

武汉理工大学资源与环境工程学院  
School of Resources & Environmental Engineering of  
Wuhan University of Technology

# 2014 版本本科培养方案

## Undergraduate Education Plan (2014)

武汉理工大学教务处

Academic Affairs Office of Wuhan University of Technology

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# 【人文地理与城乡规划专业】2014 版本本科培养方案

## Undergraduate Education Plan for Specialty in Human Geography & Urban and Rural Planning (2014)

专业名称	人文地理与城乡规划	主干学科	地理学、规划类
Major	Human Geography & Urban and Rural Planning	Major Disciplines	Geography, Urban and Rural Planning
计划学制	四年	授予学位	理学学士
Duration	4 Years	Degree Granted	Bachelor of Science
所属大类	地理科学类	大类培养年限	2年
Disciplinary	Geography	Duration	2 years

### 最低毕业学分规定

#### Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识课程 Public Basic Courses	学科大类课程 Basic Courses in General Discipline	专业课程 Courses in Specialty	个性课程 Personalized Course	集中性实践 Practice Courses	课外学 Extracurricular Credits	总学分 Total Credits
必修课 Required Courses	35	50.5	36.5		24.5		190
选修课 Elective Courses	9	4	10.5	10		10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirement

##### (一) 培养目标

- (1) 身心健康，具备良好的敬业精神、社会责任感和工程职业道德，关注当代全球和社会问题，具有质量意识、创新意识、环境意识和安全意识。
- (2) 具备从事人文地理与城乡规划领域科学研究、规划设计和管理服务等工作所需的自然科学知识和人文科学知识，并能熟练运用相关技术与方法来解决实际问题。
- (3) 具有综合运用人文地理理论和城乡规划技术从事区域规划、国土规划、城乡规划与建设管理、土地资源管理、生态规划、环境保护等相关工作的能力。
- (4) 精通人文地理和城乡规划方面所要求的基础资料调研、数据整理分析、问题归纳综合、方案制定及实施管理等方法与技术。
- (5) 具有良好的口头和书面表达能力，沟通协调能力和良好的团队意识和合作精神，具有独立思考，终身学习的能力。

#### Educational Objectives

The graduates of the Human geography and urban planning major will:

- a. Be physical and mental health, has the good professional spirit, social responsibility and engineering ethics, and focus on the contemporary global and social issues, quality

consciousness, innovation consciousness, environmental awareness and safety awareness.

- b. Have the required knowledge of natural science and the humanities in the field of human geography and urban-rural planning scientific research, planning and design and management services, and proficiency in the use of related technologies and methods to solve practical problems.
- c. Has the ability to make comprehensive use of theories of human geography and urban and rural planning technology in regional planning, land planning, urban-rural planning and construction management, land resources management, ecological planning, environmental protection and other related work.
- d. Be Skillful at basic data investigation, data analysis, problem induction and synthesis, program formulation, implementation and management and technical method, which is required in the area of human geography and urban-rural planning.
- e. Have good oral and written expression ability, communication and coordination ability, good sense of team spirit and cooperation, independent thinking and the ability of life-long learning.

## (二) 毕业要求

- (1) 学生掌握从事本专业领域所需的自然科学、人文科学、社会科学的相关知识。
- (2) 学生掌握本专业的基本理论知识和方法技术，能够利用原理性知识进行自主发现、自主分析和自主解决与经济区域和城乡规划相关的科学技术问题。
- (3) 学生掌握计算机辅助设计技术，能掌握城乡规划制图的一般方法、步骤和规范。
- (4) 学生具备自然、社会、经济等基础资料调研的能力，以及对相关数据进行分析、发现问题、提出问题、解决问题的能力。
- (5) 学生能够了解国土规划、区域规划、城乡规划、土地规划、生态规划以及景观规划的一般原理、理论与方法。
- (6) 学生具备有关 3S 技术、地理计量与统计、城市系统工程等工具手段的应用能力。
- (7) 学生具备有效进行实验和模拟仿真设计与操作的能力，并能够对实验方案进行分析和解释。
- (8) 学生了解本专业的发展动态和前沿，熟悉人文地理与城乡规划领域的最新技术手段和发展方向。
- (9) 学生具有良好的思想素质、身体素质、心理素质、文化修养、社会道德和责任担当等人文素养。
- (10) 学生了解当代全球问题和社会问题，熟悉国家在规划相关领域的法规、政策及技术规范要求，在各类空间规划与发展规划中综合考虑自然、社会、经济、生态环境、文化历史等制约因素。
- (11) 学生具有逻辑思维和辩证思维的能力，具有批判意识和求真务实的科学思维方法，具有创新意识，掌握基本的创新方法。
- (12) 学生掌握运用现代信息技术跟踪并获取信息的方法，熟练进行文献检索和资料查询。
- (13) 学生具有良好的口头和书面表达和交流能力，至少熟练掌握一门外语进行技术沟通和交流能力。具有良好的团队意识和合作精神。
- (14) 学生能够胜任本专业入门级的职业岗位，具备研究生课程学习所需的认知和基础能力。
- (15) 学生具有进行终身学习的愿望和能力，具有适应人文地理知识和城乡规划理念不断发展的能力。

## Requirement

Graduating students should demonstrate that they attain the following:

- a. The knowledge required to engage in the professional field of natural science, humanities and social science.
- b. The professional basic theories and the technological methods, and the ability to employ the principles to accomplish the process of independent discovery, analysis and solution of the related scientific and technical issues of regional economy and urban-rural planning.
- c. The technique of computer aided design, general methods, procedures and specifications of urban-rural planning charting.
- d. The ability of researching natural, social, economic and other basic data, and the ability of related data analysis, problem discovery, putting forward and solving problems.
- e. The general principles, theories and methods of land planning, regional planning, urban planning, land use planning, ecological planning and landscape planning.
- f. Students have the ability of application of tools about 3S technology, geographic measurement and statistics, urban systems engineering.
- g. The ability to effectively test and simulate design and operation, and the ability to analyze and interpret the experimental scheme.
- h. Understand the development trends and frontier of the professional area, and be familiar with the latest technological tools and development direction of human geography and urban-rural planning field.
- i. Good psychological quality, physical quality, psychological quality, cultural cultivation, social morality and responsibility and other humanistic literacy.
- j. Familiar with the contemporary global and social issues, the national relative laws and regulations, policies and technical specifications in the planning field, and comprehensive consideration of nature, society, economy, ecological environment, cultural and historical constraints in various types of spatial and development planning.
- k. The ability of logical thinking and dialectical thinking and be equipped with critical consciousness, pragmatic scientific methods of thinking, innovative consciousness, and master the basic way of creation.
- l. The ability to employ methods of modern information technology to track and acquire information, and be skilled at document retrieval and data query.
- m. Good oral and written expression and communication skills, mastery of at least one kind of foreign language for technique communication, and having a good sense of team spirit and cooperation.
- n. Qualified for the entry-level of professional post in major field, and have the ability of cognitive and basic study that required by graduate courses.
- o. The desire and ability for lifelong learning, and capability to adapt to continuous development of human geography and urban-rural planning concept.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1	✓	✓	✓	✓	✓
毕业要求 2	✓	✓	✓	✓	✓

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
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		✓	✓	✓	
毕业要求 13					✓
毕业要求 14		✓	✓	✓	
毕业要求 15	✓				✓

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

#### (一) 专业核心课程:

地质学、自然地理学、人文地理学、经济地理学、国土规划、地图学、遥感原理与应用、生态环境规划、地理信息系统原理与应用、城市总体规划、区域分析与规划、资源环境信息系统、城市详细规划、土地评价与土地管理。

Geology, Physical Geography, Human Geography, Economic Geography, Land Planning, Cartography, Principles and applications of Remote Sensing, Ecologic Environment Planning, Principles and Applications of Geographical Information System, Urban Comprehensive Planning, Regional Analyzing and Planning, Resource and Environmental Information System, Urban Detailed Planning, Land Estimating and Management .

#### (二) 专业特色课程:

区域资源与环境实时监测、计量地理学、资源环境信息系统、遥感原理与应用、地理信息系统原理及应用。

Regional Resources and Real-time Monitor, Quantitative Geography, Resource and Environmental Information System, Principles and Applications of Remote, GIS.

附：毕业要求实现矩阵：

专业核心课程	专业特色课程	课程名称	人文地理与城乡规划专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		思想道德修养与法律基础										✓					
		中国近现代史纲要										✓					
		毛泽东思想和中国特色社会主义理论体系概论										✓					
		马克思主义基本原理										✓					

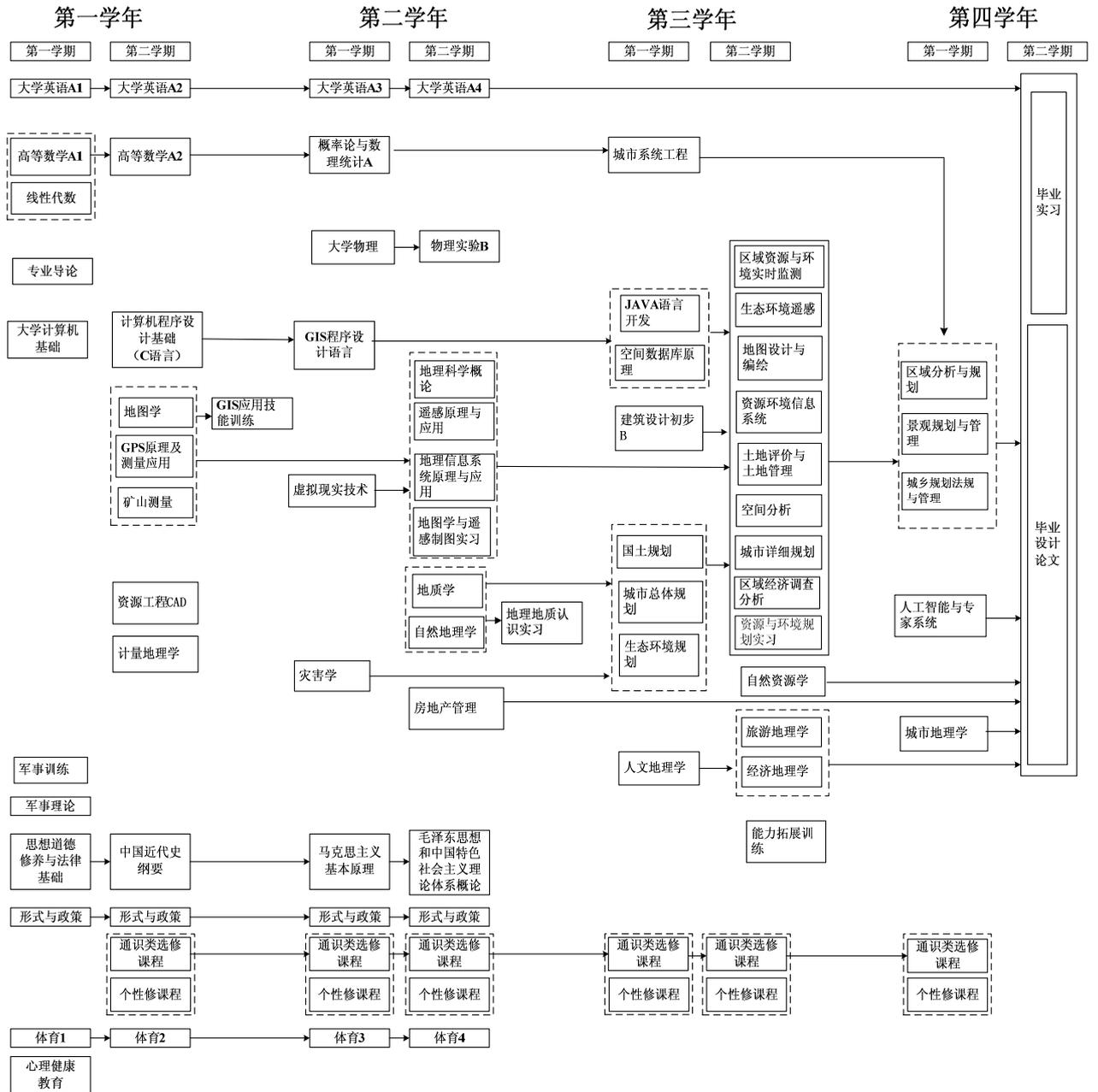
专业 核心 课程	专业 特色 课程	课程名称	人文地理与城乡规划专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		军事理论									√						
		心理健康教育									√						
		体育									√						
		大学英语									√				√		
		大学计算机基础									√						
		计算机程序设计基础(C 语言)		√	√						√						
		专业导论								√	√	√					√
		高等数学	√														
		线性代数	√														
√		计量地理学				√		√									√
√		地图学		√	√					√							
		概率论与数理统计 A	√														
		大学物理	√														
		GIS 程序设计语言			√		√	√									
		物理实验 B	√														
√	√	遥感原理与应用		√				√		√							
√	√	地理信息系统原理与应用		√				√		√							
√		地质学		√		√	√										
√		自然地理学		√		√	√										
		GPS 原理及测量应用				√		√									
		矿山测量				√		√									
		资源工程 CAD		√	√												
		灾害学	√	√													
		虚拟现实技术		√	√				√	√							
		房地产管理	√									√					

专业 核心 课程	专业 特色 课程	课程名称	人文地理与城乡规划专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		地理科学概论		√				√		√							
√		人文地理学		√		√	√										
		空间数据库原理			√			√									√
√		国土规划		√		√	√										
√		城市总体规划		√			√										
		城市系统工程						√									
√		生态环境规划		√			√										
√		经济地理学		√		√	√										
√	√	资源环境信息系统					√	√	√								
√		城市详细规划		√			√										
√		土地评价与土地管理		√			√										
√		区域分析与规划		√			√										
		建筑设计初步 B			√												
		JAVA 语言开发			√												
		地图设计与编绘			√												
		生态环境遥感						√		√							
		空间分析						√									√
√		区域资源与环境实时监测		√		√			√			√					√
		旅游地理学		√	√		√	√									
		自然资源学	√	√	√							√					
		景观规划与管理		√			√										
		城市地理学		√			√										
		城乡规划法规与管理										√					
		人工智能与专家系统						√		√							
		现代城市规划理论流派								√							

专业 核心 课程	专业 特色 课程	课程名称	人文地理与城乡规划专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		武汉市自然地理综合分析方法										√					
		区域分析中的主要数学方法				√	√										
		地理学方法与创新性思维											√				
		定量遥感		√				√									
		军事训练									√						
		GIS 应用技能训练		√		√	√	√	√					√			
		地理地质认识实习		√					√								
		地图学与遥感制图实习		√	√			√	√								
		区域经济调查分析		√			√	√									
		资源与环境规划实习		√		√		√	√			√		√			
		能力拓展训练		√		√		√	√			√		√			
		毕业实习								√		√					
		毕业设计（论文）											√	√	√	√	√

