply professional knowledge to collect and process engineering data, and apply relevant knowledge and mathematical modelling methods to derive and analyse complex urban underground space engineering problems. Students are required to propose feasible solutions to complex urban underground space engineering problems, and compare and synthesise them.

(2) Problem Analysis: Students are required to apply basic principles of mathematics, natural and engineering sciences to identify, express, and analyse complex engineering problems in urban underground space engineering through literature research in order to obtain valid conclusions. Students are required to apply principles and logical thinking from mathematics, natural science and engineering science to

identify and judge key aspects of complex urban underground space engineering problems, and give correct expression to relevant scientific principles and mathematical models. Students are required to recognise that complex urban underground space engineering problems have multiple solutions through information retrieval, literature research and analysis and relevant scientific and engineering principles, and seek effective ways to solve problems and alternative solutions. Students are required to research and analyse the influencing factors, key aspects and feasibility of solutions in complex urban underground space engineering solutions with the knowledge and literature of mathematical, natural and engineering science, and conduct comparative technical and economic analysis of multiple solutions and obtain valid conclusions.

(3) Design/develop solutions: Students are required to design solutions to complex urban underground space engineering problems, design systems, structures, components (nodes) or construction solutions to meet specific needs, produce drawings and compile technical documentation, and be able to demonstrate a sense of innovation in the design process, taking into account social, health, safety, legal, cultural and environmental factors. Students are required to master the survey methods, design methods and construction techniques of engineering practice, and understand the factors that influence design objectives and technical solutions, in order to meet the needs of solving complex urban underground space engineering problems. Students are required to complete the design of key aspects such as component and system design solutions and construction technology solutions for the specific needs of urban underground space engineering practice, correctly draw construction drawings and write design documentation, and are able to consider new processes, materials and technologies in the design process, reflecting a sense of innovation. Students are required to consider social, safety, health, legal, cultural and environmental factors in their design solutions to meet the needs of different urban underground space engineering practices, and develop reasonable solutions that meet the needs of the state and social and economic construction.

(4) Research: Students are required to study complex urban underground space engineering problems based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, synthesizing information to obtain reasonable and effective conclusions, and applying them to engineering practice. Students are required to apply scientific principles to research and analyse key technologies and solutions to complex urban underground space engineering problems through literature research or related methods. Students can choose a reasonable research route and design an experimental programme based on urban underground space engineering professional theories and for complex urban underground space engineering problems, and conduct innovative experiments, including experimental organisation, data acquisition and data processing. Students are required to analyse and interpret experimental data and obtain reasonable and valid conclusions through information synthesis.

(5) Use modern tools: Students are required to develop, select and use appropriate techniques, resources, modern engineering tools and information technology tools for complex urban underground space engineering problems, including prediction and simulation of complex engineering problems, and are able to understand their limitations. Students are required to master modern civil engineering instruments, equipment and advanced information processing technology tools to select and use appropriate techniques and tools for complex engineering problems in surveying, design and construction, and are able to analyse, calculate and design complex urban underground space engineering problems and understand their limitations. Students are required to select and use specialist hardware and software tools to develop specialised tools to meet specific needs for the optimisation, prediction and simulation of engineering solutions for the optimal design of solutions in survey, design and construction and understand their limitations.

(6) Engineering and Society: Students are required to undertake sound analysis based on relevant background knowledge of urban underground space engineering and evaluate the social, health, safety, legal and cultural implications of professional engineering practice and solutions to complex urban underground

space engineering problems, and understand the responsibilities involved. Students are required to understand the social role of urban underground space engineering and the social, health, safety, legal and cultural impacts of urban underground space engineering activities. Students are required to have an awareness of the multiple constraints in urban underground space engineering practice, be able to reasonably analyse, evaluate and address the social, health, safety, legal and cultural risks that may arise from urban underground space engineering activities, and be responsible for the quality of the work carried out and understand their responsibilities.

(7) Environment and Sustainable Development: Students are required to understand and evaluate the environmental, socially sustainable impacts of engineering practices that address complex urban underground space engineering problems. Students are required to understand and evaluate the impact of urban underground space engineering practice on environmental protection and sustainable development of society, and recognise the status and role of engineering practice in environmental protection and sustainable development. Students are required to understand the policies, laws and regulations related to urban underground space engineering practice and environmental protection and sustainable development, etc, understand and evaluate the damage and potential hazards caused by engineering practice to the environment and sustainable development of society, and develop reasonable strategies to reduce the damage and potential hazards caused to humans and the environment.

(8) Professional norms: Students will have humanities and social science literacy, social responsibility, and the ability to understand and comply with engineering professional ethics and norms in the practice of engineering and fulfill their responsibilities. 8.1 Students are required to understand China's national conditions, have patriotism and humanities and social science literacy, understand the relationship between the individual and society, and establish a correct world view, outlook on life and values. 8.2 Students are required to possess a sense of legal awareness and social responsibility, and understand the professional nature of civil engineers, and master the relevant codes and regulations of the civil engineering industry, and consciously abide by professional ethics and laws and regulations in engineering practice. 8.3 Students are required to understand the social responsibility of civil engineers for public safety, health, well-being, environmental protection, and understand the importance of engineering practice in maintaining national security and social stability, and be able to consciously fulfill their social responsibility in engineering practice.

(9) Individual and team: Students are required to assume the role of individual, team member and leader in a multidisciplinary context when solving complex urban underground space engineering problems. Students are required to good organizational and coordination skills, presentation and interpersonal skills, and the ability to communicate and cooperate effectively with members of other disciplines. Students are required to ability to independently undertake special tasks in urban underground space engineering and to assume the role of individual, team member or leader in a multidisciplinary team.

(10) Communication: Students will have the ability to communicate and interact effectively with industry peers and the public on complex urban underground space engineering issues, including writing reports and designing submissions, presenting statements, and articulating or responding to instructions clearly. Students should have the international perspective and are able to communicate and interact in a cross-cultural context. Students are required to be able to apply knowledge of urban underground space engineering and related fields, to communicate effectively with industry peers and the public on complex engineering problems in urban underground space engineering, to communicate and respond to questions, and master the methods of drawing and writing standard engineering drawings, design specifications, research reports and presentation skills. Students are required to understand the international development trends and research hotspots of civil engineering disciplines, understand and respect the differences and diversity of different cultures in the world, and have a certain international perspective. Students are

required to be proficient in a foreign language, and have the ability to retrieve foreign language materials, communicate and express themselves in a foreign language, and communicate and exchange ideas on civil engineering investigation, design and construction issues in a cross-cultural context.

(11) Project Management: Students are required to understand and master the principles of engineering management and economic decision-making methods relevant to the urban underground space engineering profession, and to apply them in a multidisciplinary environment. Students are required to master the basic principles and methods of urban underground space engineering survey, design, construction management and economic decision making. Students are required to apply a combination of technical, managerial, and economic decision-making methods in a multidisciplinary environment to design the implementation of urban underground space engineering projects and to organize and lead multidisciplinary teams in the implementation of the projects.

(12) Lifelong learning: Students will have the sense of self-directed and lifelong learning, and the ability to continuously learn and adapt to development. Students are required to have a sound understanding of the need for self-exploration and learning, and be able to demonstrate the effectiveness of self-exploration and learning. Students are required to have the ability to learn on their own, to continuously learn and adapt to urban underground space engineering developments, and to have the ability to understand, summarize, and ask questions about changing technical issues.

3. Main disciplines

Civil Engineering.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Core Courses: Theoretical Mechanics, Mechanics of Materials, Structural Mechanics, Elasticity Mechanics，Soil Mechanics, Engineering Geology，Fundamentals of Groundwater Science，Basic Reinforced Concrete Structures, Basic Steel Structure Fundamentals，Urban Underground Space Plan and Design，Urban Underground Space Engineering Construction Method，Urban Underground Space Structure Design.

Practical Courses: Design Practice of Urban Underground Space Plan and Design，Design Practice of Urban Underground Space Structure，Design Practice of Urban Underground Space Numerical Modeling Method，Design Practice of Urban Underground Space Construction Method，Design Practice of Urban Underground Space Engineering Cost、Design Practice of Foundation Engineering，Surveying Practice, Geological Survey Field Trip in Beidaihe, Engineering Geology Practice，Graduation Practice.

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification		学时数 Hours	学分 Credits	学 期 Semester										
					1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education		730	40	11.25	13.25		4.25	5.25	1	3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education		192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses		896	55.5	13	20.5		9	8		5				
	专业核心课程 Specialized Fundamental Courses		344	21.5					7		5	7.5		2	
	专业拓展课程 Specialized Development	必选课程 Required Courses	176	11								7.5		3.5	
		任选课程 Optional Courses	64	4											
实践教育 Practical Education	课程实践 Course Practice		37 周 +128 学时	31		4	6	2		2		4	4	3	6
	课外实践 Extracurricular practice		96	6											
必修课总学分 Required course credits					148										
选修课总学分 Elective course credits					33										
最低毕业总学分 Total Credits					181										

七、课程设置 (Curriculum)

1、通识教育必修课程 (Required Courses of General Education)：730 学时 (730 Hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR183004	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	64	4	48	16		考试 Exam	4	
GR181012	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形势与政策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形势与政策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形势与政策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形势与政策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形势与政策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形势与政策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形势与政策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育(1) Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303005	大学生心理素质教育(2) Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	2 夏	
GR081071	大学英语（1） College English(1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English(2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education(2)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education(3)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education(4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	40	492	222	16			

2、**通识教育选修** (Selective Courses of General Education)：192 **学时** (192Hours)，12 **学分** (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类（含在线课程） Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5-6	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-4	
总计 Total			12			

3、学科基础课程 (Disciplinary Fundamental Courses)：896 学时（896 Hours)，55.5 学分 (55.5 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR191001	高等数学 A（1） Advanced Mathematics A(1)	96	6	96			考试 Exam	1	
DR191002	高等数学 A（2） Advanced Mathematics A(2)	96	6	96			考试 Exam	2	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	
DR191008	大学物理（1） College Physics (1)	48	3	48			考试 Exam	2	
DR192009	大学物理（2） College Physics (2)	48	3	48			考试 Exam	3	
DR191010	大学化学 College Chemistry	48	3	48			考试 Exam	1	
DR011036	地球科学概论 Geosciences	64	4	32	32	8	考试 Exam	2	
DR122001	测量学 A Surveying A	40	2.5	24	16		考试 Exam	2	
DR021002	工程图学 Engineering Drawing	48	3	48			考试 Exam	1	
DR021225	土木工程制图 Civil Engineering Drawing	32	2	16	16		考查 Term paper	2	
DR022201	理论力学 B Theoretical Mechanics B	48	3	48			考试 Exam	2	
DR022126	材料力学 A Mechanics of Materials A	64	4	58	6		考试 Exam	3	
DR022227	结构力学 A（1） Structural Mechanics A（1）	56	3.5	56			考试 Exam	4	
DR022005	工程流体力学 Engineering Fluid Mechanics	32	2	28	4		考试 Exam	4	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR023251	弹性力学 Elasticity Mechanics	32	2	32			考试 Exam	5	
DR023229	土力学 Soil Mechanics	48	3	40	8		考试 Exam	5	
DR020042	城市地下空间工程专业导论	16	1	16			考查 Term paper	1	
总计 Total		896	55.5	806	82	8			