### 三、课程教学进程图

#### III Teaching Process Map



#### 四、理论教学建议进程表

#### IV Theory Course Schedule

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major		
					总学时 Tot hrs.	实验 Exp.	上机 Ope-ration	实践 Prac-tice	课外 Extra-cur					
通 识 课 程  Public Basic Courses	必 修 课  Required Courses	4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1-6				
		4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1-6				
		4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96				32		1-6			
		4220005110	马克思主义基本原理 Marxism Philosophy	3	48				8		1-6			
		1060003130	军事理论 Military Theory	1	32				16		1			
		1050001130	心理健康教育 Mental health education	1	16						1-2			
		4210001110	体育 1 Physical Education I	1	32						1			
		4210002110	体育 2 Physical Education II	1	32						2	体育 1		
		4210003110	体育 3 Physical Education III	1	32						3	体育 2		
		4210004110	体育 4 Physical Education IV	1	32						4	体育 3		
		4030002110	大学英语 A1 College English A I	3	64					16	1			
		4030003110	大学英语 A2 College English A II	3	64					16	2	大学英语 A1		
		4030004110	大学英语 A3 College English A III	3	64					16	3	大学英语 A2		
		4030005110	大学英语 A4 College English A IV	3	64					16	4	大学英语 A3		
		4120017110	大学计算机基础 Foundation of Computer	2	32			12			1			
		4120023110	计算机程序设计基础(C语言) Fundamentals of Computer Program Design(C Language)	3	48			12			2			
		小 计 Subtotal				35	736			24	64	64		
		选 修 课  Elective Courses	创新创业类 Innovation and Entrepreneurship Courses			全校学生要求至少取得 9 个学分，且必须选修艺术体育类课程中的艺术类相关课程，取得至少 2 个学分。理工科专业学生至少选修一门人文社科类或经济管理类课程，其他专业学生至少选修一门科学技术类课程。 All students are required to obtain at least 9 credits, and must select art courses from <i>Art and Physical Education Courses</i> to obtain at least 2 credits. Science and engineering students should select at least one course from <i>Arts and Social Science Courses</i> or <i>Economy and Management Courses</i> , and other students should select at least one course from <i>Science and Technology Courses</i> .								
人文社科类 Arts and Social Science Courses														
经济管理类 Economy and Management Courses														
科学技术类 Science and Technology Courses														
艺术体育类 Art and Physical Education Courses														

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
学 科 大 类 课 程  Basic Disciplinary Courses	必 修 课 Required Courses	4060215110	专业导论 Introduction to Materials Physics	1	16					1			
		4050063110	高等数学 A 上 Advanced Mathematics A I	5	80					1			
		4050229110	线性代数 Linear Algebra	2.5	40					1			
		4050064110	高等数学 A 下 Advanced Mat	5	80					2	高等数学 A 上		
		4060004110	计量地理学 Quantitative Geography	3	48	24				2			
		4060219120	地图学 Cartography	4	64	24				2			
		4050057110	概率论与数理统计 A Probability and Mathematics A	4.5	72					3			
		4060001110	GIS 程序设计语言 GIS Programming Language	3.5	56	24				3			
		4050463130	大学物理 College Physics B	5	80					3			
		4050224110	物理实验 B Physics Lab. B	1	32	32				4	大学物理		
		4060122110	遥感原理与应用 Principles and Applications of Remote Sensing	3.5	56	24				4			
		4060228120	地理信息系统原理与应用 Principles and Applications of Geographical	4	64	28				4	地图学		
		4060027110	地质学 Physical Geology	2.5	40					4			
		4060218120	自然地理学 Physical Geography	2.5	40					4			
		测量课程（二选一，3.5 学分） Surveying course cluster (Select one course, 3.5 credits)											
			4060272120	GPS 原理及测量应用 GPS Principle and Its Application in Surveying	3.5	56		10	16		2		
			4060241120	矿山测量 Mining Geodesy	3.5	56		10	16		2		
		小 计 Subtotal			50.5	824	156	10	16				
	选 修 课 Elective Courses	4060128110	资源工程 CAD Resource Engineering CAD	2	32	24				2			
		4060125110	灾害学 Disaster Science	2	32					3			
		4060277130	虚拟现实技术 Virtual Reality	2	32	16				3			
		4060030110	房地产管理 Real Estate Administration	2	32					4			
		小 计 Subtotal			8	128	40						
修读说明：要求至少选修 4 学分。 NOTE: Minimum subtotal credits:4.													

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
专 业 课 程	必 修 课 Required Courses	4060320130	地理科学概论 Introduction to Geography	2	32					4			
		4060303130	人文地理学 Human Geography	3.5	56	16				5			
		4060068110	空间数据库原理 Spatial Database Principle	3.5	56	24				5			
		4060287130	国土规划 Land Planning	2.5	40					5			
		4060020110	城市总体规划 Comprehensive Urban Planning	3	48					5			
		4060224120	城市系统工程 Urban Systems Engineering	3	48	12				5			
		4060316130	生态环境规划 Ecological Environment Planning	3	48			16		5			
		4060318130	经济地理学 Economic Geography	2	32	8				6			
		4060130110	资源环境信息系统 Resource Environment Information System	3.5	56	24				6	遥感原理与应用 地理信息系统原理与应用		
		4060225120	城市详细规划 Urban Detailed Planning	4	64			32		6			
		4060253120	土地评价与土地管理 Land Estimating and Management	3	48	24				6			
		4060302130	区域分析与规划 Region Analyzing and Planning	3.5	56	24				7			
		小 计 Subtotal				36.5	584	132		48			
		选 修 课 Elective Courses	4130134110	建筑设计初步 B Preliminary Architectural Design B	2	32					5		
	4060222120		JAVA 语言开发 JAVA language	2.5	40		24			5			
	4060281130		地图设计与编绘 Map design and compilation	3	48	40				6	地图学		
	4060321130		生态环境遥感 Eco-Environmental Remote Sensing	3	48	16				6			
	4060237120		空间分析 Spatial Analysis	3	48	24				6	地理信息系统原理与应		
	4060317130		区域资源与环境实时监测 Resources and Environmental Real-time Monitor	3	48	16				6			
	4060095110		旅游地理学 Tourism Geography	2	32					6	自然地理学		
	4060135110		自然资源学 Natural Resource	3	48					6			
	4060065110		景观规划与管理 Landscape Planning and Management	2	32					7	自然地理学		
	4130438130		城市地理学 Urban geography	2.5	40					7			
4060021110	城乡规划法规与管理 Urban and Rural planning Management	2	32					7					

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
		4060100110	人工智能与专家系统 AI & ES	2	32					7			
		小 计 Subtotal		29	464	96	24	96					
修读说明：要求至少选修 10.5 学分。 NOTE: Minimum subtotal credits: 10.5.													
个性化课程 Personalized Course	选修课 Elective Courses	4060321130	武汉市自然地理综合分析方法 Comprehensive Analysis of Natural Geographical Method in Wuhan	1	16				12	2			
		4060322130	区域分析中的主要数学方法 Main Mathematical Methods of Regional Analysis	2	32	16				4			
		4060323130	地理学方法与创新性思维 Geography Method and Creative Thinking	2	32					6			
		4060320130	现代城市规划理论流派 Schools of Modern City Planning Theory	1	16					6			
		4060324130	定量遥感 Quantitative Remote Sensing	2	32	8		8		6			
		小 计 Subtotal		8	128	24		8	12				
		修读说明：学生可跨专业自主选择修读全校其他专业的课程，建议修读以上课程。要求至少选修 10 学分。 NOTE: Students can choose any courses from the other specialties, and are especially suggested to choose the courses above. Minimum subtotal credits: 10.											

## 五、集中性实践教学环节建议进程表

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crs	建议修读学期 Suggested Term	第二专业 Second Major
1060002110	军事训练 Military Training	3	1.5	1	
4060255120	GIS 应用技能训练 Practical Training on GIS	2	2	2	
4060220120	地理地质认识实习 Practice of Understanding Geographic and Geology	2	2	4	
4060282130	地图学与遥感制图实习 Practice of Cartographic and Remote sensing Cartography Experiment	2	2	4	
4060196110	区域经济调查分析 Regional economic Investigation and Analysis	2	2	6	
4060209110	资源与环境规划实习 Practice of Resources and Environmental Planning	2	2	6	
4060190110	能力拓展训练 Ability Development Training	1	1	6	
4060148110	毕业实习 Graduation Practice	2	2	8	
4060256120	毕业设计(论文) Graduation Thesis	15	10	8	
小 计 Subtotal		31	24.5		

## 六、修读指导

### VI Recommendations on Course Studies

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

Situation & Policy, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7<sup>th</sup> term . The course will be arranged by the University Students' Affairs' Department in each school.

学院教学责任人：袁艳斌  
专业培养方案责任人：黄解军

# 【地理信息科学专业】2014 版本本科培养方案

## Undergraduate Education Plan for Specialty in Geographic Information Science (2014)

专业名称	地理信息科学	主干学科	地理学、计算机科学与技术、遥感
Major	Geographic Information Science	Major Disciplines	Geography, Computer science and technology, Remote Sensing
计划学制	四年	授予学位	理学学士
Duration	4 Years	Degree Granted	Bachelor of Science
所属大类	地理科学类	大类培养年限	2年
Disciplinary	Geography	Duration	2 years

### 最低毕业学分规定

#### Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识课程 Public Basic Courses	学科大类课程 Basic Courses in General Discipline	专业课程 Courses in Specialty	个性课程 Personalized Course	集中性实践 Practice Courses	课外学 Extracurricular Credits	总学分 Total Credits
必修课 Required Courses	35	50.5	28	\	27.5		190
选修课 Elective Courses	9	4	16	10	\	10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirement

##### (一) 培养目标

- (1) 身心健康，具备良好的敬业精神、社会责任感和工程职业道德，关注当代全球和社会问题，具有质量意识、环境意识和安全意识。
- (2) 具有从事地理空间信息领域科学研究、工程设计和技术服务等工作所需的数理知识、地理学知识和其它相关自然科学知识，并能将数学和科学工具运用于解决工程问题。
- (3) 具有综合运用科学理论和工程技术分析、设计、开发、测试和应用地理信息系统、遥感处理系统和全球定位系统的能力。
- (4) 精通设计、开发和测试地理信息系统的工具和软硬件技术，解决资源开发与灾害治理、城乡规划、环境保护与管理等领域的实际问题。
- (5) 具有良好的口头和书面表达和交流沟通能力、良好的团队意识和合作精神，具有终身学习的能力。

#### Educational Objectives

The graduates of the Geographic Information System major will:

- a. Be physical and mental health, has the good professional spirit, social responsibility and engineering ethics, and focus on the contemporary global and social issues, quality consciousness, innovation consciousness, environmental awareness and safety awareness.
- b. Have the required knowledge of mathematical knowledge, geography and other related knowledge of Natural Science in the field of geographic spatial information fields of scientific research, engineering

design and technical services, and proficiency in the use of mathematical and scientific tools to solve engineering problems.

- c. Has the ability to make comprehensive use of theories of scientific theory and engineering design, development, testing and the ability of applying geographic information system, remote sensing processing system and global positioning system.
- d. Be proficient in tools and software and hardware technology in design, development and testing of the geographic information system, solving practical problems in fields of resources development and hazard control, urban planning, environmental protection and management etc..
- e. Have good oral and written expression ability, communication and coordination ability, good sense of team spirit and cooperation, independent thinking and the ability of life-long learning.

## (二) 毕业要求

- (1) 学生掌握从事本专业领域所需的数学、地理学、计算机科学、遥感、地图学和管理等知识。
- (2) 学生掌握本专业的基本理论知识和工程基础知识，能够利用原理性知识进行自主发现、自主设计和自主解决与地理信息工程相关的科学问题。
- (3) 学生掌握地理信息系统的设计语言和开发平台，能理解地理信息系统的设计方法和步骤。
- (4) 学生能够设计和实现基于二次开发的应用系统以及实现对地理信息的采集、组织、存储、共享、分析和表达。
- (5) 学生能够理解高级语言和数据结构。
- (6) 学生具备有关地理信息系统、遥感图像处理系统、导航定位系统的应用知识，能理解资源开采、灾害治理、环境保护等领域中地理信息科学和技术的应用模式和技术方法。
- (7) 学生具备有效进行实验和模拟仿真设计与操作的能力，并能够对实验结果进行分析和解释。
- (8) 学生了解本专业的发展动态和前沿，熟悉地理信息科学领域的最新开发工具种类和发展方向。
- (9) 学生具有良好的思想素质、身体素质、心理素质、文化修养、社会道德和责任担当等人文素养。
- (10) 学生了解当代全球问题和社会问题，在工程设计中综合考虑经济、环境、法律、安全和伦理等制约因素。
- (11) 学生具有逻辑思维和辩证思维的能力，具有批判意识和求真务实的科学思维方法，具有创新意识，掌握基本的创新方法。
- (12) 学生掌握运用现代信息技术跟踪并获取信息的方法，熟练进行文献检索和资料查询。
- (13) 学生具有良好的口头和书面表达和交流能力，至少熟练掌握一门外语进行技术沟通和交流能力。具有良好的团队意识和合作精神。
- (14) 学生能够胜任本专业入门级的职业岗位，具备研究生课程学习所需的认知和基础能力。
- (15) 学生具有进行终身学习的愿望和能力，具有适应电子信息技术不断发展的能力。

### Requirement

Graduating students should demonstrate that they attain the following:

- a. The knowledge required to engage in the professional field of mathematics, computer science, geography, cartography, remote sensing and management.
- b. The professional basic theories and knowledge of engineering, and the ability to employ the principles to accomplish the process of independent discovery, analysis and solution of the related scientific and technical issues of geographic information engineering.
- c. The technique of design language and the development platform of geographic information system, design method and step in understanding the geographic information system.
- d. The ability to design and implement application system based on secondary development and to realize of the geographic information acquisition, organization, storage, sharing, analysis and expression.

- e. Understanding the high-level language and data structure.
- f. The knowledge about the application of geographic information system, remote sensing image processing system, navigation and positioning system, understanding geographic information application mode and technical methods in the field of resources exploitation, hazard control, environmental protection science and technology.
- g. Ability to effectively carry out the experiment and simulation design and operation, and be able to analyze and interpret the experimental results.
- h. Grasp the development of dynamic and frontier of the professional field, familiar with the latest the types of development tools and development direction of Geographic Information Science field.
- i. Good psychological quality, physical quality, psychological quality, cultural cultivation, social morality and responsibility and other humanistic literacy.
- j. Familiar with the contemporary global and social issues, comprehensive consideration of economic, environmental, legal, safety and ethical constraints in engineering design.
- k. The ability of logical thinking and dialectical thinking and be equipped with critical consciousness, pragmatic scientific methods of thinking, innovative consciousness, and master the basic way of creation.
- l. The ability to employ methods of modern information technology to track and acquire information, and be skilled at document retrieval and data query.
- m. Good oral and written expression and communication skills, mastery of at least one kind of foreign language for technique communication, and having a good sense of team spirit and cooperation.
- n. Qualified for the entry-level of professional post in major field, and have the ability of cognitive and basic study that required by graduate courses.
- o. The desire and ability for lifelong learning, and capability to adapt to continuous development of human geography and urban-rural planning concept.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 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		✓	✓	✓	
毕业要求 13					✓
毕业要求 14		✓	✓	✓	
毕业要求 15					✓

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

**(一) 专业核心课程:**

自然地理学、空间分析、地图学、空间数据库原理、遥感原理与应用、地理信息系统原理与应用、地理信息系统工程。

Physical Geography, Spatial Analysis, Cartography, Spatial Database Principle, Principles and Applications of Remote Sensing, Principles and Applications of Geographical Information System, and GIS Engineering.

**(二) 专业特色课程:**

资源环境信息系统、计量地理学、矿山 GIS、城市系统工程

Resource Environment Information System, Quantitative Geography, Mine GIS Courses, and Urban Systems Engineering.