4、**专业核心课程** (Specialized Core Courses)：344 **学时** (344 Hours)，21.5 **学分** (21.5 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR022282	城市地下空间规划与设计 Urban Underground Space Plan and Design	32	2	32			考试 Exam	4	
SR022231	工程地质 Engineering Geology	40	2.5	40			考试 Exam	4	
SR022283	土木工程材料 B Civil Engineering Material B	40	2.5	32	8		考试 Exam	4	
SR023284	混凝土结构基本原理 B Reinforced Concrete Structures Fundamentals B	48	3	40	8		考试 Exam	5	
SS023261	地下水科学基础 B Fundamentals of Groundwater Science B	32	2	32			考试 Exam	5	
SR023234	钢结构基本原理 Steel Structures Fundamentals	40	2.5	40			考试 Exam	6	
SR023285	城市地下空间建筑学 Urban Underground Space Architecture	32	2	32			考试 Exam	6	
SR023286	城市地下空间工程施工方法 Urban Underground Space Engineering Construction Method	48	3	48			考试 Exam	6	
SR024287	城市地下空间结构设计 Urban Underground Space Structure Design	32	2	32			考试 Exam	7	
总计 Total		344	21.5	328	16				

5、专业拓展课程 (Specialized Development Courses)：

建筑工程方向 (Architectural Engineering)：选修 240 学时 (240 Hours)，15 学分 (15Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS024263	岩土工程勘察 Geotechnical Engineering Investigation	24	1.5	16	8		考试 Exam	7	必选
SR024238	工程项目管理与法规 Engineering Project Management and Regulations	32	2	32			考查 Term paper	7	
DR023017	岩体力学 Rockmass Mechanice	32	2	28	4		考试 Exam	6	
SR023235	基础工程 Foundation Engineering	32	2	32			考试 Exam	6	
SS023288	城市地下空间工程数值建模方法 Urban Underground Space Engineering Numerical Modeling Method	32	2	32			考查 Term paper	6	
SS023243	土木工程造价 Civil Engineering Cost	24	1.5	24			考试 Exam	6	
SS024257	非开挖技术概论 Introduction to Trenchless Technology	32	2	32			考查 Term paper	7	任选
SS024289	城市地下空间工程测试与监测技术 Urban Underground Space Engineering Testing and Monitoring Technology	32	2	32			考查 Term paper	7	
SR024053	锚固技术与支挡工程 Anchor Technology and Retaining Engineering	32	2	32			考试 Exam	7	
SS023253	建筑信息模型技术（BIM）概论 Introduction to Building Information Modeling (BIM) Technology	24	1.5	24			考查 Term paper	6	
SS024267	隧道工程概论 Introduction to Tunnel Engineering	32	2	32			考查 Term paper	7	
SS024290	城市地下综合管廊（道） Urban Underground Utility Tunnel（Pipe)	16	1	16			考查 Term paper	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
公共选修课									
SS022252	土木工程专业英语 Specialty English for Civil Engineering	16	1	16			考查 Term paper	4	
SS023254	智慧基础设施（双语、研究生课程） Smart Infrastructure (Bilingual, Graduate Program)	32	2	32			考查 Term paper	6	
IS024291	智能建造导论 Introduction to Intelligent Construction	24	1.5	24			考查 Term paper	7	
SS024255	道桥工程概论 Introduction to Road and Bridge Engineering	32	2	32			考查 Term paper	7	
SS024259	地基处理 Foundation treatment	24	1.5	24			考查 Term paper	7	
SS024292	地铁与轻轨 Subway and Light Rail	16	1	16			考查 Term paper	7	
SS024249	装配式建筑结构概论 Introduction to Structure of Assembled Buildings	24	1.5	24			考查 Term paper	7	

6、**课程实践** (Course Practice)：37 **周** +128 **学时** (37 weeks and 128 hours)，31 **学分** (31Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理（1） Physics Experiments(1)	24 学时	1	考查 Term Paper	2	
PR192046	实验物理（2） Physics Experiments(2)	24 学时	1	考查 Term Paper	3	
PR191047	实验化学 Chemistry Experiments	48 学时	2	考查 Term Paper	2	
PR024268	工程结构试验 Engineering Structural Experiments	1 周	1	考查 Term Paper	7	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR122059	测量实习 Surveying Practice	1 周	1	考查 Term Paper	2	
PR011044	北戴河地质认识实习 Geological Survey Field Trip in Beidaihe	2 周	2	考查 Term Paper	1 夏	
PR022275	工程地质实习 Engineering Geology Practice	2 周	2	考查 Term Paper	2 夏	
PR022293	城市地下空间工程认识实习 Urban Underground Space Engineering Awareness Practice	1 周	1	考查 Term Paper	3	
PR023294	城市地下空间工程生产实习 Urban Underground Space Engineering Production Practice	4 周	4	考查 Term Paper	3 夏	
PR024295	城市地下空间工程毕业实习 Urban Underground Space Engineering Graduation Practice	4 周	6	考查 Term Paper	8	
PR024296	城市地下空间工程毕业设计（论文） Urban Underground Space Engineering Graduation Design (Thesis)	12 周		考查 Term Paper		
总计 Total		29 周 +128 学时	25			
PR023271	基础工程课程设计 Design Practice of Foundation Engineering	1 周	1	考查 Term Paper	6	
PR023297	城市地下空间规划与设计课程设计 Design Practice of Urban Underground Space Plan and Design	1 周	1	考查 Term Paper	6	
PR024298	城市地下空间结构课程设计 Design Practice of Urban Underground Space Structure	2 周	1	考查 Term Paper	7	
PR024299	城市地下空间工程数值建模方法课程设计 Design Practice of Urban Underground Space Numerical Modeling Method	1 周	1	考查 Term Paper	7	
PR023300	城市地下空间工程施工方法课程设计 Design Practice of Urban Underground Space Construction Method	2 周	1	考查 Term Paper	6	
PR023301	城市地下空间工程造价课程设计 Design Practice of Urban Underground Space Engineering Cost	1 周	1	考查 Term Paper	6	
总计 Total		8 周	6			

7、**课外实践** (Extracurricular practice)：**6 学分** (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

八、毕业要求与培养目标矩阵（工程教育认证类专业）

毕业要求	培养目标			
	目标 1	目标 2	目标 3	目标 4
毕业要求 1		√		
毕业要求 2		√		
毕业要求 3		√		√
毕业要求 4		√		√
毕业要求 5		√		√
毕业要求 6	√	√		
毕业要求 7		√		√
毕业要求 8	√		√	√
毕业要求 9	√		√	
毕业要求 10	√	√	√	
毕业要求 11		√		√
毕业要求 12	√			√

九、课程与毕业要求关系矩阵（工程教育认证专业类专业）

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
思想道德与法治						L	L	H		H		M
中国近现代史纲要						L		M		L		H
马克思主义基本原理								H	M		H	H
毛泽东思想和中国特色社会主义理论体系概论							M	H				H
习近平新时代中国特色社会主义思想概论						L	M	H				H
形势与政策						M	H	H				L
大学生职业生涯规划与就业指导（1-2）								M	M	L		H
大学生心理素质教育（1-2）						M			L	M		L
军事理论									M	L		
大学英语（1-4）				M	M					H		L
大学英语素质拓展课				M	L					M		
体育（1-4）									H	M		
大学计算机	L				M					M		L
程序设计基础 A	L				H					H		M
高等数学 B（1-2）	H											
线性代数	M											
概率论与数理统计	M											
大学物理（1-2）	H		M									
大学化学	M											

毕业要求 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
城市地下空间工程专业导论						H	M	H		H		L
地球科学概论	H						M					
测量学 A	H	M	L	H	H							
工程图学		L			M					M		
土木工程制图		M			H					H		
理论力学 B	H	L		M								
材料力学 A	H	L		M								
结构力学 A（1）	M	H	H	H	L							
工程流体力学		M	L		M							
弹性力学	L	H		M								
土力学		H		H		L	M					
城市地下空间规划与设计	M		M									
工程地质		H	M	H			H					
土木工程材料 B	M					L	H					
混凝土结构基本原理 B		H	M	H								
地下水科学基础 B	H		H	L	M		M					
钢结构基本原理		H	M	H								
城市地下空间建筑学		H	M				H					
城市地下空间工程施工方法		M			L	H		H		H		
城市地下空间结构设计		H	H	M	H		L					
岩土工程勘察	H		H		M							

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
工程项目管理与法规		M	H			H	H	H	L		H	
岩体力学	H	M		H	H				L			
基础工程		H	M				H					
城市地下空间工程数值建模方法	H	M		M	H							
土木工程造价			H		M		L			H	H	
专业任选课	M		L							M		L
基础工程课程设计		H	H		M		L					
城市地下空间结构课程设计			H	L	M	H	M		H			
城市地下空间规划与设计课程设计		H	H		M		M			H		
城市地下空间工程数值建模方法课程设计		H			M			L		H		
城市地下空间工程施工方法课程设计			H		M	M						
城市地下空间工程造价课程设计		L	M		H						M	
思想政治社会实践						M			H			
军事理论及训练									M	L		
实验物理（1）（2）	M	M										
实验化学	M	M										
工程结构试验		M	H	H	H	L			H			
测量实习	H		M		H			M	H	L		
北戴河地质认识实习		L					L				M	
工程地质实习		M					M				H	

毕业要求 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
城市地下空间工程认识实习				M	L	H		H		M		L
城市地下空间工程生产实习	H		M		H	H	H	H	H		H	M
毕业实习与毕业设计（论文）		H	H	H	H	M	M	H	H	H	H	H
社会实践						H	M		H	M		
科研训练		M		H							L	M
创业活动		M				L	M		H	L	H	

注：H 表示课程对毕业要求指标支撑度高；M 表示课程对毕业要求指标支撑度中等；L 表示课程对毕业要求指标支撑度低。

地质工程专业培养方案

一、专业培养目标

面向国家建设需求和地质工程未来行业发展方向，以立德树人为根本任务，培养具有“品德优良、基础厚实、知识广博、专业精深”品质，德、智、体、美、劳全面发展的地质工程应用型和创新研究型人才。毕业生应具备优良的思想素质、良好的人文科学素养、扎实的自然科学与地质工程专业基础，掌握地质工程专业知识与规范，获得地质工程执业工程师的基本训练，具备实践能力、社会适应能力、创新创业能力和终身学习能力，具有国际视野、团队精神和环境协调发展意识。能够从事地质工程领域的勘察设计、施工、项目管理、教育、科研等工作，毕业5年左右达到地质工程师执业资格相当水平，成为地质工程及相关领域的技术骨干或后备管理人才。具体目标如下：

（1）具有优良的思想政治素质、良好的人文科学素养、职业道德和社会责任感，具有环保和可持续发展意识，能够承担和履行社会责任。

（2）掌握数学、自然科学以及地质工程基础知识，能够综合运用地质工程专业知识与工程技术，发现、研究和解决实际工程中的复杂地质问题。

（3）具有团队协作意识和交流与合作能力，能够在跨职能团队中发挥骨干作用并具备承担领导角色的能力。

（4）具有国际视野，能够通过自主学习提升专业持续发展能力，适应地质工程行业科学技术的发展需求，具备获得执业资格的能力。

二、毕业要求

（1）工程知识：能够将数学、自然科学、工程基础和地质工程专业知识用于解决实际复杂工程问题。掌握数学、自然科学、工程科学等方面的基础理论和知识，用于地质工程问题的表述；能针对具体研究对象建立数学模型并求解，应用专业知识采集并处理工程数据，将相关知识和数学模型方法用于推演、分析地质工程专业复杂工程问题；能够提出解决地质工程专业复杂工程问题的可行方案，并进行比较与综合。

（2）问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析地质工程专业的复杂问题，以获得有效结论。能够将数学、自然科学、工程科学的原理和逻辑思维，识别和判断地质工程专业复杂工程问题的关键环节，并给予相关科学原理和数学模型正确表达；能够通过信息检索、文献研究分析和相关科学、工程原理，认识到地质工程专业复杂工程问题具有多种解决方案，并能够寻求解决问题的有效途径和可替代的解决方案；借助数学、自然科学、工程科学知识和文献资料，能够研究分析地质工程专业复杂工程方案中的影响因素、关键环节和方案可行性，并进行多方案的技术经济对比分析和获得有效结论。

（3）设计／开发解决方案：能够设计针对地质工程专业复杂工程问题的解决方案，设计满足特定需求的体系、结构、构件（节点）或施工方案，绘制图纸及编撰技术文档，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。面向解决地质工程专业复杂工程问题的需求，能够掌握工程实践的勘察方法、设计方法和施工技术，了解影响设计目标和技术方案的各种因素；能够针对地质工程实践的特定需求，完成勘察、施工技术方案等关键环节的设计，正确绘制施工图纸并撰写设计文档，能够在设计环节考虑新工艺、新材料、新装备和新技术，体现创新意识；能够针对不同的地质工程实践需求在设计方案中考虑社会、安全、健康、法律、文化以及环境等因素，制定出满足国家及社会经济建设需求的合理方案。

（4）研究：能够基于科学原理并采用科学方法对地质工程专业的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。能够运用科学原理，通过文

献研究或相关方法，调研、分析地质工程专业复杂工程问题的关键技术和解决方案；基于地质工程专业理论、针对地质工程专业复杂工程问题选择合理的研究路线、设计实验方案，进行创新性实验，包括实验组织、数据获取、数据处理；能够对实验数据进行分析与解释，并通过信息综合得到合理有效的结论。

（5）使用现代工具：能够针对地质工程专业复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。掌握现代地质工程仪器、设备和先进信息处理技术工具，能够针对勘察、设计和施工等方面的复杂工程问题，选择并使用恰当的技术、装备和工具，理解其局限性，能对地质工程专业复杂工程问题进行分析、计算和设计；针对勘察、设计和施工等方面的方案优化设计，能够选择、使用专业软硬件工具，开发满足特定需求的专门工具，用于工程方案的优化、预测和模拟，并理解其局限性。

（6）工程与社会：能够基于地质工程相关背景知识进行合理分析，评价地质工程专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。理解地质工程的社会作用及地质工程活动对社会、健康、安全、法律及文化的影响；在地质工程实践中具备综合考虑多种制约因素的意识，能够合理地分析、评价和解决地质工程活动对社会、健康、安全、法律以及文化等方面可能产生的风险，对所实施的工程质量负责，并理解应承担的责任。

（7）环境和可持续发展：能够理解和评价针对地质工程专业复杂工程问题的工程实践对环境、社会可持续发展的影响。理解和评价地质工程实践对环境保护、社会可持续发展的影响，认识工程实践在环境保护和可持续发展中的地位和作用；了解地质工程实践与环境保护和可持续发展等方面相关的方针政策、法律法规，理解和评价工程实践对环境、社会可持续发展造成的损害和隐患，并制定合理策略降低对人类和环境造成的损害和隐患。

（8）职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。了解中国国情，具有爱国主义情怀和人文社会科学素养，理解个人与社会的关系，树立正确的世界观、人生观、价值观；具备法律意识和社会责任感，理解地质工程师的职业性质，掌握地质工程行业相关的规范和法规，在工程实践中自觉遵守职业道德和法律法规；理解地质工程师对公共安全、健康、福祉、环境保护的社会责任，理解工程实践对维护国家安全、社会稳定的重要性，能够在工程实践中自觉履行社会责任。

（9）个人和团队：能够在解决地质工程专业的复杂工程问题时，在多学科背景下的团队中承担个体、团队成员以及负责人的角色。具备良好的组织协调能力、表达能力和人际交往能力，能够与其他学科的成员有效沟通与合作；能够独立承担地质工程的专项任务，能够在多学科组成的团队中承担个体、团队成员或负责人的角色。

（10）沟通：能够就地质工程专业的复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。能够运用地质工程及相关领域的知识，针对地质程专业复杂工程问题与业界同行及社会公众进行有效沟通、交流和回应质疑，掌握标准工程图纸、设计说明书和研究报告的绘制撰写方法和陈述发言技巧；了解地质工程学科的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性，具备一定的国际视野；熟练使用一门外语，具备外文资料检索、外语沟通与表达能力，能够就地质工程勘察、设计和施工问题在跨文化的背景下进行沟通和交流。

（11）项目管理：理解并掌握地质专业相关的工程管理原理与经济决策方法，并能在多学科环境中应用。掌握地质工程勘察、设计、施工管理与经济决策的基本原理和方法；能够在多学科环境下，综合应用技术、管理和经济等决策方法，设计地质工程项目的实施方案，并组织和领导多学科团队进行项目的实施。

（12）终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。能够正确认识自我探索和学习的必要性，并能显现自我探索和学习成效；具有自主学习的能力，不断学习、

适应地质工程发展，具备对不断变化的技术问题的理解、归纳总结和提出问题等能力。

三、主干学科

地质资源与地质工程。

四、学制与学位

学制四年。学生修满规定的最低毕业学分，达到毕业要求后，授予工学学士学位。

五、核心课程

核心课程：岩土钻掘工程方向：岩土钻掘工程学、钢筋混凝土结构原理、基础工程、岩土工程施工；工程材料、测试技术、机械原理、液压传动、工程机械设计基础、电机与拖动、钻井液工艺原理、钻井与完井工程、菲迪克合同条件与项目管理（双语）、工程管理与法规．

工程地质方向：岩土钻掘工程学、钢筋混凝土结构原理、基础工程、岩土工程施工；第四纪地质与地貌学、水文地质学基础、地下水动力学、工程物探、工程地质学基础、工程地质数值模拟、地质灾害防治、岩土工程勘察、菲迪克合同条件与项目管理（双语）、工程管理与法规．

实践课程：岩土钻掘工程方向：北戴河地质认识实习、周口店地质教学实习、测量实习、金工实习、工程 CAD 实训、钢筋混凝土课程设计、基础工程课程设计、地质工程认识实习、地质工程生产实习、毕业实习、毕业设计（论文）、工程机械设计课程设计、岩土钻掘工程课程设计。

工程地质方向：北戴河地质认识实习、周口店地质教学实习、测量实习、工程 CAD 实训、钢筋混凝土课程设计、基础工程课程设计、地质工程认识实习、地质工程生产实习、毕业实习、毕业设计（论文）、岩土工程原位测试、工程地质勘察课程设计、地质灾害与防治课程设计。

Undergraduate Program in Geological Engineering

1. Academic Objectives

Facing the needs of national construction and the future development direction of geological engineering industry, with the fundamental task of establishing moral education, the university aims to cultivate applied and innovative research talents in geological engineering with the qualities of good moral character, solid foundation, extensive knowledge and profound expertise and comprehensive development of moral, intellectual, physical, aesthetic and labor. Graduates should have excellent ideological quality, good humanities, solid natural science and geological engineering professional foundation, master geological engineering professional knowledge and specifications, obtain the basic training of geological engineering practicing engineers, have practical ability, social adaptability, innovation and entrepreneurship and lifelong learning ability, have international vision, team spirit and environmental coordination and development awareness. They are able to engage in geological engineering field of survey and design, construction, project management, education, scientific research and other work, about 5 years after graduation to achieve a level equivalent to the geological engineer practice qualification, become the backbone of geological engineering and related fields of technology or reserve management personnel. Specific objectives are as follows:

(1) Students will have an excellent ideological and political quality, good humanities and scientific literacy, professional ethics and social responsibility, a sense of environmental protection and sustainable development, and ability to assume and fulfill social responsibility.

(2) Students will acquire basic knowledge of mathematics, natural sciences and geological engineering, and integrate geological engineering expertise and engineering techniques to identify, investigate and solve complex geological problems.

(3) Students will have the sense of teamwork and the ability to communicate and cooperate and can play a key role in cross-functional teams and to assume leadership roles.

(4) Students will have an international outlook to be able to enhance continuous professional development through independent study, to adapt to the scientific and technological development needs of the geological engineering industry and to have the ability to obtain a practice qualification.

2. Graduation Requirements

(1) Engineering knowledge: Students are required to apply mathematics, natural sciences, engineering fundamentals and geological engineering expertise to solve complex geological engineering problems. Students are required to acquire basic theory and knowledge of mathematics, natural science and engineering science for the formulation of geological engineering problems. Students are required to establish mathematical models and solve them for specific research objects of engineering projects, apply professional knowledge to collect and process engineering data, and apply relevant knowledge and mathematical modelling methods to derive and analyse complex geological engineering problems in practical projects. Students are required to propose feasible solutions to complex geological engineering problems, and compare and synthesize them.

(2) Problem Analysis: Students are required to apply basic principles of mathematics, natural and engineering sciences to identify, express, and analyse complex engineering problems in geological engineering through literature research in order to obtain valid conclusions. Students are required to apply principles and logical thinking from mathematics, natural science and engineering science to identify and judge key aspects of complex geological engineering problems, and give correct expression to relevant scientific principles and mathematical models. Students are required to recognize that complex geological engineering problems have multiple solutions through information retrieval, literature research and analysis

and relevant scientific and engineering principles, and seek effective ways to solve problems and alternative solutions. Students are required to research and analyse the influencing factors, key aspects and feasibility of solutions in complex geological engineering solutions with the knowledge and literature of mathematical, natural and engineering science, and conduct comparative technical and economic analysis of multiple solutions and obtain valid conclusions.