附：毕业要求实现矩阵：

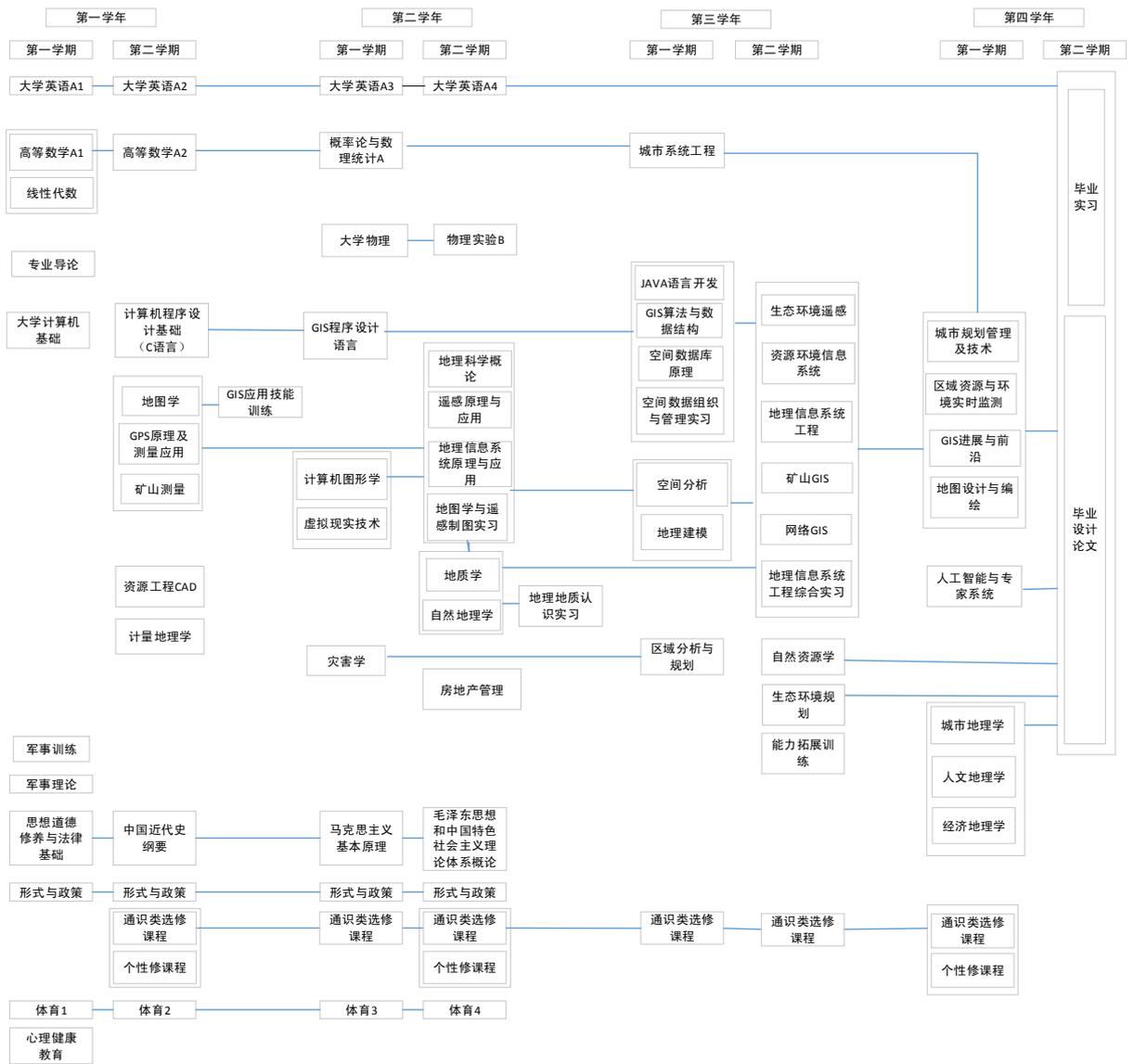
专业核 心课程	专业特 色课程	课程名称	地理信息科学专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law										✓					
		中国近现代史纲要 Outline of Contemporary and Modern Chinese History										✓					
		毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics										✓	✓	✓			
		马克思主义基本原理 Marxism Philosophy										✓	✓	✓			
		军事理论 Military Theory										✓					
		心理健康教育 Mental health education										✓					
		体育 Physical Education										✓					
		大学英语 College English										✓			✓	✓	
		大学计算机基础 Foundation of Computer	✓		✓												✓
		计算机程序设计基础(C语言) Fundamentals of Computer Program Design(C Language)			✓		✓										✓
		专业导论 Introduction to Materials Physics		✓								✓					✓
		高等数学 Advanced Mathematics	✓							✓				✓			
		线性代数 Linear Algebra	✓							✓				✓			
	✓	计量地理学 Quantitative Geography	✓	✓				✓	✓					✓			
✓		地图学 Cartography	✓	✓				✓	✓								✓
		概率论与数理统计 Probability and Mathematics	✓						✓					✓			
		大学物理 College Physics	✓	✓				✓	✓					✓			
		物理实验 B Physics Lab. B	✓	✓				✓	✓					✓			

专业核 心课程	专业特 色课程	课程名称	地理信息科学专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		GIS 程序设计语言 GIS Programming Language	✓		✓	✓	✓										✓
✓		遥感原理与应用 Principles and Applications of Remote Sensing	✓	✓					✓	✓	✓						✓
✓		地理信息系统原理与应用 Principles and Applications of Geographical	✓	✓		✓			✓	✓	✓						✓
		地质学 Physical Geology	✓	✓					✓	✓							
✓		自然地理学 Physical Geography	✓	✓					✓								✓
		GPS 原理及测量应用 GPS Principle and Its Application in Surveying		✓					✓	✓	✓						✓
		矿山测量 Mining Geodesy		✓					✓	✓	✓						✓
		资源工程 CAD Resource Engineering CAD		✓					✓								✓
		灾害学 Disaster Science							✓				✓				
		虚拟现实技术 Virtual Reality	✓			✓			✓	✓							
		房地产管理 Real Estate Administration	✓														✓
		地理科学概论 Introduction to Geography	✓	✓					✓		✓			✓			✓
✓		空间数据库原理 Spatial Database Principle	✓			✓	✓										✓
		GIS 算法与数据结构 Algorithms and Data Structures of GIS		✓	✓	✓	✓										✓
	✓	城市系统工程 Urban Systems Engineering	✓										✓	✓			
✓		空间分析 Spatial Analysis		✓					✓	✓							✓
		生态环境遥感 Eco-Environmental Remote Sensing	✓	✓					✓	✓							
✓		地理信息系统工程 GIS Engineering		✓	✓	✓			✓				✓				✓
	✓	资源环境信息系统 Resource Environment Information System				✓			✓				✓				
		网络 GIS Web GIS							✓		✓						
	✓	矿山 GIS GIS of Mines							✓	✓							
		计算机图形学 Computer Graphics	✓							✓							
		人文地理学 Human Geography	✓	✓									✓				✓
		JAVA 语言开发 JAVA language			✓	✓	✓				✓						
		生态环境规划 Ecological Environment Planning							✓				✓				
		地图设计与编绘 Map Design and Compilation		✓					✓								✓

专业核 心课程	专业特 色课程	课程名称	地理信息科学专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		区域分析与规划 Region Analyzing and Planning		✓				✓									
		经济地理学 Economic Geography	✓	✓													✓
		自然资源学 Natural Resource	✓	✓				✓									
		GIS 进展与前沿 GIS Development								✓			✓				
		区域资源与环境实时监测 Resources and Environmental Real-time Monitor						✓									
		城市规划管理及技术 Urban Planning Management and Technology		✓				✓									✓
		城市地理学 Urban geography	✓	✓				✓									✓
		人工智能与专家系统 AI & ES	✓							✓							
		武汉市自然地理综合分析方法 Comprehensive Analysis of Natural Geographical Method in Wuhan						✓	✓								✓
		区域分析中的主要数学方法 Main Mathematical Methods of Regional Analysis	✓	✓				✓									
		地理学方法与创新性思维 Geography Method and Creative Thinking	✓								✓		✓				✓
		定量遥感 Quantitative Remote Sensing	✓					✓	✓								
		军事训练 Military Training									✓						
		GIS 应用技能训练 Practical Training on GIS		✓				✓	✓								✓
		地理地质认识实习 Practice of Understanding Geographic and	✓					✓	✓								✓
		地图学与遥感制图实习 Practice of Cartographic and Remote	✓	✓				✓		✓							✓
		空间数据组织与管理实习 Practice of Spatial Data Organization and	✓	✓		✓	✓										✓
		地理建模 Geographic modeling		✓				✓	✓			✓					
		地理信息系统工程综合实习 Practice of GIS		✓	✓	✓		✓									
		能力拓展训练 Ability Development Training			✓			✓		✓							
		毕业实习 Graduation Practice		✓					✓	✓						✓	✓
		毕业设计(论文) Graduation Thesis		✓					✓	✓	✓		✓	✓			✓

### 三、课程教学进程图

#### III Teaching Process Map



#### 四、理论教学建议进程表

#### IV Theory Course Schedule

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
通 识 课 程  Public Basic Courses	必 修 课  Required Courses	4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1-6			
		4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1-6			
		4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		1-6			
		4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		1-6			
		1060003130	军事理论 Military Theory	1	32			16		1			
		1050001130	心理健康教育 Mental health education	1	16					1-2			
		4210001110	体育 1 Physical Education I	1	32					1			
		4210002110	体育 2 Physical Education II	1	32					2	体育 1		
		4210003110	体育 3 Physical Education III	1	32					3	体育 2		
		4210004110	体育 4 Physical Education IV	1	32					4	体育 3		
		4030002110	大学英语 A1 College English A I	3	64				16	1			
		4030003110	大学英语 A2 College English A II	3	64				16	2	大学英语 A1		
		4030004110	大学英语 A3 College English A III	3	64				16	3	大学英语 A2		
		4030005110	大学英语 A4 College English A IV	3	64				16	4	大学英语 A3		
		4120017110	大学计算机基础 Foundation of Computer	2	32			12		1			
		4120023110	计算机程序设计基础(C 语言) Fundamentals of Computer Program Design(C Language)	3	48			12		2			
					小 计 Subtotal	35	736		24	64	64		
选 修 课  Elective Courses	创新创业类 Innovation and Entrepreneurship Courses	<p>全校学生要求至少取得 9 个学分，且必须选修艺术体育类课程中的艺术类相关课程，取得至少 2 个学分。理工科专业学生至少选修一门人文社科类或经济管理类课程，其他专业学生至少选修一门科学技术类课程。</p> <p>All students are required to obtain at least 9 credits, and must select art courses from <i>Art and Physical Education Courses</i> to obtain at least 2 credits. Science and engineering students should select at least one course from <i>Arts and Social Science Courses</i> or <i>Economy and Management Courses</i>, and other students should select at least one course from <i>Science and Technology Courses</i>.</p>											
	人文社科类 Arts and Social Science Courses												
	经济管理类 Economy and Management Courses												
	科学技术类 Science and Technology Courses												
	艺术体育类 Art and Physical Education Courses												

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
学 科 大 类 课 程  Basic Disciplinary Courses	必 修 课 程  Required Courses	4060215110	专业导论 Introduction to Materials Physics	1	16					1			
		4050063110	高等数学 A 上 Advanced Mathematics A I	5	80					1			
		4050229110	线性代数 Linear Algebra	2.5	40					1			
		4050064110	高等数学 A 下 Advanced Mathematics A II	5	80					2	高等数学 A 上		
		4060004110	计量地理学 Quantitative Geography	3	48	24				2			
		4060219120	地图学 Cartography	4	64	24				2			
		4050057110	概率论与数理统计 A Probability and Mathematics A	4.5	72					3			
		4050463130	大学物理 College Physics B	5	80					3			
		4060001110	GIS 程序设计语言 GIS Programming Language	3.5	56	24				3			
		4050224110	物理实验 B Physics Lab. B	1	32	32				4	大学物理		
		4060122110	遥感原理与应用 Principles and Applications of Remote	3.5	56	24				4			
		4060228120	地理信息系统原理与应用 Principles and Applications of Geographical Information System	4	64	28				4	地图学		
		4060027110	地质学 Physical Geology	2.5	40					4			
		4060218120	自然地理学 Physical Geography	2.5	40					4			
	测量课程（二选一，3.5 学分） Surveying course cluster (Select one course, 3.5 credits)												
			4060272120	GPS 原理及测量应用 GPS Principle and Its Application in	3.5	56		10	16		2		
			4060241120	矿山测量 Mining Geodesy	3.5	56		10	16		2		
			小 计 Subtotal		50.5	824	156	10	16				
	选 修 课 程  Elective Courses		4060128110	资源工程 CAD Resource Engineering CAD	2	32	24				2		
			4060125110	灾害学 Disaster Science	2	32					3		
		4060227130	虚拟现实技术 Virtual Reality	2	32	16				3			
		4060030110	房地产管理 Real Estate Administration	2	32					4			
			小 计 Subtotal		8	128	40						
		修读说明：要求至少选修 4 学分。 NOTE: Minimum subtotal credits: 4 .											



课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
		4060100110	人工智能与专家系统 AI & ES	2	32					7			
		小 计 Subtotal		35	560	120	16	16					
修读说明：要求至少选修 16 学分。 NOTE: Minimum subtotal credits:16.													
个性课程 Personalized Course	选修课 Elective Courses	4060321130	武汉市自然地理综合分析方法 Comprehensive Analysis of Natural	1	16				12	2			
		4060322130	区域分析中的主要数学方法 Main Mathematical Methods of Regional	2	32	16				4			
		4060323130	地理学方法与创新性思维 Geography Method and Creative	2	32					7			
		4060324130	定量遥感 Quantitative Remote Sensing	2	32	8		8		7			
		小 计 Subtotal		7	112	24		8	12				
		修读说明：学生可跨专业自主选择修读全校其他专业的课程，建议第四学期选修课程。要求至少选修 10 学分。 NOTE: Students can choose any courses from the other specialties. Minimum subtotal credits: 10.											

## 五、集中性实践教学环节建议进程表

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crts	建议修读学期 Suggested Term	第二专业 Second Major
1060002110	军事训练 Military Training	3	1.5	1	
4060255120	GIS 应用技能训练 Practical Training on GIS	2	2	2	
4060220120	地理地质认识实习 Practice of Understanding Geographic and Geology	2	2	4	
4060282130	地图学与遥感制图实习 Practice of Cartographic and Remote sensing Cartography Experiment	2	2	4	
4060298130	空间数据组织与管理实习 Practice of Spatial Data Organization and Management	2	2	5	
4060322130	地理建模 Geographic modeling	2	2	5	
4060262120	地理信息系统工程综合实习 Practice of GIS	2	2	6	
4060194110	能力拓展训练 Ability Development Training	2	2	6	
4060153110	毕业实习 Graduation Practice	2	2	8	
4060260120	毕业设计(论文) Graduation Thesis	15	10	8	
小 计 Subtotal		34	27.5		

## 六、其它要求

### VI Recommendations on Course Studies

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

Situation & Policy, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7<sup>th</sup> term . The course will be arranged by the University Students' Affairs' Department in each school.

学院教学责任人：袁艳斌  
专业培养方案责任人：黄解军

# 【环境工程专业】2014 版本本科培养方案

## Undergraduate Education Plan for Specialty in Environmental Engineering (2014)

专业名称	环境工程	主干学科	土木工程, 化工与制药工程, 生物工程
Major	Environmental Engineering	Major Disciplines	Civil engineering, Chemical and Pharmaceutical Engineering, Biological Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	环境科学与工程类	大类培养年限	2 年
Disciplinary	Environment Science & Engineering	Duration	2 years

### 最低毕业学分规定

#### Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识课程 Public Basic Courses	学科大类课程 Basic Courses in General Discipline	专业课程 Courses in Specialty	个性课程 Personalized Course	集中性实践 Practice Courses	课外学 Extracurricular Credits	总学分 Total Credits
必修课 Required Courses	35	49	29.5	\	28.5	\	190
选修课 Elective Courses	9	4	15	10	\	10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirement

##### (一) 培养目标

- (1) 身心健康, 具备良好的敬业精神、社会责任感和工程职业道德, 关注当代全球和社会问题, 具有质量意识、环境意识和安全意识。
- (2) 具有从事环境工程与科学研究、工程设计和技术服务等工作所需的化学知识、工程知识和其它相关自然科学知识, 并能将理论运用于解决工程问题。
- (3) 在设计单位、科研单位、施工单位, 工矿企业、环保部门、政府部门、经济管理部门、学校等从事设计、施工、管理、教育和研究开发方面工作
- (4) 具有良好的口头和书面表达和交流沟通能力、良好的团队意识和合作精神, 具有终身学习的能力。

##### ( I ) Educational Objectives

(1) Physical and mental health, have good professional dedication, sense of social responsibility and engineering ethics, focus on the contemporary global and social issues, quality consciousness, environmental awareness and safety awareness.

(2) Have a good knowledge of chemistry, engineering and other related knowledge of natural science knowledge to be engaged in environmental engineering and scientific research, engineering design and technical services, and be able to apply theory to solve engineering problems.

(3) Graduates of the program are sought by design institute, scientific research institute, construction company, mine corporation, local, regional, and national environmental protection department, government agencies, university and so on.

(4) With a good ability of expression and communication in oral and written, with good team consciousness and the spirit of cooperation, and with the ability of lifelong learning

## (二) 毕业要求

- (1) 掌握无机化学、有机化学、分析化学、物理化学、工程制图、微生物学、力学等知识;
- (2) 学生掌握本专业的基本理论知识和工程基础知识,能够利用原理性知识进行自主发现、自主设计和自主解决与环境工程相关的科学问题;
- (3) 掌握水污染控制工程、大气污染控制工程、噪声污染控制工程、固体废物处理处置与资源化工程的基本原理和设计方法;
- (4) 具有污染物监测和分析、环境监测、环境质量评价、环境规划与管理的初步能力;
- (5) 学生了解本专业的发展动态和前沿;
- (6) 学生具有良好的思想素质、身体素质、心理素质、文化修养、社会道德和责任担当等人文素养;
- (7) 学生了解当代全球问题和社会问题,在工程设计中综合考虑经济、环境、法律、安全和伦理等制约因素。
- (8) 学生具有逻辑思维和辩证思维的能力,具有批判意识和求真务实的科学思维方法,具有创新意识,掌握基本的创新方法。
- (9) 掌握文献检索、资料查询的基本方法,具有初步的科学研究和实际工作能力。
- (10) 学生具有良好的口头和书面表达和交流能力,至少熟练掌握一门外语进行技术沟通和交流能力。具有良好的团队意识和合作精神。
- (11) 学生能够胜任本专业入门级的职业岗位,具备研究生课程学习所需的认知和基础能力。
- (12) 学生具有进行终身学习的愿望和能力,具有适应环境工程技术不断发展的能力。

## (II) Graduation Requirement

(1) An ability to apply the fundamental principle and knowledge of Inorganic Chemistry, Organic chemistry, analytic chemistry, physical chemistry, engineering drawing, microbiology, mechanics;

(2) An ability to apply the basic theory knowledge and basic engineering knowledge, and an ability to discovery, design and solve the problem independently Using the original rational knowledge;

(3) An ability for the design of water pollution control project, air pollution control project, noise pollution control project, disposing and resource project of solid waste;

(4) The initial ability of monitoring and analyzing of pollutants, environmental monitoring, environmental quality assessment, environmental planning and managing;

(5) A knowledge of the theory cutting-edge and developments of Environmental science and technology;

(6) With good thought quality, physical quality, psychological quality, culture, social morality and responsibility to bear such as the humanities;

(7) Understand contemporary global issues and social problems, and consider economic, environmental, legal, safety and ethical constraints in engineering design;

(8) An ability of logical thinking and dialectical thinking, and with critical awareness, practical scientific thinking method and innovation consciousness, and master the basic method of innovation;

(9) An ability to grasp the fundamental methods of literature researching and information assessing , and having the initial ability of science researching and working;

(10) A grasp of a foreign language well, and the strong ability to reading, writing, listening, speaking, translating and information of getting and treating;

(11) An ability to this professional entry-level jobs, graduate courses required basis and cognitive ability;

(12) With the desire and ability of lifelong learning, and having the ability to adapt to the environment engineering technology development.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 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				√

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

#### (一) 专业核心课程：

环境工程原理、环境工程微生物学、环境监测、水污染控制工程、大气污染控制工程、固体废物处理处置工程、环境质量评价。

Core Courses: Environmental Engineering Principle, Environmental Engineering Microbiology, Environmental Monitoring, Water Pollution Control Engineering, Air Pollution Control Engineering, Solid Waste Treatment and Disposal, Environmental Quality Assessment.

#### (二) 专业特色课程：

水污染控制工程、大气污染控制工程、固体废物处理与处置工程、环境工程微生物学、环境质量评价。

Characteristic Courses: Water Pollution Control Engineering, Air Pollution Control Engineering, Solid Waste Treatment and Disposal Engineering, Environmental Engineering Microbiology, Environmental Quality Assessment.

附：毕业要求实现矩阵：

专业 核心 课程	专业 特色 课程	课程名称	环境工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law						√	√	√		√	√	√
		中国近现代史纲要 Outline of Contemporary and Modern Chinese History						√	√	√		√	√	√
		毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics						√	√	√		√	√	√
		马克思主义基本原理 Marxism Philosophy						√	√	√		√	√	√

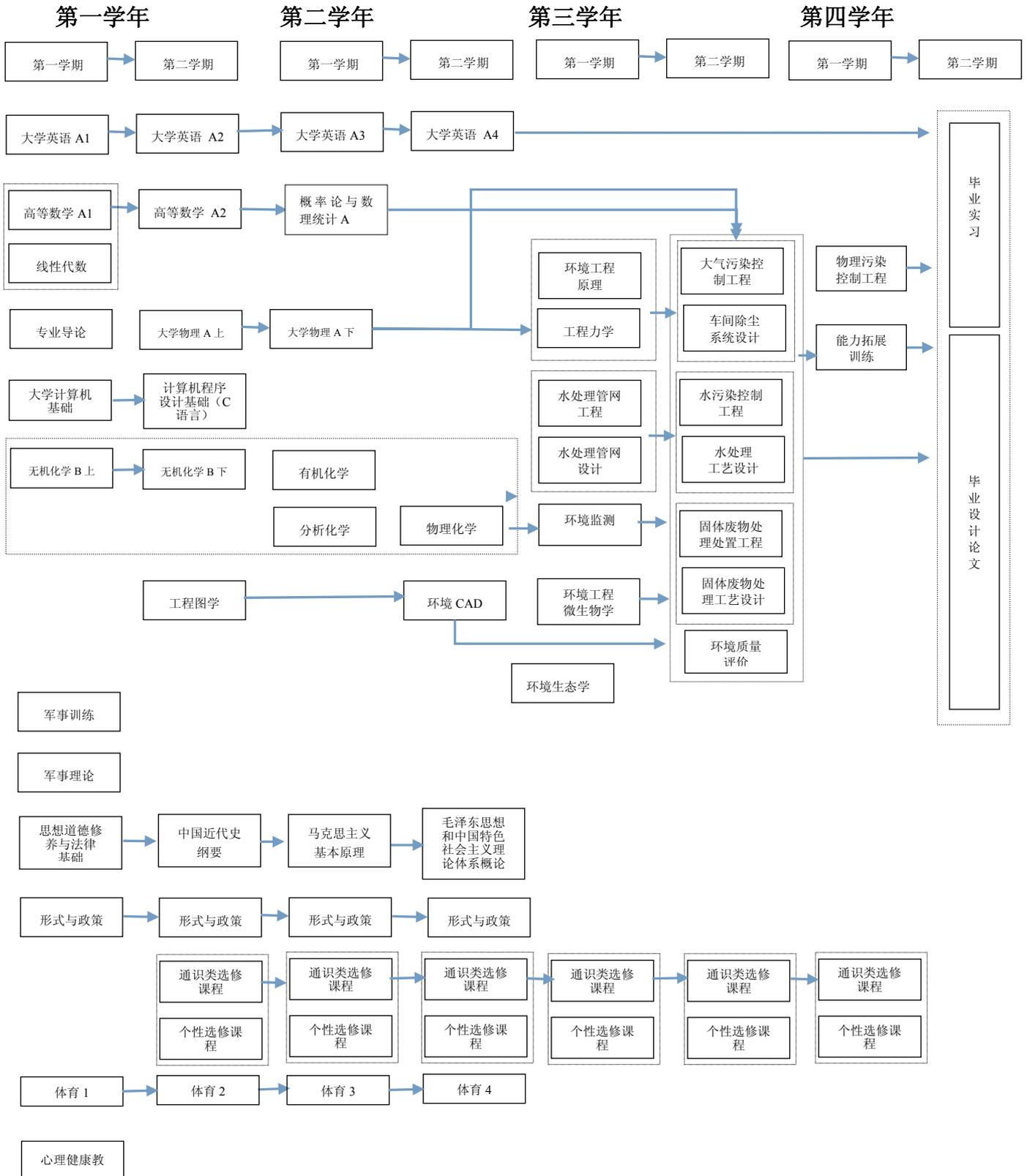
专业 核心 课程	专业 特色 课程	课程名称	环境工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		军事理论 Military Theory						√	√	√		√	√	√
		心理健康教育 Mental health education						√	√	√		√	√	√
		体育 Physical Education						√	√					
		大学英语 College English		√								√		
		大学计算机基础 Foundation of Computer	√											√
		计算机程序设计基础(C语言) Fundamentals of Computer Program Design(C)	√											√
		专业导论 Introduction to Environmental Science	√	√										
		高等数学 Advanced Mathematics	√	√										
		无机化学 Chemistry	√	√										
		工程图学 B Engineering Drawing B	√	√										
		大学物理 Physics	√	√										
		线性代数 Linear Algebra	√	√		√								
		有机化学 C Organic Chemistry C	√	√										
		物理化学 C Physical Chemistry C	√	√		√								
		分析化学 B Analytical Chemistry B	√	√										
		环境 CAD Environmental CAD	√	√	√									
		环境材料概论 Introduction to Environmental Materials		√										
		资源环境经济学 Resource and Environment Economics		√										
		流体力学 C Fluid Mechanics D		√										
		清洁生产导论 Introduction of cleaner Production Technology		√								√		
√	√	环境工程微生物学 Environmental Engineering Microbiology	√	√	√	√								
		水处理管网工程 Water Treatment Pipe Network Engineering	√	√	√									
		工程力学 A Engineering Mechanics A	√	√										
√		环境工程原理 Environmental Engineering Principle	√	√		√								
		环境监测 Environmental Monitoring		√	√	√								
√	√	水污染控制工程 Water Pollution Control Engineering	√	√	√									

专业 核心 课程	专业 特色 课程	课程名称	环境工程专业毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
√	√	大气污染控制工程 Air Pollution Control Engineering		√	√										
√	√	固体废物处理处置工程 Solid Waste Treatment and Disposal Engineering	√	√	√										
√		环境质量评价 Environmental Quality Assessment		√	√	√									
		物理污染控制工程 Physical Pollution Control Engineering		√	√	√									
		环境工程设计基础 Environmental Engineering Design		√	√										
		土建概论 Civil Engineering Introduction		√											
		空气污染气象学 Air pollution meteorology	√	√											
		环境毒理学 Environmental toxicology	√	√											
		自然灾害学 Natural Disaster		√	√	√	√								
		工程管理概论 Project Management Introduction		√	√	√									
		现代环境测试技术 Modern Environmental Testing Technology		√		√									
		环境科学专业英语 English for Environmental Science		√		√	√						√		
		水处理新工艺 New water Treatment Technology	√	√	√										
		环境化学 B Environmental Chemistry B	√	√											
		环境工程施工及概预算 Environmental Project Budget		√	√									√	
		文献检索 Literature Searching				√	√					√			
		环境规划学 Environmental Planning		√		√									
		生物化学 C Biological Chemistry C	√	√											
		生态工程学 Biology Engineering		√											
		环境管理与环境法规 Environmental Management and Laws		√		√		√							
		环境监理概论 Introduction to Environmental Supervision		√		√									
		环境科学与工程前沿 Frontiers of Environmental Science and Engineering		√		√	√								
		环境监察概论 Introduction to Environmental Monitoring		√		√									
		军事训练 Military Training	√												√
		基础强化训练 Foundation Strengthening Training		√	√	√						√			

专业 核心 课程	专业 特色 课程	课程名称	环境工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		认识实习 Understanding of Specialty	√	√	√	√					√		√	√
		环境监测综合实验 Environmental Monitoring Experiment	√	√	√	√					√		√	√
		水处理管网设计 Design on Water Treatment Pipe Network	√	√	√						√		√	√
		水污染控制综合实验 Experiment of Water pollution Control		√	√						√		√	√
		大气污染控制实验技术 Experiment Technique of Air Pollution		√	√						√		√	√
		固体废物处理实验技术 Experiment Technique of Solid Waste Disposal		√	√						√		√	√
		水处理工艺设计 Design on Water Treatment Process		√	√						√		√	√
		车间除尘系统设计 Design on Workshop Dust Removal System		√	√						√		√	√
		固体废物处理工艺设计 Design on Solid Waste Treatment Process		√	√						√		√	√
		微生物学实验技术 Microbiology Experiment Technology		√	√						√		√	√
		生产实习 Practice of Specialty		√	√						√		√	√
		能力拓展训练 Ability to Develop Training		√	√						√		√	√
		毕业实习 Graduation Practice		√	√						√		√	√
		毕业设计（论文） Graduation Design (Thesis)		√							√		√	√

### 三、课程教学进程图

#### III Teaching Process Map



#### 四、理论教学建议进程表

#### IV Theory Course Schedule

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
通 识 课 程  Public Basic Courses	必 修 课  Required Courses	4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1-6			
		4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1-6			
		4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		1-6			
		4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		1-6			
		1060003130	军事理论 Military Theory	1	32			16		1			
		1050001130	心理健康教育 Mental health education	1	16					1-2			
		4210001110	体育 1 Physical Education I	1	32					1			
		4210002110	体育 2 Physical Education II	1	32					2	体育 1		
		4210003110	体育 3 Physical Education III	1	32					3	体育 2		
		4210004110	体育 4 Physical Education IV	1	32					4	体育 3		
		4030002110	大学英语 A1 College English A 1	3	64				16	1			
		4030003110	大学英语 A2 College English A II	3	64				16	2	大学英语 A1		
		4030004110	大学英语 A3 College English A III	3	64				16	3	大学英语 A2		
		4030005110	大学英语 A4 College English A IV	3	64				16	4	大学英语 A3		
		4120017110	大学计算机基础 Foundation of Computer	2	32		12			1			
		程序设计语言课程组(三选一, 3 学分) Computer Program Design Language Courses(Choice One freely)											
				4120023110	计算机程序设计基础(C 语言) Fundamentals of Computer Program Design(C)	3	48		12			1-2	
			4120024110	计算机程序设计基础(FORTRAN 语言) Fundamentals of Computer Program Design(FORTRAN)	3	48		12			2		
			4120025110	计算机程序设计基础(VB 语言) Fundamentals of Computer Program Design(VB)	3	48		12			2		
			小 计 Subtotal		35	736		24	64	64			
	选 修 课  Elective Courses	创新创业类 Innovation and Entrepreneurship Courses		全校学生要求至少取得 9 个学分, 且必须选修艺术体育类课程中的艺术 术类相关课程, 取得至少 2 个学分。理工科专业学生至少选修一门人文社 科类或经济管理类课程, 其他专业学生至少选修一门科学技术类课程。 All students are required to obtain at least 9 credits, and must select art courses from Art and Physical Education Courses to obtain at least 2 credits. Science and engineering students should select at least one course from Arts and Social Science Courses or Economy and Management Courses, and other students should select at least one course from Science and Technology Courses.									
		人文社科类 Arts and Social Science Courses											
		经济管理类 Economy and Management Courses											