(3) Design/develop solutions: Students are required to design solutions to complex geological engineering problems, design systems, structures, components (nodes) or construction solutions to meet specific needs, produce drawings and compile technical documentation, and be able to demonstrate a sense of innovation in the design process, taking into account social, health, safety, legal, cultural and environmental factors. Students are required to master the survey methods, design methods and construction techniques of engineering practice, and understand the factors that influence design objectives and technical solutions, in order to meet the needs of solving complex geological engineering problems. Students are required to complete the design of key aspects such as geological survey solutions and construction technology solutions for the specific needs of geological engineering practice, correctly draw construction drawings and write design documentation, and are able to consider new processes, materials, equipment and technologies in the design process, reflecting a sense of innovation. Students are required to consider social, safety, health, legal, cultural and environmental factors in their design solutions to meet the needs of different geological engineering practices, and develop reasonable solutions that meet the needs of the state and social and economic construction.

(4) Research: Students are required to study complex geological engineering problems based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, synthesizing information to obtain reasonable and effective conclusions, and applying them to engineering practice. Students are required to apply scientific principles to research and analyse key technologies and solutions to complex geological engineering problems through literature research or related methods. Students can choose a reasonable research route and design an experimental programme based on geological engineering professional theories and for complex geological engineering problems, and conduct innovative experiments, including experimental organisation, data acquisition and data processing. Students are required to analyse and interpret experimental data and obtain reasonable and valid conclusions through information synthesis.

(5) Use modern tools: Students are required to develop, select and use appropriate techniques, resources, modern engineering tools and information technology tools for complex geological engineering problems, including prediction and simulation of complex engineering problems, and are able to understand their limitations. Students are required to master modern geological engineering instruments, equipment and advanced information processing technology tools to select and use appropriate techniques, equipment and tools for complex engineering problems in surveying, design and construction, and are able to analyse, calculate and design complex geological problems and understand their limitations. Students are required to select and use specialist hardware and software tools to develop specialised tools to meet specific needs for the optimisation, prediction and simulation of engineering solutions for the optimal design of solutions in survey, design and construction and understand their limitations.

(6) Engineering and Society: Students are required to undertake sound analysis based on relevant background knowledge of geological engineering and evaluate the social, health, safety, legal and cultural implications of professional engineering practice and solutions to complex geological problems, and understand the responsibilities involved. Students are required to understand the social role of geological engineering and the social, health, safety, legal and cultural impacts of geological engineering activities. Students are required to have an awareness of the multiple constraints in geological engineering practice, be able to reasonably analyse, evaluate and address the social, health, safety, legal and cultural risks that may

arise from geological engineering activities, and be responsible for the quality of the work carried out and understand their responsibilities.

(7) Environment and Sustainable Development: Students are required to understand and evaluate the environmental, socially sustainable impacts of engineering practices that address complex geological engineering problems. Students are required to understand and evaluate the impact of geological engineering practice on environmental protection and sustainable development of society, and recognise the status and role of engineering practice in environmental protection and sustainable development. Students are required to understand the policies, laws and regulations related to geological engineering practice and environmental protection and sustainable development etc., understand and evaluate the damage and potential hazards caused by engineering practice to the environment and sustainable development of society, and develop reasonable strategies to reduce the damage and potential hazards caused to humans and the environment.

(8) Professional norms: Students will have humanities and social science literacy, social responsibility, and the ability to understand and comply with engineering professional ethics and norms in the practice of engineering and fulfill their responsibilities. Students are required to understand China's national conditions, have patriotism and humanities and social science literacy, understand the relationship between the individual and society, and establish a correct world view, outlook on life and values. Students are required to possess a sense of legal awareness and social responsibility, and understand the professional nature of geological engineers, and master the relevant codes and regulations of the geological engineering industry, and consciously abide by professional ethics and laws and regulations in engineering practice. Students are required to understand the social responsibility of geological engineers for public safety, health, well-being, environmental protection, and understand the importance of engineering practice in maintaining national security and social stability, and be able to consciously fulfill their social responsibility in engineering practice.

(9) Individual and team: Students are required to assume the role of individual, team member and leader in a multidisciplinary context when solving complex geological problems. Students are required to good organizational and coordination skills, presentation and interpersonal skills, and the ability to communicate and cooperate effectively with members of other disciplines. Students are required to ability to independently undertake special tasks in geological engineering and to assume the role of individual, team member or leader in a multidisciplinary team.

(10) Communication: Students will have the ability to communicate and interact effectively with industry peers and the public on complex geological engineering issues, including writing reports and designing submissions, presenting statements, and articulating or responding to instructions clearly. Students should have the international perspective and are able to communicate and interact in a cross-cultural context. Students are required to be able to apply knowledge of geological engineering and related fields, to communicate effectively with industry peers and the public on complex engineering problems in geological engineering, to communicate and respond to questions, and master the methods of drawing and writing standard engineering drawings, design specifications, research reports and presentation skills. Students are required to understand the international development trends and research hotspots of geological engineering disciplines, understand and respect the differences and diversity of different cultures in the world, and have a certain international perspective. Students are required to be proficient in a foreign language, and have the ability to retrieve foreign language materials, communicate and express themselves in a foreign language, and communicate and exchange ideas on geological engineering investigation, design and construction issues in a cross-cultural context.

(11) Project Management: Students are required to understand and master the principles of engineering management and economic decision-making methods relevant to the geological engineering profession, and to apply them in a multidisciplinary environment. Students are required to master the basic principles and

methods of geological engineering survey, design, construction management and economic decision making. Students are required to apply a combination of technical, managerial, and economic decision-making methods in a multidisciplinary environment to design the implementation of geological engineering projects and to organize and lead multidisciplinary teams in the implementation of the projects.

(12) Lifelong learning: Students will have the sense of self-directed and lifelong learning, and the ability to continuously learn and adapt to development. Students are required to have a sound understanding of the need for self-exploration and learning, and be able to demonstrate the effectiveness of self-exploration and learning. Students are required to have the ability to learn on their own, to continuously learn and adapt to geological engineering developments, and to have the ability to understand, summarize, and ask questions about changing technical issues.

3. Main disciplines

Civil Engineering.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Core Courses: Direction of drilling and tunnelling: Drilling Engineering,Principles of Reinforced Concrete Structures, Foundation Engineering, Construction of Geotechnical Engineering, Engineering Material, Testing Technology, Mechanical Principle, Hydraulic Transmission, Basis of Engineering Machine Design,Electrical Machinery & Towage, Principle of Drilling Fluid Process, Drilling and Completion Engineering, FIDIC Terms of Contract and Project Management.

Direction of engineering geology: Drilling Engineering，Principles of Reinforced Concrete Structures, Foundation Engineering, Construction of Geotechnical Engineering, Quaternary Geology and Geomorphology，Fundamentals of hydrogeology，Groundwater Dynamics，Engineering Physical Exploration，Fundamentals of Engineering Geology，Numerical Simulation of Engineering Geology，Geologic Hazard Control，Geotechnical Investigation，Engineering Project Management and Regulations.

Practical Courses: Direction of drilling and tunnelling,Geological Field Survey in Beidaihe, Geological Field Survey in Zhoukoudian, Engineering Measuring, Metalworking Practice, Training of Engineering CAD, Design of Reinforced concrete structures,, Foundation engineering course design, Geological Engineering Awareness Practice, Geological Engineering Production Practice, Graduation Practice, Graduation Design (Thesis), Basic course design of mechanical design, Design of Drilling and Excavation Engineering.

Direction of engineering geology: Geological Field Survey in Beidaihe, Geological Field Survey in Zhoukoudian, Engineering Measuring, Training of Engineering CAD, Design of Reinforced concrete structures, Foundation engineering course design, Geological Engineering Awareness Practice, Geological Engineering Production Practice, Graduation Practice, Graduation Design (Thesis), In-situ testing of geotechnical engineering, Design of geotechnical engineering investigation course, Design of Geologic Hazard Control.

.

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification	学时数 Hours	学分 Credits	学 期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	40	11.25	13.25		4.25	5.25	1	3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	992	62	10	19		12	12		9				
	专业核心课程 Specialized Fundamental Courses	400	25				2	6		4/4.5	13/12.5			
	专业拓展课程 Specialized Development	96	6											
实践教育 Practical Education	课程实践 Course Practice	42 周 +128 学时	34		4	6	1		7	2.5	1.5	5	1	6
	课外实践 Extracurricular practice	96	6											
必修课总学分 Required course credits				161										
选修课总学分 Elective course credits				24										
最低毕业总学分 Total Credits				185										

七、课程设置 (Curriculum)

1、**通识教育必修课程** (Required Courses of General Education)：730 **学时** (730 Hours)，40 **学分** (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR183004	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	64	4	48	16		考试 Exam	4	
GR181012	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形势与政策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形势与政策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形势与政策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形势与政策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形势与政策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形势与政策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形势与政策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育(1) Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303005	大学生心理素质教育(2) Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	2 夏	
GR081071	大学英语（1） College English(1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English(2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education(2)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education(3)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education(4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	40	492	222	16			

2、**通识教育选修** (Selective Courses of General Education)：192 **学时** (192Hours)，12 **学分** (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类（含在线课程） Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5-6	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-4	
总计 Total			12			

3、学科基础课程 (Disciplinary Fundamental Courses)：992 学时 (992 Hours)，62 学分 (62 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR020043	地质工程专业导论 Professional Introduction Courses	16	1	16			考查 Term paper	1	
DR191001	高等数学 A（1） Advanced Mathematics A (1)	96	6	96			考试 Exam	1	
DR191002	高等数学 A（2） Advanced Mathematics A (2)	96	6	96			考试 Exam	2	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	
DR191008	大学物理（1） College Physics(1)	48	3	48			考试 Exam	2	
DR192009	大学物理（2） College Physics(2)	48	3	48			考试 Exam	3	
DR042127	电工电子技术 B Electrical and Electronic Technology B	48	3	34	14		考试 Exam	3	
DR191010	大学化学 College Chemistry	48	3	48			考试 Exam	1	
DR011036	地球科学概论 Geosciences	64	4	32	32	8	考试 Exam	2	
DR012039	综合地质学 Synthetic geology	64	4	32	32		考试 Exam	4	
DR122001	测量学 A Surveying A	40	2.5	24	16		考试 Exam	2	
DR021224	工程图学 A Engineering Drawing A	56	3.5	48	8		考试 Exam	2	
DR022302	理论力学 A Theoretical Mechanics A	64	4	64			考试 Exam	3	W1-16
DR022202	材料力学 B Mechanics of Materials B	48	3	44	4		考试 Exam	4	W1-12

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR022005	工程流体力学 Engineering Fluid Mechanics	32	2	28	4		考试 Exam	4	W1-8
DR023251	弹性力学 Theory of Elasticity	32	2	32			考查 Term paper	5	W1-8
DR023351	结构力学 B Structural Mechanics B	32	2	32			考试 Exam	5	W1-8
DR023016	土力学 Soil Mechanics	48	3	40	8		考试 Exam	5	W9-16
DR023017	岩体力学 Rockmass Mechanics	32	2	28	4		考试 Exam	6	W9-16
总计 Total		992	62	870	122	8			