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur			
		科学技术类 Science and Technology Courses										
		艺术体育类 Art and Physical Education Courses										
学 科 大 类 课 程 Basic Disciplinary Courses	必修 Required Courses	4060274130	专业导论 Introduction to Environmental Science	1	16					1		
		4050063110	高等数学 A 上 Advanced Mathematics A I	5	80					1		
		4050064110	高等数学 A 下 Advanced Mathematics A II	5	80					2	高等数学 A 上	
		4200307120	无机化学 B 上 Chemistry B I	3	48					1		
		4200308120	无机化学 B 下 Chemistry B II	1.5	24					2	无机化学 B 上	
		4200309120	无机化学 B 实验上 Inorganic Chemistry B Experiment I	1	24	24				1		
		4200310120	无机化学 B 实验下 Inorganic Chemistry B Experiment II	0.5	24	24				2	无机化学 B 实验上	
		4080041110	工程图学 B Engineering Drawing B	4	64		4			2		
		4050229110	线性代数 Linear Algebra	2.5	40					2		
		4050021110	大学物理 A 上 Physics A I	3.5	56					2		
		4050022110	大学物理 A 下 Physics A II	3.5	56					3	大学物理 A 上	
		4050466130	物理实验 A 上 Physics Lab. A I	1	32	32				3		
		4050467130	物理实验 A 下 Physics Lab. A II	1	32	32				4	物理实验 A 上	
		4200274120	有机化学 C Organic Chemistry C	3	48					3		
		4200275120	有机化学 C 实验 Organic Chemistry C Experiment	0.5	16	16				3		
		4200199120	分析化学 B Analytical Chemistry B	2	32					3		
		4200201120	分析化学 B 实验 Analytical Chemistry B Experiment	1.5	48	48				3		
		4200184120	物理化学 C Physical Chemistry C	4	64					4		
		4200185130	物理化学 C 实验 Physical Chemistry C Experimental	0.5	16	16				4		
		4050058110	概率论与数理统计 B Probability and Mathematics B	3	48					4		
计算机辅助制图课程（二选一，2 学分） CAD Courses(Choice One freely)												
		4060128110	资源工程 CAD Resource Engineering CAD	2	32		20			4		
		4060039110	环境 CAD Environmental CAD	2	32		20			4		

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
		小 计 Subtotal		49	880	192	24						
	选修课 Elective Courses	4060040110	环境材料概论 Introduction to Environmental Materials	2	32					3			
		4060129110	资源环境经济学 Resource and Environment Economics	2	32					3			
		4050134110	流体力学 C Fluid Mechanics D	3	48	6				4			
		4060097110	清洁生产导论 Introduction of cleaner Production Technology	2	32					4			
		小 计 Subtotal		9.0	144	6							
修读说明：要求至少选修 4 学分。 NOTE: Minimum subtotal credits: 4.													
专业 Specialized Courses	必修课 Required Courses	4060289130	环境工程微生物学 Environmental Engineering Microbiology	2	32					5			
		4060305130	水处理管网工程 Water Treatment Pipe Network Engineering	2.5	40					5			
		4050071110	工程力学 A Engineering Mechanics A	4	64	4				5			
		4200290130	环境工程原理 Environmental Engineering Principle	3	48	8				5			
		4060292130	环境监测 Environmental Monitoring	3	48					5	分析化学 B		
		4060307130	水污染控制工程 Water Pollution Control Engineering	3.5	56					6			
		4060022110	大气污染控制工程 Air Pollution Control Engineering	3.5	56					6			
		4060035110	固体废物处理处置工程 Solid Waste Treatment and Disposal Engineering	2.5	40					6			
		4060365140	环境质量评价 Environmental Quality Assessment	2.5	40			8		6			
		4060366140	物理污染控制工程 Physical Pollution Control Engineering	3	48			16		7	大学物理 A 上		
	小 计 Subtotal		29.5	472	20		16						
		选修课 Elective Courses	4060041110	环境工程设计基础 Environmental Engineering Design	2	32					5		
			4060110110	土建概论 Civil Engineering Introduction	2	32					5		
			4060283130	工程管理概论 Project Management Introduction	2	32					5		
	4060288130		环境毒理学 Environmental toxicology	2	32					6			
	4060117110		现代环境测试技术 Modern Environmental Testing Technology	2	32	12				6			
	4060115110		文献检索 Literature Searching	1	16					6			
	4060299130		空气污染气象学 Air pollution meteorology	2	32					7			

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 CrS	学时分配 Including				建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice			
		4060134110	自然灾害学 Natural Disaster	2	32				7		
		4060051110	环境科学专业英语 English for Environmental Science	2	32				7		
		4060109110	水处理新工艺 New water Treatment Technology	2	32				7		
		4060048110	环境化学 B Environmental Chemistry B	2	32				7		
		4060042110	环境工程施工及概预算 Environmental Project Budget	2	32				7		
		4060046110	环境规划学 Environmental Planning	2	32				7		
		4050155110	生物化学 C Biological Chemistry C	2	32				7		
		4060103110	生态工程学 Biology Engineering	2	32				7		
		4060045110	环境管理与环境法规 Environmental Management and Laws	2	32				7		
		小 计 Subtotal		31	496	12					
修读说明：要求至少选修 15 学分 NOTE: Minimum subtotal credits: 15											
个性化课程 Personalized Course	选修课 Elective Courses	4060325130	环境监理概论 Introduction to Environmental Supervision	2	32				6、7		
		4060326130	环境科学与工程前沿 Frontiers of Environmental Science and Engineering	2	32				6		
		4060327130	环境监察概论 Introduction for Environmental Monitoring	2	32				6、7		
		4060367140	环保设备基础 Introduction for Environmental Protection Equipments	2	32				6、7		
		小 计 Subtotal		6	96						
修读说明：学生可跨专业自主选择修读全校其他专业的课程，建议修读以上课程。要求至少选修 10 学分。 NOTE: Students can choose any courses from the other specialties, and are especially suggested to choose the courses above. Minimum subtotal credits: 10.											

## 五、集中性实践教学环节建议进程表

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 CrS	建议修读学期 Suggested Term	第二专业 Second Major
1060002110	军事训练 Military Training	3	1.5	1	
4060198110	认识实习 Understanding of Specialty	1	1	3	
4060177110	基础强化训练 Foundation Strengthening Training	1	1	4(暑期)	
4060293130	环境监测综合实验 Environmental Monitoring Experiment	1	1	5	

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crts	建议修读学期 Suggested Term	第二专业 Second Major
4060306130	水处理管网设计 Design on Water Treatment Pipe Network	2	2	5	
4060309130	水污染控制综合实验 Experiment of Water pollution Control	1	1	6	
4060156110	大气污染控制实验技术 Experiment Technique of Air pollution Control	1	1	6	
4060165110	固体废物处理实验技术 Experiment Technique of Solid waste disposal	1	1	6	
4060368140	水处理工艺设计 Design on Water Treatment Process	1	1	6	
4060278130	车间除尘系统设计 Design on Workshop Dust Removal System	1	1	6	
4060285130	固体废物处理工艺设计 Design on Solid Waste Treatment Process	1	1	6	
4060311130	微生物学实验技术 Microbiology Experiment Technology	1	1	6	
4060203110	生产实习 Practice of Specialty	2	2	6	
4060193110	能力拓展训练 Ability to Develop Training	1	1	7	
4060151110	毕业实习 Graduation Practice	2	2	8	
4060259120	毕业设计（论文） Graduation Design (Thesis)	15	10	8	
小 计 Subtotal		36	28.5		

## 六、其它要求

### VI Recommendations on Course Studies

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

Situation & Policy, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7<sup>th</sup> term . The course will be arranged by the University Students' Affairs' Department in each school.

学院教学责任人：袁艳斌  
专业培养方案责任人：张高科

# 【环境科学专业】2014 版本本科培养方案

## Undergraduate Program for Specialty in Environmental Science (2014)

专业名称	环境工程	主干学科	环境自然科学，环境技术科学，环境人文社会科学
Major	Environmental Science	Major Disciplines	Environmental Science and Technology, the Environment of Humanities and Social Sciences
计划学制	四年	授予学位	理学学士
Duration	4 Years	Degree Granted	Bachelor of Science
所属大类	环境科学与工程类	大类培养年限	2年
Disciplinary	Environment Science & Engineering	Duration	2 years

### 最低毕业学分规定

#### VI. Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识课程 Public Basic Courses	学科大类课程 Basic Courses in General Discipline	专业课程 Courses in Specialty	个性课程 Personalized Course	集中性实践 Practice Courses	课外学 Extracurricular Credits	总学分 Total Credits
必修课 Required Courses	35	49	33.5	\	24.5	\	190
选修课 Elective Courses	9	4	15	10	\	10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirement

##### (一) 培养目标

- (1) 身心健康，具备良好的敬业精神、社会责任感和工程职业道德，关注当代全球和社会问题，具有质量意识、环境意识和安全意识。
- (2) 具有从事环境科学研究、工程设计和技术服务等工作所需的化学知识、工程知识和其它相关自然科学知识，并能将理论运用于解决工程问题。
- (3) 在设计单位、科研单位、施工单位，工矿企业、环保部门、政府部门、经济管理部门、学校等从事设计、施工、管理、教育和研究开发方面工作
- (4) 具有良好的口头和书面表达和交流沟通能力、良好的团队意识和合作精神，具有终身学习的能力。

##### ( I ) Educational Objectives

(1) Physical and mental health, have good professional dedication, sense of social responsibility and engineering ethics, focus on the contemporary global and social issues, quality consciousness, environmental awareness and safety awareness.

(2) Have a good knowledge of chemistry, engineering and other related knowledge of natural

science knowledge to be engaged in environmental scientific research, engineering design and technical services, and be able to apply theory to solve engineering problems.

(3) Graduates of the program are sought by design institute, scientific research institute, construction company, mine corporation, local, regional, and national environmental protection department, government agencies, university and so on.

(4) With a good ability of expression and communication in oral and written, with good team consciousness and the spirit of cooperation, and with the ability of lifelong learning

## (二) 毕业要求

- (1) 掌握数学、物理、化学和微生物等方面的基本理论和基本知识；
- (2) 掌握环境监测、环境评价和环境管理等方面的基本理论、基本知识和基本技能；
- (3) 具有水、气、声、固等污染控制新技术和新工艺的研发与设计能力；
- (4) 熟悉国家环境保护、自然资源合理利用、可持续发展、知识产权等有关政策和法规；
- (5) 具有一定的实验设计能力，分析整理实验结果的能力以及撰写科技报告的能力；
- (6) 学生了解本专业的发展动态和前沿；
- (7) 学生具有良好的思想素质、身体素质、心理素质、文化修养、社会道德和责任担当等人文素养；
- (8) 学生了解当代全球问题和社会问题，在工程设计中综合考虑经济、环境、法律、安全和伦理等制约因素。
- (9) 学生具有逻辑思维和辩证思维的能力，具有批判意识和求真务实的科学思维方法，具有创新意识，掌握基本的创新方法。
- (10) 掌握文献检索、资料查询的基本方法，具有初步的科学研究和实际工作能力。
- (11) 学生具有良好的口头和书面表达和交流能力，至少熟练掌握一门外语进行技术沟通和交流能力。具有良好的团队意识和合作精神。
- (12) 学生能够胜任本专业入门级的职业岗位，具备研究生课程学习所需的认知和基础能力。
- (13) 学生具有进行终身学习的愿望和能力，具有适应环境工程技术不断发展的能力。

## (II) Graduation Requirement

(1) A grasp of the fundamental theory of mathematics, physics, chemistry and microbiology.

(2) A grasp of the fundamental theory, basic knowledge and skills of environmental monitoring, environmental evaluation, environmental management and so on.

(3) Be proficient in researching and developing the new technology in water pollution control, air pollution control, noise pollution control and solid waste treating and disposal.

(4) Be familiar with the policies and regulations about environmental protection, rational use of natural resources, sustainable development and intellectual property.

(5) An ability to design and conduct experiments, to analyze and interpret data, as well as to write a technical report or proposal in the filed of Environmental Science.

(6) A knowledge of the theory cutting-edge and developments of Environmental science and technology;

(7) With good thought quality, physical quality, psychological quality, culture, social morality and responsibility to bear such as the humanities;

(8) Understand contemporary global issues and social problems, and consider economic, environmental, legal, safety and ethical constraints in engineering design;

(9) An ability of logical thinking and dialectical thinking, and with critical awareness, practical scientific thinking method and innovation consciousness, and master the basic method of innovation;

(10) An ability to grasp the fundamental methods of literature researching and information assessing , and having the initial ability of science researching and working;

(11) A grasp of a foreign language well, and the strong ability for reading, writing, listening, speaking, translating and information of getting and treating;

(12) An ability to this professional entry-level jobs, graduate courses required basis and cognitive ability;

(13) With the desire and ability of lifelong learning, and having the ability to adapt to the environment engineering technology development.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 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				√
毕业要求 13				√

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

#### (一) 专业核心课程:

环境生态学、环境化学、环境生物学、环境监测、水污染控制基础、大气污染控制基础、固体废物处理处置基础、环境微生物学、环境质量评价

Environmental Ecology, Environmental Chemistry, Environmental Biology, Environmental Monitoring, Water Pollution Control, Air Pollution Control, Solid Waste Treatment and Disposal, Environmental Microbiology, Environmental Quality Assessment.

#### (二) 专业特色课程:

环境化学、环境监测、水污染控制基础、大气污染控制基础、环境质量评价、环境微生物学

Water Pollution Control Engineering, Air Pollution Control Engineering, Solid Waste Treatment and Disposal Engineering, Environmental Engineering Microbiology, Environmental Quality Assessment

环境化学、环境监测、水污染控制基础、大气污染控制基础、环境质量评价、环境微生物学

物学

Environmental Chemistry, Environmental Monitoring, Water Pollution Control, Air Pollution Control, Environmental Quality Assessment, Environmental Microbiology

附：毕业要求实现矩阵：

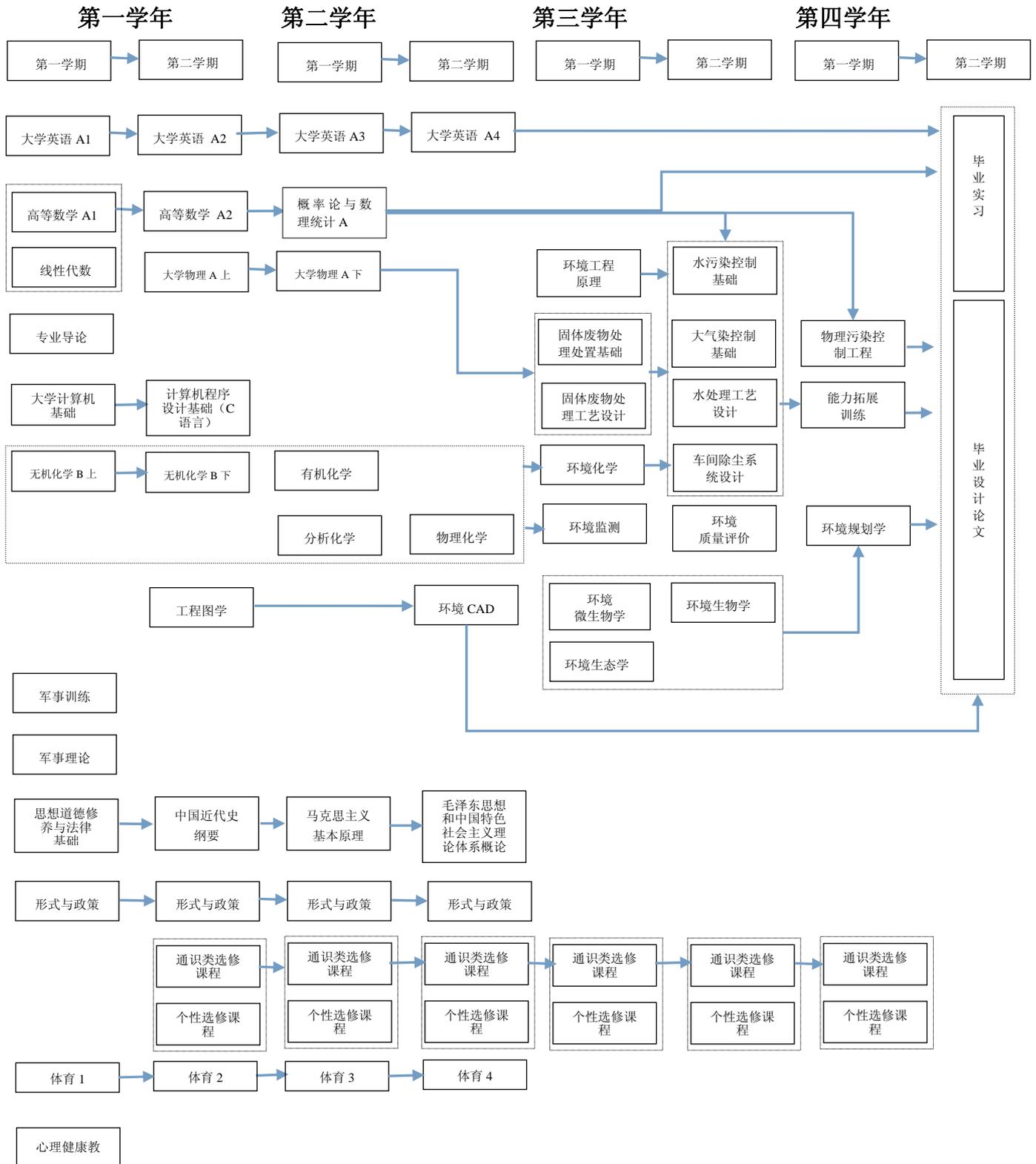
专业 核心 课程	专业 特色 课程	课程名称	环境科学专业毕业要求													
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
		思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law				√			√	√	√				√	√
		中国近现代史纲要 Outline of Contemporary and Modern Chinese History				√			√	√	√				√	√
		毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics				√			√	√	√				√	√
		马克思主义基本原理 Marxism Philosophy				√			√	√	√				√	√
		军事理论 Military Theory							√	√	√				√	√
		心理健康教育 Mental health education		.	.	.			√	√	√				√	√
		体育 Physical Education							√	√	.					
		大学英语 College English									.		√			
		大学计算机基础 Foundation of Computer	√													
		计算机程序设计基础(C语言) Fundamentals of Computer Program Design(C)	√													
		专业导论 Introduction to Environmental Science	√	√												
		高等数学 Advanced Mathematics	√													
		无机化学 Chemistry	√													
		工程图学 B Engineering Drawing B	√													
		大学物理 Physics	√													
		线性代数 Linear Algebra	√													
		有机化学 C Organic Chemistry C	√				√									
		物理化学 C Physical Chemistry C	√				√									
		分析化学 B Analytical Chemistry B	√				√									
		环境 CAD Environmental CAD	√		√		√								√	

专业 核心 课程	专业 特色 课程	课程名称	环境科学专业毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
		环境材料概论 Introduction to Environmental Materials			√		√	√						√	
		资源环境经济学 Resource and Environment Economics		√	√		√	√		√				√	
		流体力学 C Fluid Mechanics D			√		√		.					√	
		清洁生产导论 Introduction of cleaner Production Technology		√	√		.	√	√				√	√	
		环境生态学 A Environmental Ecology A	√	√	√		√							√	
√	√	环境化学 Environment Chemistry A	√	√	√		√	.	.					√	
		环境工程原理 Environmental Engineering Principle	√	√	√		√							√	
√	√	环境监测 Environmental Monitoring		√	√		√		.					√	
		环境生物学 Environmental Biology	√	√	√		√							√	
√	√	水污染控制基础 Water Pollution Control		√	√		√	.	.					√	
√	√	大气污染控制基础 Air Pollution Control		√	√		√							√	
		固体废物处理处置基础 Solid Waste Treatment and Disposal		√	√		.	√						√	
√	√	环境质量评价 Environmental Quality Assessment		√	√		√		.					√	
		环境规划学 Environmental Planning		√	√		√		.	√				√	
√	√	环境微生物学 Environmental Microbiology		√	√		√		.					√	
		物理污染控制工程 Physical Pollution Control Engineering		√	√		.	√						√	
		环境土壤学 Environmental Soil	√	√	.									√	
		自然地理学 Physical Geography	√	√	.		.		.	.				√	
		水文学与水资源 Water Resources and Hydrology		√	√		√		.					√	
		空气污染气象学 Air pollution meteorology			√		√			.				√	
		环境工程设计基础 Environmental Engineering Design			√		√		.	.				√	
		自然灾害学 Natural Disaster		√	√		√		.	√				√	
		环境毒理学 Environmental toxicology	√	√	√		√		.	.				√	
		环境科学专业英语 English for Environmental Science	√	√	√							√	√		
		现代环境测试技术 Modern Environmental Testing Technology		√	√		√			.				√	

专业 核心 课程	专业 特色 课程	课程名称	环境科学专业毕业要求													
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
		环境信息系统 Environmental Information System		√	√		√	.	.		√			√		
		环境工程施工及概预算 Environmental Project Budget			√			.	.	√					√	
		文献检索 Literature Searching		√	√		√		.			√			√	
		生态工程学 Biology Engineering		√	√		√		.						√	
		生物化学 C Biological Chemistry C		√	.			√	.						√	
		环境管理与环境法规 Environmental Management and Laws		√	.	√			.	√					√	
		环境监理概论 Introduction to Environmental Supervision		√	.	√	√	.	.						√	
		环境科学与工程前沿 Frontiers of Environmental Science and Engineering		√	√			√	.	√					√	√
		环境监察概论 Introduction to Environmental Monitoring		√	.	√		.	.						√	
		军事训练 Military Training		√	√					.	√	.				
		基础强化训练 Foundation Strengthening Training		√	√		√			√	√	√	√	√	√	√
		认识实习 Understanding of Specialty		√	√		√			√	√	√	√	√	√	√
		环境监测综合实验 Environmental monitoring experiment		√	√		√			√	√	√	√	√	√	√
		环境工程综合实验 Environmental Engineering Experiment		√	√		√			√	√	√	√	√	√	√
		水处理工艺设计 Design on Water Treatment Process		√	√		√			√	√	√	√	√	√	√
		车间除尘系统设计 Design on Workshop Dust Removal System design		√	√		√			√	√	√	√	√	√	√
		固体废物处理工艺设计 Design on Solid Waste Treatment Process		√	√		√			√	√	√	√	√	√	√
		微生物学实验技术 Microbiology Experiment Technology		√	√		√			√	√	√	√	√	√	√
		生产实习 Practice of Specialty		√	√		√			√	√	√	√	√	√	√
		能力拓展训练 Ability to Develop Training		√	√		√			√	√	√	√	√	√	√
		毕业实习 Graduation Practice		√	√		√			√	√	√	√	√	√	√
		毕业设计(论文) Graduation Design (Thesis)		√	√		√				√	√	√	√		

### 三、课程教学进程图

#### III Teaching Process Map



四、理论教学建议进程表  
IV Theory Course Schedule

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
通 识 课 程  Public Basic Courses	必 修 课 Required Courses	4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1-6			
		4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1-6			
		4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		1-6			
		4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		1-6			
		1060003130	军事理论 Military Theory	1	32			16		1			
		1050001130	心理健康教育 Mental health education	1	16					1-2			
		4210001110	体育 1 Physical Education I	1	32					1			
		4210002110	体育 2 Physical Education II	1	32					2	体育 1		
		4210003110	体育 3 Physical Education III	1	32					3	体育 2		
		4210004110	体育 4 Physical Education IV	1	32					4	体育 3		
		4030002110	大学英语 A1 College English A I	3	64				16	1			
		4030003110	大学英语 A2 College English A II	3	64				16	2	大学英语 A1		
		4030004110	大学英语 A3 College English A III	3	64				16	3	大学英语 A2		
		4030005110	大学英语 A4 College English A IV	3	64				16	4	大学英语 A3		
		4120017110	大学计算机基础 Foundation of Computer	2	32		12			1			
		程序设计语言课程组(三选一, 3 学分) Computer Program Design Language Courses(Choice One freely)											
		4120023110	计算机程序设计基础(C 语言) Fundamentals of Computer Program Design(C Language)	3	48			12			1-2		
		4120024110	计算机程序设计基础(FORTRAN 语言) Fundamentals of Computer Program Design(FORTRAN)	3	48			12			1-2		
		4120025110	计算机程序设计基础(VB 语言) Fundamentals of Computer Program Design(VB)	3	48			12			1-2		
		小 计 Subtotal				35	736		24	64	64		
选 修 课 Elective Courses	创新创业类 Innovation and Entrepreneurship Courses			全校学生要求至少取得 9 个学分, 且必须选修艺术体育类课程中的艺术类相关课程, 取得至少 2 个学分。理工科专业学生至少选修一门人文社科类或经济管理类课程, 其他专业学生至少选修一门科学技术类课程。 All students are required to obtain at least 9 credits, and must select art courses from Art and Physical Education Courses to obtain at least 2 credits. Science and engineering students should select at least one course from Arts and Social Science Courses or Economy and Management Courses, and other students should select at least one course from Science and Technology Courses.									
	人文社科类 Arts and Social Science Courses												
	经济管理类 Economy and Management Courses												

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major		
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur					
		科学技术类 Science and Technology Courses												
		艺术体育类 Art and Physical Education Courses												
学 科 大 类 课 程  Basic Disciplinary Courses	必 修 课  Required Courses	4060274130	专业导论 Introduction to Environmental Science	1	16					1				
		4050063110	高等数学 A 上 Advanced Mathematics A I	5	80					1				
		4050064110	高等数学 A 下 Advanced Mathematics A II	5	80					2	高等数学 A 上			
		4200307120	无机化学 B 上 Chemistry B I	3	48					1				
		4200308120	无机化学 B 下 Chemistry B II	1.5	24					2	无机化学 B 上			
		4200309120	无机化学 B 实验上 Inorganic Chemistry B Experiment I	1	24	24				1				
		4200310120	无机化学 B 实验下 Inorganic Chemistry B Experiment II	0.5	24	24				2	无机化学 B 实验上			
		4080041110	工程图学 B Engineering Drawing B	4	64		4			2				
		4050229110	线性代数 Linear Algebra	2.5	40					2				
		4050021110	大学物理 A 上 Physics A I	3.5	56					2				
		4050022110	大学物理 A 下 Physics A II	3.5	56					3	大学物理 A 上			
		4050466130	物理实验 A 上 Physics Lab. A I	1	32	32				3				
		4050467130	物理实验 A 下 Physics Lab. A II	1	32	32				4	物理实验 A 上			
		4200274120	有机化学 C Organic Chemistry C	3	48					3				
		4200275120	有机化学 C 实验 Organic Chemistry C Experiment	0.5	16	16				3				
		4200199120	分析化学 B Analytical Chemistry B	2	32					3				
		4200201120	分析化学 B 实验 Analytical Chemistry B Experiment	1.5	48	48				3				
		4200184120	物理化学 C Physical Chemistry C	4	64					4				
		4200185130	物理化学 C 实验 Physical Chemistry C Experimental	0.5	16	16				4				
		4050058110	概率论与数理统计 B Probability and Mathematics B	3	48					4				
		计算机辅助制图课程（二选一，2 学分） CAD Courses(Choice One freely)												
		4060128110	资源工程 CAD Resource Engineering CAD	2	32		20				4			

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
		4060039110	环境 CAD Environmental CAD	2	32		20			4			
		小 计 Subtotal		49	880	192	24						
	选修课 Elective Courses	4060040110	环境材料概论 Introduction to Environmental Materials	2	32					3			
		4060129110	资源环境经济学 Resource and Environment Economics	2	32					3			
		4050134110	流体力学 C Fluid Mechanics C	3	48	6				4			
		4060097110	清洁生产导论 Introduction of cleaner Production Technology	2	32					4			
		小 计 Subtotal		9	144	6							
	修读说明：要求至少选修 4 学分。 NOTE: Minimum subtotal credits: 4.												
专 业 课 Specialized Courses	必修课 Required Courses	4060294130	环境生态学 A Environmental Ecology A	3	48	16				5			
		4060291130	环境化学 Environment Chemistry A	4	64	24				5			
		4200014110	环境工程原理 Environmental Engineering Principle	3	48	8				5			
		4060292130	环境监测 Environmental Monitoring	3	48					5	分析化学 B		
		4060057110	环境微生物学 Environmental Microbiology	2	32					5			
		4060388120	环境生物学 Environmental Biology	2	32					6			
		4060308130	水污染控制基础 Water Pollution Control	3	48					6			
		4060279130	大气污染控制基础 Air Pollution Control	3	48					6			
		4060286130	固体废物处理处置基础 Solid Waste Treatment and Disposal	2	32					5			
		4060296130	环境质量评价 Environmental Quality Assessment	2.5	40			8		6			
		4060234120	环境规划学 Environmental Planning	3	48			16		7			
		4060315130	物理污染控制工程 Physical Pollution Control Engineering	3	48			16		7	大学物理 A 上		
		小 计 Subtotal		33.5	536	48		32					
		选修课 Elective Courses	4060218120	自然地理学 Physical Geography	2.5	40					5		
			4060110110	水文学与水资源 Water Resources and Hydrology	2	32					5		
	4060041110		环境工程设计基础 Environmental Engineering Design	2	32					5			
	4060056110		环境土壤学 Environmental Soil	2	32					6			

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
		4060288130	环境毒理学 Environmental toxicology	2	32					6			
		4060117110	现代环境测试技术 Modern Environmental Testing Technology	2	32	12				6			
		4060295130	环境信息系统 Environmental Information System	3	48			16		6			
		4060115110	文献检索 Literature Searching	1	16					6			
		4060110110	空气污染气象学 Air pollution meteorology	2	32					7			
		4060134110	自然灾害学 Natural Disaster	2	32					7			
		4060051110	环境科学专业英语 English for Environmental Science	2	32					7			
		4060042110	环境工程施工及概预算 Environmental Project Budget	2	32					7			
		4060103110	生态工程学 Biology Engineering	2	32					7			
		4050155110	生物化学 C Biological Chemistry C	2	32					7			
		4060045110	环境管理与环境法规 Environmental Management and Laws	2	32					7			
		小 计 Subtotal		30.5	488	12		16					
修读说明：要求至少选修 15 学分 NOTE: Minimum subtotal credits: 15													
个性化课程 Personalized Course	选修课 Elective Courses	4060325130	环境监理概论 Introduction to Environmental Supervision	2	32					6、7			
		4060326130	环境科学与工程前沿 Frontiers of Environmental Science and Engineering	2	32					6			
		4060327130	环境监察概论 Introduction to Environmental Monitoring	2	32					6、7			
		4060328130	环保设备基础 Introduction for Environmental Protection Equipments	2	32					6、7			
		小 计 Subtotal		6	96								
		修读说明：学生可跨专业自主选择修读全校其他专业的课程，建议修读以上课程。要求至少选修 10 学分。 NOTE: Students can choose any courses from the other specialties, and are especially suggested to choose the courses above. Minimum subtotal credits: 10.											

## 五、集中性实践教学环节建议进程表

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crts	建议修读学期 Suggested Term	第二专业 Second Major
1060002110	军事训练 Military Training	3	1.5	1	
4060197110	认识实习 Understanding of Specialty	1	1	3	
4060175110	基础强化训练 Foundation Strengthening Training	1	1	4(暑期)	
4060293130	环境监测综合实验 Environmental monitoring experiment	1	1	5	
4060285130	固体废物处理工艺设计 Design on Solid Waste Treatment Process	1	1	5	
4060323130	环境工程综合实验 Environmental Engineering Experiment	1	1	6	
4060304130	水处理工艺设计 Design on Water Treatment Process	1	1	6	
4060278130	车间除尘系统设计 Design on Workshop Dust Removal System Design	1	1	6	
4060311130	微生物学实验技术 Microbiology Experiment Technology	1	1	6	
4060201110	生产实习 Practice of Specialty	2	2	6	
4060191110	能力拓展训练 Ability to Develop Training	1	1	7	
4060149110	毕业实习 Graduation Practice	2	2	8	
4060257120	毕业设计(论文) Graduation Design (Thesis)	15	10	8	
小 计 Subtotal		31	24.5		

## 六、其它要求

### VI Recommendations on Course Studies

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

Situation & Policy, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7<sup>th</sup> term . The course will be arranged by the University Students' Affairs' Department in each school.