4、**专业核心课程** (Specialized Core Courses)：

岩土钻掘工程方向 (Geotechnical Drilling and Excavation Engineering) 400 **学时** (400 Hours)，25 **学分** (25 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
公共核心课程模块									
SR023308	岩土钻掘工程学 Drilling Engineering	48	3	40	8		考试 Exam	6	W1-12
DR023008	钢筋混凝土结构原理 Principles of Reinforced Concrete Structures	32	2	32			考试 Exam	6	W1-8
SR023041	基础工程 Foundation Engineering	32	2	32			考试 Exam	6	W9-16
SR024048	岩土工程施工 Construction of Geotechnical Engineering	32	2	26	6		考试 Exam	6	W9-16

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
岩土钻掘工程模块									
SR022303	工程材料 B Engineering Materials B	32	2	24	8		考试 Exam	3	W9-16
SR022304	机械原理 B Mechanical Principle	32	2	32			考试 Exam	4	W1-8
SR022305	测试技术 B Testing Technology B	32	2	26	6		考试 Exam	4	W9-16
SR023049	液压传动 Hydraulic Transmission	32	2	28	4		考试 Exam	4	W9-16
SR022306	工程机械设计基础 Basis of Engineering Machine Design	32	2	32			考试 Exam	5	W1-8
SR023307	电机与拖动 Electrical Machinery & Towage	32	2	32			考试 Exam	5	W9-16
SR024046	钻井与完井工程 Drilling and Completion Engineering	32	2	32			考试 Exam	6	W1-8
SR023042	钻井液工艺原理 Principle of Drilling Fluid Process	32	2	20	12		考试 Exam	6	W9-16
总计 Total		400	25						

工程地质方向 (Engineering Geology) **400 学时** (400 Hours)，**25 学分** (25 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
公共核心课程模块									
SR023308	岩土钻掘工程学 Drilling Engineering	48	3	40	8		考试 Exam	6	W1-12
DR023008	钢筋混凝土结构原理 Principles of Reinforced Concrete Structures	32	2	32			考试 Exam	6	W1-8
SR023041	基础工程 Foundation Engineering	32	2	32			考试 Exam	6	W9-16
SR024048	岩土工程施工 Construction of Geotechnical Engineering	32	2	26	6		考试 Exam	6	W9-16
工程地质模块									
SR023061	第四纪地质与地貌学 Quaternary Geology and Geomorphology	32	2	32			考试 Exam	3	W9-16
SR023057	工程地质学 Engineering Geology	64	4	56	8		考试 Exam	4	W1-16
SR023056	水文地质学基础 Fundamentals of hydrogeology	32	2	32			考试 Exam	4	W9-16
SR023239	地质灾害防治 A Geologic Hazard Control A	32	2	32			考试 Exam	5	W1-8
SR024054	工程物探 Engineering Physical Exploration	32	2	32			考试 Exam	5	W9-16
SR023070	工程地质勘察 Engineering Geological Investigation	32	2	32			考试 Exam	6	W1-8
SR023309	岩土工程原位测试技术 In-site Testing of Geotechnical	32	2	16	16		考查 Term paper	6	W9-16
总计 Total		400	25						

5、专业拓展课程 (Specialized Development Courses)：

岩土钻掘工程方向 (Geotechnical Drilling and Excavation Engineering)：任选 96 学时 (96 Hours)，6 学分 (6 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
公共拓展课程模块									
SS024318	地质工程前沿 Geological Engineering Frontiers	16	1	16			考查 Term paper	7	
SR023051	地质工程专业英语 Specialty English for Geological Engineering	16	1	16			考查 Term paper	7	
DR024007	菲迪克合同条件与项目管理（双语） FIDIC Terms of Contract and Project Management	32	2	32			考查 Term paper	7	
SR024238	工程项目管理与法规 Engineering Project Management and Regulations	32	2	32			考查 Term paper	7	
SS024257	非开挖技术概论 Introduction to Trenchless Technology	32	2	32			考查 Term paper	7	
SR024053	锚固技术与支挡工程 Anchor Technology and Retaining Engineering	32	2	32			考试 Exam	7	
SR023064	工程地震导论 Engineering Earthquake	16	1	16			考查 Term paper	7	
SS024319	地质工程与人工智能 Geo-engineering and Artificial Intelligence	16	1	16			考查 Term paper	7	
岩土钻掘工程模块									
SS024310	地热资源勘探开发技术 Exploration and Development and Utilization of Geothermal	16	1	16			考查 Term paper	7	
SS024311	极地与海洋钻探技术 Polar and Offshore Drilling Techniques	16	1	16			考查 Term paper	7	
SS024312	非常规油气勘探与开发 Unconventional Oil and Gas Exploration and Development	16	1	16			考查 Term paper	7	
SS024313	石油工程概论 Introduction to Petroleum Engineering	16	1	16			考查 Term paper	7	
SS024314	高分子材料 Organic and Polymer Material	16	1	16			考查 Term paper	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS024315	钻探设备 Drilling Equipment	16	1	16			考查 Term paper	7	
SS024316	碎岩技术 Rock breaking Technology	16	1	16			考查 Term paper	7	
SS024317	压裂技术 Fracturing Technology	16	1	16			考查 Term paper	7	
总计 Total		96	6						

工程地质方向 (Engineering Geology)：**任选 96 学时** (96 Hours)，**6 学分** (6 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
公共拓展课程模块									
SS024318	地质工程前沿 Geological Engineering Frontiers	16	1	16			考查 Term paper	7	
SR023051	地质工程专业英语 Specialty English for Geological Engineering	16	1	16			考查 Term paper	7	
DR024007	菲迪克合同条件与项目管理（双语） FIDIC Terms of Contract and Project Management	32	2	32			考查 Term paper	7	
SR024238	工程项目管理与法规 Engineering Project Management and Regulations	32	2	32			考查 Term paper	7	
SS024257	非开挖技术概论 Introduction to Trenchless Technology	32	2	32			考查 Term paper	7	
SR024053	锚固技术与支挡工程 Anchor Technology and Retaining Engineering	32	2	32			考试 Exam	7	
SR023064	工程地震导论 Engineering Earthquake	16	1	16			考查 Term paper	7	
SS024319	地质工程与人工智能 Geo-engineering and Artificial Intelligence	16	1	16			考查 Term paper	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
工程地质模块									
SS024320	地质灾害监测预警理论与方法 Theory and Method of Monitoring and Prewarning for Geological Disaster	16	1	16			考查 Term paper	7	
SS024321	地理信息系统 Geographical Information System	16	1	16			考查 Term paper	7	
SR023059	地下水动力学 Dynamics of Groundwater	32	2	32			考查 Term paper	7	
SS024322	工程地质数值模拟 Fundamental of Numerical Simulation in Engineering Geology	24	1.5	20	4		考查 Term paper	7	
SS024323	现代遥感技术 Modern remote sensing technology	32	2	16	16		考查 Term paper	7	
SS024324	环境地质学 Environmental Geology	32	2	32			考查 Term paper	7	
SS024325	地质素描基础 Geological Sketch	32	2	32			考查 Term paper	7	
SS024326	大地构造学 Geotechnology	32	2	32			考查 Term paper	7	
总计 Total		96	6						

6、**课程实践** (Course Practice)：

岩土钻掘工程方向 (Geotechnical Drilling and Excavation Engineering)：42 **周** +128 **学时** (42 weeks and 128 hours)，34 **学分** (34 Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
公共实践模块						
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理（1） Physics Experiments(1)	24 学时	1	考试 Exam	2	
PR192046	实验物理（2） Physics Experiments(2)	24 学时	1	考试 Exam	3	
PR191047	实验化学 Chemistry Experiments	48 学时	2	考试 Exam	2	
PR022099	金工实习 Metalworking Practice	1 周	1	考查 Term Paper	2 夏	
PR011044	北戴河地质认识实习 Geological Field Survey in Beidaihe	2 周	2	考查 Term Paper	1 夏	
PR012047	周口店地质教学实习 Geological Field Survey in Zhoukoudian	4 周	4	考查 Term Paper	2 夏	
PR122059	测量实习 Engineering Measuring	1 周	1	考查 Term Paper	2	
PR023327	工程 CAD 实训 Training of Engineering CAD	3 周	1.5	考查 Term Paper	5	W9-16
PR023116	钢筋混凝土课程设计 Design of Reinforced concrete structures	1 周	0.5	考查 Term Paper	6	W9-16
PR023271	基础工程课程设计 Foundation engineering course design	1 周	1	考查 Term Paper	7	W1-8
PR022328	地质工程认识实习 Geological Engineering Awareness Practice	2 周	2	考查 Term Paper	2 夏	
PR023329	地质工程生产实习 Geological Engineering Production Practice	5 周	5	考查 Term Paper	3 夏	
PR024330	地质工程毕业实习 Geological Engineering Graduation Practice	4 周	6	考查 Term Paper	8	
PR024109	地质工程毕业设计（论文） Geological Engineering Graduation Design (Thesis)	12 周		考查 Term Paper	8	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
岩土钻掘工程模块						
PR023331	工程机械设计课程设计 Basic course design of mechanical design	2 周	1	考查 Term Paper	5	W9-16
PR023332	岩土钻掘工程课程设计 Design of Drilling and Excavation Engineering	2 周	1	考查 Term Paper	6	W9-16
总计 Total		42 周 +128 学时	34 学分			

工程地质方向 (Engineering Geology) ：42 **周** +128 **学时** (42 weeks and 128 hours)，34 **学分** (34 Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
公共实践模块						
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理（1） Physics Experiments(1)	24 学时	1	考试 Exam	2	
PR192046	实验物理（2） Physics Experiments(2)	24 学时	1	考试 Exam	3	
PR191047	实验化学 Chemistry Experiments	48 学时	2	考试 Exam	2	
PR022099	金工实习 Metalworking Practice	1 周	1	考查 Term Paper	2 夏	
PR011044	北戴河地质认识实习 Geological Field Survey in Beidaihe	2 周	2	考查 Term Paper	1 夏	
PR012047	周口店地质教学实习 Geological Field Survey in Zhoukoudian	4 周	4	考查 Term Paper	2 夏	
PR122059	测量实习 Engineering Measuring	1 周	1	考查 Term Paper	2	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR023327	工程 CAD 实训 Training of Engineering CAD	3 周	1.5	考查 Term Paper	5	W9-16
PR023116	钢筋混凝土课程设计 Design of Reinforced concrete structures	1 周	0.5	考查 Term Paper	6	W9-16
PR023271	基础工程课程设计 Foundation engineering course design	1 周	1	考查 Term Paper	7	W1-8
PR022328	地质工程认识实习 Geological Engineering Awareness Practice	2 周	2	考查 Term Paper	2 夏	
PR023329	地质工程生产实习 Geological Engineering Production Practice	5 周	5	考查 Term Paper	3 夏	
PR024330	地质工程毕业实习 Geological Engineering Graduation Practice	4 周	6	考查 Term Paper	8	
PR024109	地质工程毕业设计（论文） Geological Engineering Graduation Design (Thesis)	12 周		考查 Term Paper	8	
工程地质模块						
PR023333	地质灾害与防治课程设计 Design of Geologic Hazard Control	2 周	1	考查 Term Paper	5	W9-16
PR023334	工程地质勘察课程设计 Design of engineering Geological Investigation	2 周	1	考查 Term Paper	6	W9-16
总计 Total		42 周 +128 学时	34 学分			

7、**课外实践** (Extracurricular practice)：6 **学分** (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

安全工程专业培养方案

一、专业培养目标

本专业面向国民经济建设和社会发展需求，培养德、智、体、美、劳全面发展，具备优良的思想政治素质、人文与自然科学素养，掌握安全科学、安全管理、安全技术和职业健康等方面的理论知识和技能，能够在安全技术及工程、安全监察与管理、应急管理与救援、安全教育与培训、安全评价与咨询、职业健康监测、安全科学研究等领域，从事研究、管理、监察、设计、检测、评价与培训等工作的“管理+技术”型高级专业人才。经过5年左右的实际工作，能够承担企业或政府部门安全管理或技术岗位的工作。目标分解如下：

（1）具有优良的思想政治素质和人文素养，具有艰苦朴素、求真务实的优良品质，具有强烈的社会责任感与崇高的职业道德精神。

（2）掌握数学、自然科学以及相应的工程基础知识，掌握安全科学、安全管理、安全技术和职业健康等方面的知识和技能。

（3）具有系统性思维、创新性潜质和国际化视野，具有较强的团队合作精神、领导力以及交流能力。

（4）具有终身学习的理念，并通过继续教育或其它学习途径能够自我更新知识和提升能力，以不断适应社会发展和环境变化。

（5）具备自主学习、研究和解决安全工程专业复杂工程问题的能力，具备利用先进的工具对安全工程专业复杂工程问题进行分析、监测、预测、评价以及防治的能力。

二、毕业要求

安全工程专业在我校“特色加精品”的办学理念要求下，旨在培养“品德优良、基础厚实、知识广博、专业精深”的安全工程专业人才。依据国家“卓越工程师培养计划”要求、国际工程教育专业认证以及国家专业目录和专业规范要求，坚持以学生全面发展为宗旨，通识教育、专业教育相结合与创新创业教育相结合，长远目标和就业目标相结合，优化课程体系，制定了全面、详细的培养方案。经过四年学习，毕业生应获得以下几方面的知识、能力和素质：

（1）工程知识：具备应用数学、自然科学、工程基础和安全工程专业知识解决现代社会发展所面临的安全工程专业复杂工程问题的能力。掌握数学、自然科学、工程基础知识与安全工程专业知识，用于安全工程问题的表述；能针对具体安全工程问题应用专业知识进行分析与处理；能够提出解决安全工程专业复杂工程问题的可行方案，并进行比较与综合。

（2）问题分析：能够应用所学的数学、自然科学、工程科学和安全科学的基本原理，识别、表达、并能通过中外文献检索、资料查询及运用现代信息技术了解安全工程专业问题的研究现状、解决方法，分析各相关领域中安全工程、职业健康等方面的复杂工程问题，以获得有效结论。能够将数学、自然科学、工程科学和安全科学的基本原理和逻辑思维，识别和判断安全工程专业复杂工程问题的关键环节，并基于相关科学原理正确表达；能够通过信息检索、中外文献研究分析和相关科学、工程原理，识别安全工程专业复杂工程问题的多种解决方案，并能够寻求解决问题的有效途径和可替代的解决方案；借助数学、自然科学、工程科学知识和文献资料，能够研究、分析安全工程、职业健康等方面复杂工程方案中的影响因素、关键环节和方案可行性，并进行多方案的技术经济对比分析和获得有效结论。

（3）设计/开发解决方案：能够针对工矿企业或建筑施工、石油化工、企业生产与经营、公共安全等现代社会发展领域中的复杂安全工程问题，综合运用安全工程理论和技术手段设计满足特定需求的安全工程、安全管理控制等系统和过程，以及针对具体安全工程问题的专项技术方案，并

能够在设计环节中体现创新意识考虑社会、健康、安全、法律、文化及环境因素。针对工矿企业或建筑施工、石油化工、企业生产与经营、公共安全等现代社会发展领域中的安全工程专业复杂工程问题，能够掌握安全工程相关技术手段，了解影响设计目标和技术方案的各种因素；能够针对安全工程实践的特定需求，完成设计方案、技术方案等关键环节的设计，并能够在设计环节考虑新技术、新理念，体现创新意识；能够针对不同的安全工程实践需求在设计方案中考虑社会、安全、健康、法律、文化以及环境等因素，制定出满足国家及社会经济建设需求的合理方案。

（4）研究：能够基于科学原理并采用科学方法对安全工程专业复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。能够运用科学原理，通过文献研究和相关方法，调研、分析安全工程专业复杂工程问题的关键技术和解决方案；基于安全工程专业理论、针对安全工程专业复杂工程问题选择合理的技术路线、设计实验方案，进行创新型实验，包括实验组织、数据获取、数据处理；能够对实验数据进行分析与解释，并通过信息综合得到合理有效的结论。

（5）使用现代工具：能够针对安全工程专业复杂工程问题，开发、选择与使用恰当的技术手段、计算机模拟及仿真技术、相关资源、现代工程工具和信息技术工具，包括对安全工程专业复杂工程问题的预测与模拟，并能够理解其局限性。掌握现在安全工程相关仪器、设备和先进信息处理技术工具，能够针对安全工程复杂工程问题，选择、使用恰当的技术手段、计算机模拟及仿真技术、相关资源、现代工具以及信息技术工具，理解其局限性，能对复杂工程问题进行分析、计算和设计；针对安全工程复杂工程问题方案，能够选择、使用专业软硬件工具，开发满足特定需求的专门工具，用于工程方案的优化、预测和模拟，并理解其局限性。

（6）工程与社会：熟悉安全工程专业领域相关的国家、行业标准、工程技术规范和国家相关政策及法律法规，能够基于工程背景知识进行合理分析，评价安全工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。理解安全工程的社会作用及安全工程活动对社会、健康、安全、法律及文化的影响；在安全工程实践中具备综合考虑多种制约因素的意识，能够合理的分析、评价和解决安全工程活动对社会、健康、安全、法律以及文化等方面可能产生的风险，并理解应承担的责任。

（7）环境和可持续发展：能够理解和评价针对安全工程实践对环境、社会可持续发展的影响。理解和评价安全工程实践对环境保护、社会可持续发展的影响，认识工程实践在环境保护和可持续发展中的地位和作用；了解安全工程实践与环境保护和可持续发展等方面相关的方针政策、法律法规，理解和评价工程实践对环境、社会可持续发展造成的损害和隐患，并制定合理策略降低对人类和环境造成的损害和隐患。

（8）职业规范：具有坚定正确的政治方向和世界观、人生观、价值观；具有较好的人文社会科学素养、较强的社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任；掌握科学锻炼身体的基本技能，受到必要的军事训练，具有良好的身体、心理素质。了解中国国情，具有爱国主义情怀和人文社会科学素养，理解个人与社会的关系，树立正确的世界观、人生观、价值观；具备法律意识和社会责任感，理解安全工程领域工作的职业性质，掌握行业相关的规范和法规，在工程实践中自觉遵守职业道德和法律法规。

（9）个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色，具有一定的组织管理能力、表达能力、人际交往能力以及在团队中发挥作用的能力。具备良好的组织协调能力、表达能力和人际交往能力，能够与其他学科的成员有效沟通与合作；能够独立承担安全工程的专项任务，能够在多学科组成的团队中承担个体、团队成员或负责人的角色。

（10）沟通：能够就安全工程专业复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。能够运用安全工程及相关领域的知识，针对安全工程专业复杂工程问题

与业界同行、社会公众进行有效沟通、交流和回应质疑，掌握研究报告的绘制撰写方法和陈述发言技巧；了解安全工程学科的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性，具备一定的国际视野。

（11）项目管理：理解并掌握工程管理原理与经济决策方法，能够将系统思维和方法用于安全检测、工程设计、评估、监测、应急等实践活动，并能在多学科环境中应用，具备从事公共安全、工矿企业或建筑施工、石油化工、企业生产与经营等多学科环境的安全方案设计、安全生产组织、安全教育和管理等的基本能力。理解并掌握安全工程管理原理与经济决策方法；能够在多学科环境下，将系统思维和方法用于安全检测、工程设计、评估、监测、应急等实践活动，具备从事公共安全、工矿企业或建筑施工、石油化工、企业生产与经营等多学科环境的安全方案设计、安全生产组织、安全教育和管理等的基本能力。

（12）终身学习：能够针对安全工程行业的变化需求，具有自主学习和终身学习的意识，掌握自主有效的学习方法；具备综合应用各种手段收集资料、拓展专业知识领域、不断学习、适应安全工程新发展的能力。对于自我探索和学习的必要性有正确的认识，并能表现出自我探索和学习成效；具有自主学习的能力，不断学习、适应安全工程发展，具备对不断变化的技术问题的理解、归纳总结和提出问题等能力。

三、主干学科

安全科学与工程。

四、学制与学位

学制四年。学生修满规定的最低毕业学分，达到毕业要求后，授予理学学士学位。

五、核心课程

专业核心课程：职业卫生工程学、毒害控制与辐射安全、安全人机工程、电气与机械安全工程学、特种设备安全、防火防爆工程学、消防工程、通风工程学、矿山灾害防治、建筑安全工程学、危险化学品管理、石油化工安全、应急管理与救援。

主要实践性教学课程：教学实习、矿山安全设计、防火防爆课程设计、安全评价实习、压力容器安全设计、工程 CAD 制图实训、工业通风设计、职业卫生设计、消防工程课程设计、专业实习、建筑安全工程实习、危险化学品实习、石油化工安全实习、特种设备安全实习、安全工程毕业设计（论文）。

Undergraduate Program in Safety Engineering

1. Academic Objectives

To meet the needs of national economic construction and social development, this major cultivates "management-technology" type high-level professionals, which is engaged in the research, management, supervision, design, test, evaluation and training etc. in safety technology and engineering, safety supervision and management, emergency management and rescue, safety education and training, safety evaluation and consultation, occupational safety and health monitoring, scientific research and other fields. Their morality, intelligence, physical education, beauty and labor will be fully developed, they will possess excellent ideological and political quality, humanistic and natural science literacy and master theoretical knowledge and skills of safety science, safety management, safety technology and occupational health, etc. After about 5 years of practical work, they can be able to undertake safety management or technical positions in enterprises or government departments. The objective is broken down as follows:

(1) Students will have an excellent ideological and political quality and humanistic quality, a fine quality of hard work and plain living, realistic and pragmatic and a strong sense of social responsibility and lofty professional ethics.