学院教学责任人：袁艳斌  
专业培养方案责任人：张高科

# 【采矿工程专业】2014 版本本科培养方案

## Undergraduate Education Plan for Specialty in Mining Engineering (2014)

专业名称	采矿工程	主干学科	矿业工程
Major	Mining Engineering	Major Disciplines	Mineral Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	矿业类	大类培养年限	2年
Disciplinary	Mineral	Duration	2 years

### 最低毕业学分规定

#### Graduation Credit Criteria

课程类 Course Classification 课程性质 Course Nature	通识课程 Public Basic Courses	学科大类课程 Basic Disciplinary Courses	专业课程 Specialized Courses	个性课程 Personalized Course	集中性实践 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	35	40	38.5	\	25.5	\	190
选修课 Elective Courses	9	6	16	10	\	10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirement

##### (一) 培养目标

采矿工程专业在秉承几十年专业建设的深厚积淀基础上，以培养基础宽、能力强、素质高、适应国内外现代矿山技术发展需要，具有较强实践能力、语言沟通能力、创新意识与创新能力，具备在固体矿床开采（含金属和非金属开采）、岩土工程、安全工程、爆破工程领域从事生产、管理、设计及科研能力的高级工程技术人才。

- (1) 具有良好的人文社会科学素养、较强的社会责任感和工程职业道德。
- (2) 具有较扎实的数学、物理、计算机科学等方面的自然科学基础，并能利用数学和科学理论和技术手段分析并解决工程问题，具有技术革新、新技术及新工艺研究的初步能力。
- (3) 掌握与矿山企业管理相关的国家有关科学技术、安全生产、劳动保护和环境保护等方面的政策和法规，紧跟国际矿业工程的理论前沿和最新发展动态，以及矿业工程领域相关产业发展状况。
- (4) 具有利用所学专业基础知识和技术手段解决矿产资源露天开采以及地下开采过程中所遇到的工程问题的能力，能够进行矿产资源开采的设计、组织施工和生产管理。掌握矿山生产系统数字化和可视化的方法，基本具有构建和设计数字矿山的能力。
- (5) 掌握矿产资源开采工艺环节可能发生的主要安全问题及安全管理知识，具备运用安全科学与工程相关的理论和技术方法分析并解决所遇到的矿山安全生产问题的能力。
- (6) 具有较好的综合素质，具有良好的口头和书面表达和沟通交流能力，具有团结协作精神和与他人合作共事的能力，具有适应艰苦环境和胜任艰巨工作的能力，具有终身学习的能力。

#### Educational Objectives

Based on decades of professional conduction and development, Mining Engineering is aimed to cultivate senior engineering and technical personnel with solid foundation and high quality to meet the needs of modern mining technology both home and abroad. Furthermore, the excellent graduates are provided with good practical ability, communication skills, creativity, sense of innovation as well as the abilities of production, management, design and scientific research in the field of Mining (metal and nonmetal mines), safety, blasting and geotechnical engineering, etc. To be more specific, the high-level talents of Mining Engineering should be able to

- ① acquire the comprehensive quality of science and humanity as well as the sense of social responsibility and professional morality.

- ② lay a solid foundation of natural sciences such as mathematics, physics, computer science, etc., with which they are able to analyze and solve engineering problems by mathematical and scientific methods. Furthermore, they should acquire initial ability of technological innovation.
- ③ grasp relevant policies and regulations about science and technology, production safety, labor and environmental protection, etc. in the field of mine enterprise management. In the meanwhile, they should keep in step with the cutting edge of the theories and development of Mining Engineering and relevant industries both home and abroad.
- ④ acquire the ability of solving engineering problems in both opencast and underground mining with professional theories and technologies and therefore be able to in charge of designing, organization, construction and production management during mineral resources exploitation. Simultaneously, they should master the digital and visualization methods of mining production system so as to design and build a digital mine.
- ⑤ grasp the main knowledge about safety issues and management in the process of mineral resource exploitation and acquire the ability of analyzing and solving problems by relevant theories and techniques about safety science and engineering.
- ⑥ process good comprehensive quality, the oral and written expression ability as well as communication skills, the unity spirit and the capability to work in cooperation, the ability of adapting to harsh environment and arduous work, the sense of lifelong education, etc.

## (二) 毕业要求

- (1) 学生掌握从事本专业领域所需的数学、相关自然科学知识以及一定的人文和社会科学知识。
- (2) 学生掌握扎实的矿业工程学科的基本知识和从事采矿工作所需的基础理论知识，了解本专业的发展现状和趋势。
- (3) 学生掌握工程项目管理的基础理论与管理方法，具有初步的工程项目管理能力。
- (4) 学生掌握爆破工程的基本理论和基本知识，能够独立进行岩土工程爆破方案设计。
- (5) 学生掌握矿产资源露天开采所需的基础理论知识，具有利用所学专业基础知识和技术手段解决露天开采过程中所遇到的工程问题的基本能力。
- (6) 学生掌握矿产资源地下开采所需的基础理论知识，具有利用所学专业基础知识和技术手段解决地下开采过程中所遇到的工程问题的基本能力。
- (7) 学生掌握较扎实的安全工程技术理论知识和较强的专业技能，能够运用所学知识和技能从事安全工程与技术、安全科学研究、安全监察与管理、矿山通风管理、通风系统设计、安全检测与监测等方面的工作。
- (8) 学生能熟练地运用计算机及其相关软件（如：AutoCAD 或 Surpac）进行采矿工程开采及单体设计。
- (9) 学生具备有效进行采矿工程专业技术综合实验和模拟仿真设计与操作的能力，并能够对实验结果进行分析和解释。
- (10) 学生具有逻辑思维和辩证思维的能力，具有批判意识和求真务实的科学思维方法，具有创新意识，掌握基本的创新方法。
- (11) 学生掌握运用现代信息技术跟踪并获取信息的方法，熟练进行文献检索和资料查询。
- (12) 学生具有良好的口头和书面表达和交流能力，至少熟练掌握一门外语进行技术沟通和交流能力，具有良好的团队意识和合作精神。
- (13) 学生具有良好的思想素质、身体素质、心理素质、文化修养、社会道德和责任担当等人文素养。
- (14) 学生具有较强的社会责任感、工作责任感，能不断检查自身的发展需求，制定并实施继续职业发展计划。

## Graduated Requirement

- 1 Students should acquire the relevant knowledge in natural sciences, humanities and social sciences.
- 2 Students should master the basic theoretical knowledge in Mining Engineering and understand the state and trend of its development.
- 3 Students should master the basic theories and methods in engineering project management and therefore be capable to take charge of a project preliminarily.
- 4 Students should master the basic theories of blasting engineering and therefore be able to carry out the design of geotechnical blasting independently.
- 5 Students should acquire the basic knowledge of opencast mining and be able to solve engineering problems by professional theories and techniques.
- 6 Students should acquire the basic knowledge of underground mining and be able to solve engineering

problems with professional theories and techniques.

7 Students should master solid theoretical knowledge and professional skills in safety engineering so as to carry out relevant works about safety engineering and technology, safety science research, safety supervision and management, mine ventilation management, ventilation system design, safety testing and monitoring, etc.

8 Students should be able to skillfully use computers and relevant software (e.g. AutoCAD and Surpac) for mining and monomer design.

9 Students should acquire the ability to carry out technology comprehensive experiment, simulation design and operation in Mining Engineering and be able to analyze and interpret the experimental results.

10 Students should be provided with logical and dialectical thinking method, critical and pragmatic consciousness as well as innovation sense and methods.

11 Students should be able to master the methods for tracking and obtaining information by modern techniques as well as conduct literature retrieval and data query skillfully.

12 Students should not only acquire good oral and written expression ability and communication skills, but also master at least one foreign language in order to make daily and technical communication. Moreover, they should have a good sense of unity and cooperation.

13 Students should acquire good humanistic qualities including ideological quality, physical quality, psychological quality, cultural accomplishment as well as sense of social morality and responsibility.

14 Students should acquire strong sense of social and professional responsibility, be able to self-examine their own needs of development and draw up and implement their career development plan.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5	培养目标 6
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			√			√
毕业要求 13	√					
毕业要求 14	√					√

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

#### (一) 专业核心课程:

专业核心课程：地质学、GPS 原理及测量应用、矿山测量、理论力学 B、材料力学 C、流体力学 D、岩体力学、爆破工程、矿山地质与工程地质、矿山工程测试技术、矿床露天开采、矿床地下开采、井巷与隧道工程、矿山提升与运输、工矿通风与空调、矿山设计原理、资源数字化技术。

**Core Courses:** Geology, Mining Engineering Surveying ,Theoretical Mechanics B, Mechanics of Materials C, Fluid Mechanics D, Rock Mechanics, Blasting Engineering, Mine geology and Engineering geology, Mine Engineering Testing Technology, Surface Mining, Underground Mining, Mine & Tunnel Engineering, Mine Lift and Transportation ,Mine and Industrial Ventilation & Air-Conditioning, Principles for Design of Mines, Digital Mine

#### (二) 专业特色课程:

矿山工程测试技术、爆破工程、矿业系统工程、井巷与隧道工程、工矿通风与空调、矿业工程前沿、矿山企业管理、资源数字化技术。

**Characteristic Courses:** Mine Engineering Testing Technology, Blasting Engineering, Mining Systems Engineering, Mine & Tunnel Engineering, Mine and Industrial Ventilation & Air-Conditioning, Mining Engineering Frontier, Mine Enterprise Management, Digital Mine

附：毕业要求实现矩阵：

专业 核心 课程	专业 特色 课程	课程名称	采矿工程专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
		思想道德修养与法律基础	√													√	
		中国近现代史纲要	√														
		毛泽东思想和中国特色社会主义理论体系概论	√													√	
		马克思主义基本原理	√													√	
		军事理论	√														
		体育														√	
		大学英语												√			
		大学计算机基础	√								√		√				
		计算机程序设计基础	√								√						
		专业导论		√													
		高等数学	√														
		线性代数	√														
		概率论与数理统计 B	√														
√		地质学		√		√					√						
		工程图学 C		√							√						
		大学物理 B	√														
		物理实验 B	√														
		电工与电子技术基础 C	√														
√		矿山测量									√						
√		GPS 原理及测量应用									√						
		资源工程 CAD									√						
		虚拟现实技术										√					
		灾害防治理论与技术									√						
		矿业工程项目管理				√											
		灾害学原理									√						

专业 核心 课程	专业 特色 课程	课程名称	采矿工程专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
		矿业技术经济学			√												
		安全管理学								√							
		安全心理学								√							
		人工智能与专家系统										√					
√		理论力学 B		√													
		机械设计基础	√														
√		材料力学 C		√													
√		流体力学 D		√													
√	√	爆破工程				√					√						
√		岩体力学		√													
√		矿山地质与工程地质		√													
√	√	矿山工程测试技术		√						√							
√		矿床露天开采						√									
√		矿床地下开采							√								
√	√	井巷与隧道工程				√		√									
√	√	工矿通风与空调						√	√								
√		矿山提升与运输						√									
√	√	资源数字化技术									√						
√		矿山设计原理				√			√	√							
		对地观测技术与公共安全						√	√								
	√	矿业工程前沿		√									√				
		采矿工程专业外语												√			
		弹性力学 B		√													
		控制爆破				√											
		采矿工程数值模拟与仿真									√						
		矿山采掘设备及其管理						√	√								

专业 核心 课程	专业 特色 课程	课程名称	采矿工程专业毕业要求														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
		安全工程学								√							
	√	矿业系统工程			√								√				
		选矿工艺与实例			√												
		爆破安全技术								√							
		危险辨识与风险评价技术								√							
		安全系统工程与系统管理								√							
	√	矿山企业管理			√												
		总图与厂矿道路工程			√		√	√									
		石材工程					√										
		地下空间工程						√									
		军事训练														√	√
		认识实习（含地质实习）		√													
		机械制造工程实训 C	√														
		机械设计基础课程设计	√														
		能力拓展训练		√						√			√				
		工程技术综合实验				√						√					
		生产实习									√	√					
		工矿通风与空调课程设计							√	√							
		工程设计数字化训练									√						
		毕业实习														√	√
		毕业设计（论文）					√	√	√	√	√						

### 三、课程教学进程图

#### III Teaching Process Map



#### 四、理论教学建议进程表

#### IV Theory Course Schedule

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major		
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur					
通 识 课 程  Public Basic Courses	必 修 课 Required Courses	4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1-6				
		4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1-6				
		4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		1-6				
		4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		1-6				
		1060003130	军事理论 Military Theory	1	32			16		1-4				
		4210001110	体育 1 Physical Education I	1	32					1				
		4210002110	体育 2 Physical Education II	1	32					2	体育 1			
		4210003110	体育 3 Physical Education III	1	32					3	体育 2			
		4210004110	体育 4 Physical Education IV	1	32					4	体育 3			
		1050001130	心理健康教育 Mental Health Education	1	16					1-2				
		4030002110	大学英语 A1 College English A I	3	64				16	1				
		4030003110	大学英语 A2 College English A II	3	64				16	2	大学英语 A1			
		4030004110	大学英语 A3 College English A III	3	64				16	3	大学英语 A2			
		4030005110	大学英语 A4 College English A IV	3	64				16	4	大学英语 A3			
		4120017110	大学计算机基础 Foundation of Computer	2	32		12			1				
		程序设计语言课程组(三选一, 3 学分) Courses of Computer Program Design (select one out of three, Credits: 3)												
				4120023110	计算机程序设计基础(C 语言) Fundamentals of Computer Program	3	48		12			2		
				4120024110	计算机程序设计基础(FORTRAN 语言) Fundamentals of Computer Program	3	48		12			2		
				4120025110	计算机程序设计基础(VB 语言) Fundamentals of Computer Program	3	48		12			2		
				小 计 Subtotal		35	736		24	64	64			
选 修 课 Elective Courses	创新创业类 Innovation and Entrepreneurship Courses			全校学生要求至少取得 9 个学分, 且必须选修艺术体育类课程中的艺术类相关课程, 取得至少 2 个学分。理工科专业学生至少选修一门人文社科类或经济管理类课程, 其他专业学生至少选修一门科学技术类课程。 All students are required to obtain at least 9 credits, and must select art courses from Art and Physical Education Courses to obtain at least 2 credits. Science and engineering students should select at least one course from Arts and Social Science Courses or Economy and Management Courses, and other students should select at least one course from Science and Technology Courses.										
	人文社科类 Arts and Social Science Courses													
	经济管理类 Economy and Management Courses													