(2) Students will master mathematics, natural science and the corresponding basic knowledge of engineering, and master the knowledge and skills of safety science, safety management, safety technology and occupational health.

(3) Students will have systematic thinking, innovative potential, international vision, strong team spirit, leadership and communication skills.

(4) Students will have the concept of lifelong learning, as well as be able to update their knowledge and improve their abilities through a continuing education or other learning channels so that they can constantly adapt to social development and environmental changes.

(5) Students will have the ability to independently study, research and solve complex engineering problems in safety engineering, as well as the ability to analyze, monitor, predict, evaluate and prevent complex engineering problems in safety engineering with advanced tools.

2. Graduation Requirements

Under the educational philosophy of "characteristic plus quality" of our school, the safety engineering major aims at cultivating safety engineering professionals with "good moral character, solid foundation, extensive knowledge and profound specialty". Accordance with the requirements of national "outstanding engineers training plan", the international engineering education professional certification and the national specialty catalog and specification requirements, this major adheres to the objective of students' all-round development, the combination of general education, professional education and innovation entrepreneurship education, the combination of long-term goals and employment goals and the optimization of curriculum system, a comprehensive and detailed training plan is set up.

After four years of study, graduates should acquire the following knowledge, ability and quality:

(1) Knowledge of engineering: Students are required to have the ability to apply mathematics, natural science, engineering foundation and safety engineering expertise to solve complex engineering problems generated by modern social development. Students should master basic knowledge of mathematics, natural science, engineering and professional knowledge of safety engineering for the presentation of safety engineering problems. Students can apply their professional knowledge to analyze and deal with specific safety engineering problems. Students are able to propose feasible solutions to complex engineering problems in the safety engineering major, and compare and synthesize them.

(2) Problem Analysis: Students are required to apply mathematics, natural science, engineering science,

and the basic principle of safety science to identify and express information, they need to understand the research status and solutions of safety engineering professional problems through Chinese and foreign literature search, data query and the use of modern information technology, as well as analyze complex engineering problems in various related fields, such as safety engineering and occupational health, so as to obtain effective conclusions. Students are able to identify and judge the key links of complex engineering problems in safety engineering majors by applying the basic principles and logical thinking of mathematics, natural science, engineering science and safety science, and correctly express them based on relevant scientific principles. Students can identify multiple solutions to complex engineering problems in safety engineering majors through information retrieval, Chinese and foreign literature research and analysis, and related scientific and engineering principles, and seek effective ways and alternative solutions to solve problems. With the help of mathematics, natural science, engineering science knowledge and literature materials, students can study and analyze the influencing factors, key links and feasibility of complex engineering schemes in safety engineering and occupational health, and carry out technical and economic comparative analysis of multiple schemes and obtain effective conclusions.

(3) Design/develop solutions: Students are required to industrial and mining enterprises or construction, petrochemical industry, enterprise production and management, public safety and other modern complex safety engineering issue in the field of social development, the integrated use of theory of safety engineering and technology design to meet the specific needs of the safety engineering, safety management control systems and processes, as well as special technical solutions for specific safety engineering problem, and can be innovative in the design process considering social, health, safety, legal, cultural and environmental factors. Aiming at the complex engineering problems of safety engineering major in the fields of modern social development such as industrial and mining enterprises or construction, petrochemical industry, enterprise production and operation, public safety and so on, students can master the relevant technical means of safety engineering and understand the various factors that affect the design objectives and technical solutions. Students can complete the design of design scheme, technical scheme and other key links according to the specific requirements of safety engineering practice, and can consider new technologies and new ideas in the design process, reflecting the sense of innovation. Students are able to take social, safety, health, legal, cultural and environmental factors into consideration in the design scheme according to different safety engineering practice needs, and develop reasonable schemes to meet the needs of national and social and economic construction.

(4) Research: Students are required to research complex engineering problems in safety engineering based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, and drawing reasonable and effective conclusions through information synthesis. Students are required to apply scientific principles to research and analyze key technologies and solutions to complex engineering problems in safety engineering specialisms through literature research or related methods. Students can choose a reasonable research route and design an experimental programme based on safety engineering professional theories and for complex engineering problems in safety engineering, and conduct innovative experiments, including experimental organisation, data acquisition and data processing. Students are able to analyze and interpret experimental data and obtain reasonable and valid conclusions through information synthesis.

(5) Use modern tools: Students are required to develop, select and use appropriate technical means, computer simulation and simulation technology, related resources, modern engineering tools and information technology tools for complex engineering problems in the safety engineering major, including prediction and simulation of complex engineering problems in the safety engineering major, and understand their limitations. students are required to master relevant instruments now safety engineering tools, equipment, and advanced information processing technology, can according to safety engineering complex engineering problem, selection and use of appropriate technology, computer modeling and simulation technology, the

related resources, modern tools and information technology tools, understand its limits, to analyze the complex engineering problems, calculation and design. Students are required to select and use professional software and hardware tools to solve complex engineering problems in safety engineering, develop specialized tools to meet specific requirements for optimization, prediction and simulation of engineering solutions, and understand their limitations.

(6) Engineering and Society: Students are required to be familiar with national and industry standards in the fields of safety engineering, engineering specifications and relevant national policies and laws and regulations, they can carry on the reasonable analysis based on the engineering background, evaluation of safety engineering practice and complex engineering solutions to problems of social, health, safety, and legal and the influence of culture, and understand the responsibility. Students are required to understand the social role of safety engineering and the social, health, safety, legal and cultural impacts of safety engineering activities. Students are required to have an awareness of the multiple constraints in safety engineering practice, be able to reasonably analyze, evaluate and address the social, health, safety, legal and cultural risks that may arise from safety engineering activities, and understand their responsibilities.

(7) Environment and sustainable development: Students are required to understand and evaluate the impact of safety engineering practice on environmental protection and sustainable development of society. Students are required to understand and evaluate the impact of safety engineering practice on environmental protection and sustainable development of society, and recognize the status and role of engineering practice in environmental protection and sustainable development. Students are required to understand the policies, laws and regulations related to safety engineering practice and environmental protection and sustainable development, etc. as well as to understand and evaluate the damage and potential hazards caused by engineering practice to the environment and sustainable development of society and develop reasonable strategies to reduce the damage and potential hazards caused to humans and the environment.

(8) Professional Standards: Students are required to have a firm and correct political direction, world outlook, outlook on life and values and have good humanistic and social science literacy, strong sense of social responsibility, they are able to understand and abide by engineering professional ethics and norms in engineering practice and fulfill responsibilities. They can master the basic skills of scientific physical exercise, receive necessary military training and have good physical and psychological quality. Students are required to Understand China's national conditions, have patriotism and humanities and social science literacy, understand the relationship between the individual and society, and establish a correct world view, outlook on life and values. Students are required to possess a sense of legal awareness and social responsibility, and understand the occupational nature of work in the safety engineering field, and master the relevant codes and regulations of the safety engineering industry, and consciously abide by professional ethics and laws and regulations in engineering practice.

(9) Individual and Team：Students are required to play the roles of individual, team member and leader in a multi-disciplinary team, with certain organizational and management skills, expression skills, interpersonal skills and the ability to play a role in the team. Students are required to good organizational and coordination skills, presentation and interpersonal skills, and the ability to communicate and cooperate effectively with members of other disciplines. Students are required to ability to independently undertake special tasks in safety engineering and to assume the role of individual, team member or leader in a multidisciplinary team.

(10) Communication：Students are required to be able to effectively communicate with industry colleagues and the public on complex engineering issues in the safety engineering profession, including writing reports and design documents, making presentations, and clearly expressing or responding to instructions, they need to have a certain international vision so that they can communicate and exchange in the cross-cultural background. Students can use the knowledge of safety engineering and related fields to effectively communicate, exchange and respond to questions with their peers in the industry and the public

regarding complex engineering problems in the safety engineering specialty, and master the methods of drawing and writing research reports and the skills of presentation and presentation. Students are required to understand the international development trends and research hotspots of civil engineering disciplines, understand and respect the differences and diversity of different cultures in the world, and have a certain international perspective.

(11) Project Management: Students are required to understand and master the principles of project management and economic decision-making methods, as well as can apply systems thinking and methods to practical activities such as safety inspection, engineering design, evaluation, monitoring, emergency response and apply them in a multidisciplinary environment, they should have the basic ability of safety program design, safety production organization, safety education and management in the multidisciplinary environment of public safety, industrial and mining enterprises or construction, petrochemical industry and enterprise production and operation. Students are required to understand and master the principles of safety engineering management and economic decision-making methods. In a multidisciplinary environment, students can apply system thinking and method for safety testing, engineering design, evaluation, monitoring and emergency practice and possess the basic ability to engage in safety program design, safety production organization, safety education and management in multidisciplinary environments, such as public safety, industrial and mining enterprises or building construction, petrochemicals, enterprise production and operation, etc.

(12) Lifelong Learning: Students are required to have the awareness of autonomous learning and lifelong learning, and master autonomous and effective learning methods to meet the changing needs of the safety engineering industry; as well as have the ability to collect data, expand professional knowledge, learn constantly and adapt to new development of safety engineering by comprehensive application of various means. Students are required to have a sound understanding of the need for self-exploration and learning, and be able to demonstrate the effectiveness of self-exploration and learning. Students are required to have the ability to learn on their own, to continuously learn and adapt to safety engineering developments, to understand, summarize, and ask questions about changing technical issues.

3. Main disciplines

Safety Science and Engineering.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Professional core courses: Engineering of Occupational Health, Poison Control and Radiation Protection, Safety Ergonomics, Electric and Mechanic Safety Engineering, Special Purpose Equipment Safety, Fire and Explosion Prevention, Construction Fire Prevention Engineering, Ventilation Engineering, Mine Safety, Construction Safety Engineering, Hazardous Chemicals Management, Petrochemical Safety, Emergency Management and Rescue.

Main practical teaching courses: Teaching Practice, Design of Mine Safety, Design of Fire & Explosion Prevention, Practice on Safety Assessment, Design of Pressure Vessel Safety, Mechanical CAD Training, Design of Ventilation Systems, Design of Occupational Health, Design of Fire Prevention, Professional Practice, Practice on Construction Safety, Practice on Hazardous Chemicals and Oil Industrial Safety, Practice on Petrochemical Safety, Practice on Special Purpose Equipment Safety, Graduation Design (Thesis).

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification	学时数 Hours	学分 Credits	学 期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	40	11.25	13.25		4.25	5.25	1	3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	880	55	13	10.5		11.5	11		7	2			
	专业核心课程 Specialized Fundamental Courses	400	25							9	11		5	
	专业拓展课程 Specialized Development	64	4											
实践教育 Practical Education	课程实践 Course Practice	37 周 +128 学时	37		3	4	1		4	8	4	5	2	6
	课外实践 Extracurricular practice	--	6	--										
必修课总学分 Required course credits				157										
选修课总学分 Elective course credits				22										
最低毕业总学分 Total Credits				179										

七、课程设置 (Curriculum)

1、通识教育必修课程 (Required Courses of General Education)：730 学时 (730 Hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR183004	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	64	4	48	16		考试 Exam	4	
GR181012	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形势与政策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形势与政策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形势与政策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形势与政策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形势与政策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形势与政策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形势与政策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育(1) Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303005	大学生心理素质教育(2) Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	2 夏	
GR081071	大学英语（1） College English(1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English(2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education(2)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education(3)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education(4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	40	492	222	16			

2、**通识教育选修** (Selective Courses of General Education)：192 **学时** (192Hours)，12 **学分** (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类（含在线课程） Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5-6	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-4	
总计 Total			12			

3、学科基础课程 (Disciplinary Fundamental Courses)：880 学时（880 Hours)，55 学分 (55 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR191003	高等数学 B（1） Advanced Mathematics B(1)	96	6	96			考试 Exam	1	
DR191004	高等数学 B（2） Advanced Mathematics B(2)	64	4	64			考试 Exam	2	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	
DR191008	大学物理（1） College Physics (1)	48	3	48			考试 Exam	2	
DR192009	大学物理（2） College Physics (2)	48	3	48			考试 Exam	3	
DR191010	大学化学 College Chemistry	48	3	48			考试 Exam	1	
DR192012	分析化学 Analytical Chemistry	56	3.5	44	12		考试 Exam	3	
DR021002	工程图学 Engineering Drawing	48	3	48			考试 Exam	1	
DR042127	电工电子技术 B Electrical and Electronic Technology B	48	3	34	14		考试 Exam	3	
DR021029	工程力学 Engineering Mechanics	56	3.5	52	4		考试 Exam	2	
DR022335	工程热力学 Engineering Thermodynamics	32	2	30	2		考试 Exam	4	
DR022031	安全法律与法规 Laws and Regulation on Safety	32	2	30	2		考查 Term Pape	4	
DR022032	可靠性理论 Reliability Theory	32	2	30	2		考试 Exam	4	
DR023336	安全监测与控制 Safety Surveillance and Control	32	2	26	6		考试 Exam	5	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR022005	工程流体力学 Engineering Fluid Mechanics	32	2	28	4		考试 Exam	4	
DR023034	系统安全工程 System Safety Engineering	48	3	44	4		考试 Exam	5	
DR023036	安全管理学 Safety Management	32	2	30	2		考试 Exam	6	
DR023037	安全行为学 Safety Psychology and Behavior Science	32	2	30	2		考试 Exam	5	
DR020007	安全工程专业导论 Introduction to Safety Engineering	16	1	16			考查 Term Paper	1	
总计 Total		880	55	826	54				

4、**专业核心课程** (Specialized Core Courses)：400 **学时** (400 Hours)，25 **学分** (25 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR023086	职业卫生工程学 Engineering of Occupational Health	32	2	28	4		考试 Exam	6	
SR023087	毒害控制与辐射安全 Poison Control and Radiation Protection	32	2	32			考试 Exam	6	
SR023088	安全人机工程 Safety Ergonomics	32	2	28	4		考试 Exam	5	
SR023089	电气与机械安全工程学 Electric and Mechanic Safety Engineering	48	3	46	2		考试 Exam	5	
SR023090	特种设备安全 Special Purpose Equipment Safety	32	2	30	2		考试 Exam	5	
SR023091	防火防爆工程学 Fire and Explosion Prevention	32	2	28	4		考试 Exam	5	
SR023092	消防工程 Construction Fire Prevention Engineering	32	2	30	2		考试 Exam	6	
SR023093	通风工程学 Ventilation Engineering	32	2	28	4		考试 Exam	6	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR023337	矿山灾害防治 Mine Disaster Prevention	32	2	32			考试 Exam	6	
SR024095	建筑安全工程学 Construction Safety Engineering	32	2	32			考查 Term Paper	7	
SR024338	危险化学安全品管理 Hazardous Chemicals Safety Management	16	1	16			考查 Term Paper	7	
SR023339	石油化工安全 Petrochemical Safety	16	1	16			考查 Term Paper	6	
SR024098	应急管理与救援 Emergency Management and Rescue	32	2	30	2		考查 Term Paper	7	
总计 Total		400	25	376	24				

5、**专业拓展课程** (Specialized Development Courses)：**任选 64 学时** (64 Hours)，**4 学分** (4Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS023340	安全管理学前沿 Frontier of Safety Management	16	1	16			考查 Term Paper	6	学院内选修
SS024341	智能安全工程 Intelligent Safety Engineering	16	1	16			考查 Term Paper	7	
SR023097	事故调查与案例分析 Accident Investigation and Case Studies	32	2	32			考查 Term Paper	6	
SR024238	工程项目管理与法规 Engineering Project Management and Regulations	32	2	32			考查 Term Paper	7	
SS024342	安全经济学概论 Introduction to Safety Economics	16	1	16			考查 Term Paper	7	
SS024264	地质灾害防治 B Geologic Hazard Control B	24	1.5	24			考查 Term Paper	7	
总计 Total		64	4						

6、**课程实践** (Course Practice)：37 **周** +128 **学时** (37 weeks and 128 hours)，37 **学分** (37 Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理（1） Physics Experiments (1)	24 学时	1	考试 Exam	2	
PR192046	实验物理（2） Physics Experiments (1)	24 学时	1	考试 Exam	3	
PR191047	实验化学 Chemistry Experiments	48 学时	2	考试 Exam	2	
PR022342	安全工程认识实习 Safety Engineering Cognition Practice	4 周	4	考查 Term Paper	2 夏	
PR023343	矿山安全设计 Design of Mine Safety	1 周	1	考查 Term Paper	5	
PR023142	防火防爆课程设计 Design of Fire & Explosion Prevention	1 周	1	考查 Term Paper	5	
PR023143	安全评价实习 Practice on Safety Assessment	2 周	2	考查 Term Paper	5	
PR023144	压力容器安全设计 Design of Pressure Vessel Safety	1 周	1	考查 Term Paper	5	
PR023344	工程 CAD 制图实训 Training of Engineering CAD Drawing	2 周	2	考查 Term Paper	5	
PR023345	工业通风设计 Design of Industrial Ventilation	1 周	1	考查 Term Paper	6	
PR023146	职业卫生设计 Design of Occupational Health	1 周	1	考查 Term Paper	6	
PR023147	消防工程课程设计 Design of Fire Prevention	1 周	1	考查 Term Paper	6	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR023346	安全工程生产实习 Safety Engineering Production Practice	5 周	5	考查 Term Paper	3 夏	
PR024148	建筑安全工程实习 Practice on Construction Safety	1 周	1	考查 Term Paper	7	
PR024347	危险化学品安全管理实习 Practice on Hazardous Chemicals Safety Management	1 周	1	考查 Term Paper	7	
PR023348	石油化工安全实习 Practice on Petrochemical Safety	1 周	1	考查 Term Paper	6	
PR023349	特种设备安全实习 Practice on Special Purpose Equipment Safety	1 周	1	考查 Term Paper	5	
PR024112	安全工程毕业设计（论文） Safety Engineering Graduation Design (Thesis)	12 周	6	考查 Term Paper	8	
总计 Total		37 周 +128 学时	37			

7、**课外实践** (Extracurricular practice)：6 **学分** (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

八、毕业要求与培养目标矩阵（工程教育认证类专业）

毕业要求	培养目标				
	目标 1	目标 2	目标 3	目标 4	目标 5
毕业要求 1		√			√
毕业要求 2		√	√	√	√
毕业要求 3		√	√	√	√
毕业要求 4		√	√	√	√
毕业要求 5				√	√
毕业要求 6	√	√	√	√	√
毕业要求 7	√		√		√
毕业要求 8	√		√		
毕业要求 9	√		√		
毕业要求 10			√		√
毕业要求 11		√	√		√
毕业要求 12	√			√	√

九、课程与毕业要求关系矩阵（工程教育认证类专业）

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计 / 开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
思想道德与法治						L	L	H	M			M
中国近现代史纲要						L		M		L		
马克思主义基本原理								H	M			
毛泽东思想和中国特色社会主义理论体系概论							M	M				L
习近平新时代中国特色社会主义思想概论								M				H
形势与政策							L	M				
大学生职业生涯规划与就业指导												
大学生心理素质教育									M			M
军事理论												
大学英语				M	M					H		L
体育									H	M		
大学计算机	L				M							L
程序设计基础 A	L				M							M
高等数学 B	H											
线性代数	M											
概率论与数理统计	M											
大学物理	M											
大学化学	M											
分析化学	M			M			M					
工程图学	H	H	M									

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
电工电子技术 B	M	M										
工程力学	H	M										
工程热力学	H	M										
安全法律与法规	M	H						H				
可靠性理论	M	H										
安全监测与控制	M	M										
工程流体力学	H	H	L									
系统安全工程	H	H	M			M				M		
安全管理学		H	H	M		M					H	
安全行为学	M	H				M		M				
安全工程专业导论				M				L				
职业卫生工程学		H	H			L						
毒害控制与辐射安全		M	H	M			M					
安全人机工程	M	H	M									
电气与机械安全工程学	M	M	M									
特种设备安全		H	M									
防火防爆工程学	M	H		M			L					
消防工程	M	H					L					
通风工程学	M	H		M								
矿山灾害防治		H		M		M	L					
建筑安全工程学	M	H		M								
危险化学品安全管理			H		M							
石油化工安全			H		M							

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计 / 开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
应急管理与救援		H		M	H	M						
安全管理学前言				M								H
智能安全工程		L	L		M	L						
事故调查与案例分析			L	M		L						
工程项目管理与法规						L					M	
安全经济学概论			L			M						
地质灾害防治 B		M		L	M	L	L					
军事理论及训练									M			M
思想政治社会实践								H				L
实验物理	L				L							
实验化学	M											
安全工程认识实习			H	M	L				M	M		M
矿山安全设计		M	H			L	L					
防火防爆课程设计			H	H	M							
安全评价实习		M			H				M	L		
压力容器安全设计			H	M					M			
工程 CAD 制图实训			H		H							L

毕业要求 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计／开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
工业通风设计			H	H		L						
职业卫生设计			M		H	M	M		M	L		
消防工程课程设计			H		M							
安全工程生产实习	M		H	H	M			M	H	H	M	M
建筑安全工程实习			H	M		M			L			
危险化学品安全管理实习		H	H	M			M		M	M		
石油化工安全实习		H	H	M			M		M	M		
特种设备安全实习												
安全工程毕业设计（论文）			H	H	M	H	M	M		M	H	M
社会实践						H	M		H	M		
科研训练				H							L	M
创业活动							M		H	M		M

注：H 表示课程对毕业要求指标支撑度高；M 表示课程对毕业要求指标支撑度中等；L 表示课程对毕业要求指标支撑度低。