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major		
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur					
		科学技术类 Science and Technology Courses												
		艺术体育类 Art and Physical Education Courses												
学 科 大 类 课 程  Basic Disciplinary Courses	必 修 课  Required Courses	4060212110	专业导论 Introduction to Specialty	1	16					1				
		4050063110	高等数学 A1 Advanced Mathematics A1	5	80					1				
		4050229110	线性代数 Linear Algebra	2.5	40					2				
		4050064110	高等数学 A2 Advanced Mathematics A2	5	80					2				
		4060027110	地质学 Physical Geology	2.5	40					2				
		4080042110	工程图学 C Engineering Graphics C	4	64		8			2				
		4050058110	概率论与数理统计 B Probability and Statistics B	3	48					3				
		4050463130	大学物理 B Physics B	5	80					3				
		4050224110	物理实验 B Physics Lab. B	1	32	32				4				
		4050012110	电工与电子技术基础 C Fundamentals of Electrical Engineering &	4	64	10				4				
		4200184130	物理化学 C Physical Chemistry C	4	64					4				
		测量课程组（二选一，3.5 学分） Surveying courses (Choice one freely,Crs:3.5)												
		4060369140	矿山测量 Mining Geodesy	3	48		10	16			3			
		4060370140	GPS 原理及测量应用 GPS Principle and Its Application in Surveying	3	48		10	16			3			
		小 计 Subtotal				40	656	42	18	16				
		选 修 课  ELECTIVE Courses		4060128110	资源工程 CAD Resource Engineering CAD	2	32		24			2		
				4060118110	虚拟现实技术 Virtual Reality	2	32	12				3		
				4060124110	灾害防治理论与技术 Calamity Prevention theory and technology	2	32					3		
				4060091110	矿业工程项目管理 Engineering project management	2	32					3		
4060125110	灾害学原理 Disaster Science			2	32					3				
4060301130	矿业技术经济学 Mining Economics			2	32					4				
4060129110	安全管理学 Safety Management			2	32					4				
4060324130	安全心理学 Safety Psychology			2	32			8		4				

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
		4060100110	人工智能与专家系统 AI & ES	2	32					4			
		小 计 Subtotal		18	288	12	24	8					
		修读说明：要求至少选修 6 学分。 NOTE: Minimum subtotal credits: 6.											
专 业 课 程  Specialized Courses	必 修 课  Required Courses	4050129110	理论力学 A Theoretical Mechanics A	4.5	72					3			
		4080061110	机械设计基础 Foundation of Machine Design	3.5	56	6				4	工程图学 C		
		4050018110	材料力学 C Mechanics of Materials C	4	64	4				4	理论力学 B		
		4050136110	流体力学 D Fluid Mechanics D	2	32	6				5	理论力学 B		
		4060014110	爆破工程 Blasting Engineering	2.5	40					5	理论力学 B		
		4060121110	岩体力学 Rock Mechanics	2.5	40					5	理论力学 B		
		4060077110	矿山地质与工程地质 Mining Geology & Engineering Geology	2	32					5			
		4060078110	矿山工程测试技术 Testing Techniques in mining	2	32					5			
		4060071110	矿床露天开采 Surface Mining	2	32					6	材料力学 C		
		4060070110	矿床地下开采 Underground Mining	2	32					6	材料力学 C		
		4060236120	井巷与隧道工程 Mine & Tunnel Engineering	2	32					6	岩体力学		
		4060230120	工矿通风与空调 Mine and Industry Ventilation & Air-Conditioning	2	32					6	矿床地下开采		
		4060081110	矿山提升与运输 Mine Lift and Transportation	2	32					6	矿床地下开采		
		4060131110	资源数字化技术 Digital Mine	2	32					7			
	4060300130	矿山设计原理 Principles for Design of Mines	3.5	56				28	7				
			小 计 Subtotal		38.5	616	16		28				
		选 修 课  Elective Courses	4060329130	对地观测技术与公共安全 Earth Observation Technology and Public	2	32					4		
			4060328130	矿业工程前沿 Mining Engineering Frontier	2	32					5		
			4060360130	采矿工程专业外语 Specialized English of Mining Engineering	2	32					5		
			4050026110	弹性力学 B Mechanics of Elasticity B	3	48					5	材料力学 C	
	4060069110		控制爆破 Demolition Blasting	2	32					6	爆破工程		
	4060075110		矿山采掘设备及其管理 Excavation Equipment and Management	2	32					6	矿床露天开采		

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
		4060009110	安全工程学 Safety Engineering	2	32					6			
		4060094110	矿业系统工程 Mining Systems Engineering	3	48					6	概率论与数理统计 B		
		4060119110	选矿工艺与实例 Technics and Examples of Mineral	2	32					7			
		4060013110	爆破安全技术 Security Techniques of Blasting	2	32					7	爆破工程		
		4060114110	危险辨识与风险评价技术 Hazard Identification & Risk Assessment	2	32					7			
		4060223110	安全系统工程与系统管理 Safety System Engineering and System	4	64			32		7			
		4060079120	矿山企业管理 Mine Enterprise Management	2	32					7			
		4060136110	总图与厂矿道路工程 Road Engineering	2	32					7			
		4060105110	石材工程 Stone Material Project	2	32					7			
		4060026110	地下空间工程 Underground Engineering	2	32					7			
		小 计 Subtotal		36	576			32					
		修读说明：要求至少选修 16 学分。 NOTE: Minimum subtotal credits: 16.											
个性化课程 Personalized Course	选修课 Elective Courses	4060329130	对地观测技术与公共安全 earth Observation Technology and Public	2	32					4			
		4060328130	矿业工程前沿 Mining Engineering Frontier	2	32					5			
		4060330130	安全工程前沿 Safety Engineering Frontier	2	32					5			
		4060361130	采矿工程数值模拟与仿真 Numerical Modeling and Simulation of	2	32					6			
		小 计 Subtotal		8	128								
		修读说明：学生可跨专业自主选择修读全校其他专业的课程，建议修读以上课程。要求至少选修 10 学分。 NOTE: Students can choose any courses from the other specialties, and are especially suggested to choose the courses above. Minimum subtotal credits: 10.											

## 五、集中性实践教学环节

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crs	建议修读学期 Suggested Term
1060002110	军事训练 Military Training	3	1.5	1
4060314130	认识实习（含地质实习） Field trip I (including practice of geology)	1	1	4（暑期）
4080151110	机械制造工程实训 C Machinery Manufacturing Engineering Practice C	2	2	4
4080146110	机械设计基础课程设计 Course Design on Foundation of Machine Design	2	2	4

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crs	建议修读学期 Suggested Term
4060192110	能力拓展训练 Ability Development Training	1	1	5
4060264120	工程技术综合实验 Engineering Techniques Lab. Session	2	2	6
4060202110	生产实习 Field Trip	2	2	6 (暑期)
4060163110	工矿通风与空调课程设计 Mine and Industry Ventilation & Air-Condition	1	1	6
4060284130	工程设计数字化训练 Engineering Design Digital Training	1	1	7
4060150110	毕业实习 Graduation Practice	2	2	8
4060258120	毕业设计 (论文) Graduation Thesis	15	10	8
小 计 Subtotal		32	25.5	

## 六、修读指导

### VI Recommendations on Course Studies

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

Situation & Policy, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7<sup>th</sup> term. The course will be arranged by the University Students' Affairs' Department in each school.

学院教学责任人：袁艳斌  
专业培养方案责任人：任高峰

# 【安全工程专业】2014 版本本科培养方案

## Undergraduate Education Plan for Specialty in Safety Engineering (2014)

专业名称	安全工程	主干学科	安全科学与工程
Major	Safety Engineering	Major Disciplines	Safety Science and Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of engineering
所属大类	工学	大类培养年限	2 年
Disciplinary	Science and engineering	Duration	2 years

### 最低毕业学分规定

#### Graduation Credit Criteria

课程类 Course Classification 课程性质 Course Nature	通识课程 Public Basic Courses	学科大类课程 Basic Disciplinary Courses	专业课程 Specialized Courses	个性课程 Personalized Course	集中性实践 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	35	40	34	\	28	\	190
选修课 Elective Courses	9	6	18	10	\	10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirements

##### (一) 培养目标

本专业学生主要学习安全系统工程、灾害防治理论与技术、安全信息系统等方面的基本理论和基本知识，受到应用基础研究和技术开发方面的科学思维和科学实验训练，具有较好的科学素养；具备注册安全工程师基础知识、专业能力和素质，掌握安全工程设计、生产开发与应急技术的基本技能及初步的教学、研究、开发和管理能力。通过大学四年的学习，毕业生应获得以下几方面的知识和能力：

- (1) 具有较好的人文社会科学素养、较强的社会责任感和工程职业道德，身心健康，具备较高的安全意识。
- (2) 具有较扎实的数学、物理、计算机科学等方面的自然科学基础，较好的人文社会科学基础和外语综合能力。
- (3) 具有运用安全系统工程、安全心理学、人机工程学、安全信息系统、安全经济学、灾害防治理论与技术、职业安全与卫生学等知识进行灾害应急预警、安全管理和安全评价能力。
- (4) 具备运用安全科学与工程相关的理论和现代安全监测技术解决矿山安全、工业与环境安全等行业领域的实际问题能力。
- (5) 掌握与安全职业和行业相关的国家有关科学技术、安全生产、环境保护和劳动保护等方面的政策和法规，紧跟国际安全科学与工程的理论前沿、应用前景和最新发展动态，以及安全工程领域相关产业发展状况。
- (6) 具有良好的口头和书面表达和交流沟通能力、良好的团队意识和合作精神，具有终身学习的能力。
- (7) 掌握资料查询、文献检索及运用现代信息技术获取相关信息的基本方法；具有一定

的实验设计、创造实验条件，归纳、整理、分析实验结果，撰写论文、参与学术交流的能力。

### **(I) Educational Objectives**

The curriculum of the major includes safety engineering, disaster prevention theory and technology, safety information system, etc. The undergraduates are required to study the basic theory and knowledge of these courses. The students will be trained with the scientific thought and experiment in aspects of both applied fundamental research and technology development. Then the students will have good scientific literacy, and have the ability to conduct safety design, production & development, and emergency technology. The students should also have the preliminary abilities of teaching, research, development and managements. The graduates should have the required knowledge, skills and abilities as follows after four-year college education:

1 Good humanism quality, strong societal responsibility and professional ethics, healthy body and mind, and good safety awareness.

2 Solid foundation in mathematics, physics, computer science, etc.; qualified foundation in humanities and social sciences and comprehensive foreign language abilities.

3 Abilities to conduct disaster emergency warning, safety management and evaluation using the knowledge of safety engineering, safety psychology, ergonomics, safety informatics, safety economics, disaster prevention theory and technology, occupational safety and health, etc.

4 Abilities to apply the solving theory and technique of safety science to solve practical problems on mine safety, Industrial and of environmental safety, etc.

5 Master the national policies, laws and regulations related to the safety occupation and industry in the science & technology, production safety, environment protection; Keep up with the international theory forefront of safety science and engineering, application prospects, the latest status and the development situation in industries concerned with safety engineering.

6 Qualified foundation in Oral communication and written expression; have team spirit and life-long learning ability.

7 Master the basic methods of data query, the literature search and the application of modern information technology in acquiring information; Have the abilities to design experiment, create experimental conditions, and induce, process and analyze the experimental data. Have the abilities to write paper and participate in academic exchanges.

### **(二) 毕业要求**

- (1) 具有从事安全工程工作所需的自然科学知识以及一定的人文和社会科学知识。
- (2) 掌握扎实的安全工程基础知识和本专业的基本理论知识，了解本专业的发展现状和趋势。
- (3) 熟悉安全工程职业与相关行业领域的国家有关科学技术、安全生产、环境保护和劳动保护等方面的政策和法规。
- (4) 了解矿山工程在安全生产方面的实际需求以及相应的技术发展，能结合矿山岩土工程地质条件与矿床开采工艺环节，初步具备对矿山事故、地质与工程灾害等开展调查和分析，改进矿山安全与生产与管理的能力。
- (5) 了解工业与环境在安全生产方面的实际需求以及相应的技术发展，掌握火灾与爆炸灾害基础知识，并能运用所学的电工学、计算机技术和防火防爆等专业知识，对工业生产过程进行安全检测、监测与控制。
- (6) 掌握安全信息系统、安全数字化训练、公共安全应急与技术等基础知识，熟练运用以空间信息技术为核心的专业化软件，初步具备设计、开发和应用安全业务信

息系统的专业技能和工程管理理念。

- (7) 了解其它行业领域等运用安全科学的一般原理、技术和方法，重点包括交通运输工程、土木建筑、化工与消防等工程。
- (8) 具备从事安全工程方面的设计、研究、检测、评价、监察和管理等工作的能力。
- (9) 具有较强的表达和沟通能力，能够进行工程文件的编纂，能够运用英语进行与安全工程技术方面的表达、沟通和交流。
- (10) 具有较强的获取知识、终身学习的能力，具备收集、分析、判断、归纳和选择国内外相关技术信息的能力。
- (11) 学生具有良好的思想素质、身体素质、心理素质、文化修养、社会道德和责任担当等人文素养。
- (12) 具有较强的社会责任感和工作责任感、扎实的安全意识与安全技能。

## **(II) Graduated Requirements**

(1) Natural science knowledge and some Humanistic and social science required by engaging in safety engineering work.

(2) Master solid foundation knowledge in safety engineering, and have the knowledge about status and trend of this major.

(3) Be familiar with the policies and laws about the science and technology of safety engineering and relevant fields, and about safety production, environment protection and labor protection, etc.

(4) Have the knowledge about the actual demands of safety production in mining engineering and its relevant technology development. Abilities to carry out the investigation and analysis on mining accidents, geological and engineering hazards, and improve the mine production process or the management mode based on the mine geotechnical engineering geological conditions and deposit mining processes.

(5) Have the knowledge about the actual demands of safety production in industry and environment, and its relevant technology development, master the fundamental knowledge of fire and explosion, and the safety detection, monitoring and control of industry production based on the professional knowledge of electrotechnics, computer technology, fire and explosion prevention, etc.

(6) Master the fundamental knowledge of safety numerical technology, safety information system, accident emergency and management etc., be familiar with the professional software of GIS, and the professional skills of design, develop and apply the safety production information system and the engineering management idea.

(7) Have the knowledge about the general principle, technology and method of safety science in other industry fields, including traffic and transport engineering, civil engineering, etc.

(8) Strong competency in design, research, detective, evaluation, procuratorial and management work on safety engineering.

(9) Qualified foundation in expression and communication to compile project files and exchange engineering technical information in both native and English language.

(10) Abilities to obtain knowledge, and lifelong learning; have the capability of collecting, analyzing, judging, concluding and selecting the domestic and foreign relevant technology.

(11) Good quality on ideology, body, psychology, culture, social conscience and responsibility, etc.

(12) Strong social responsibility, positive working attitudes, and good safety awareness.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5	培养目标 6	培养目标 7
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	✓						

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

#### (一) 专业核心课程：

安全系统工程、安全人机工程、安全信息系统、危险源辨识与风险评价、职业安全与卫生、工程热力学与传热学、燃烧与爆炸学。

Safety Systems Engineering, Safety Ergonomics, Safety Information System, Hazard Identification & Risk Assessment, Occupational Safety and Health, Engineering Thermodynamics and Heat Transfer, Combustion and Explosion Science.

#### (二) 专业特色课程：

工矿通风与空调、防火防爆工程、爆破工程、建筑工程施工安全、地质灾害预报与防治、矿山安全评价、公共安全与应急技术、安全检测与监测。

Characteristic Courses: Mine Ventilation and Air Conditioning, Fire Prevention and Protection, Blasting Engineering, Construction Engineering Safety, Prediction and Prevention of Geological Disasters, Mining Safety, Public Security and Emergency Technology, Safety Detection and Monitoring Technology.

附：毕业要求实现矩阵：

专业核心课程	专业特色课程	课程名称	安全工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础											✓	
		中国近现代史纲要	✓											
		毛泽东思想和中国特色社会主义理论体系概论	✓										✓	
		马克思主义基本原理	✓										✓	
		军事理论	✓											
		体育											✓	
		大学英语									✓			

专业 核心 课程	专业 特色 课程	课程名称	安全工程专业毕业要求													
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
		大学计算机基础	✓													
		计算机程序设计基础	✓													
		专业导论		✓								✓	✓	✓		
		高等数学	✓													
		线性代数	✓													
		概率论与数理统计 B	✓													
		地质学		✓												
		工程图学 C		✓												
		大学物理 B	✓													
		物理实验 B	✓													
		电工与电子技术基础 C	✓													
		矿山测量				✓										
		GPS 原理及测量应用				✓										
		资源工程 CAD	✓								✓					
		虚拟现实技术						✓								
		灾害防治理论与技术		✓												
		矿业工程项目管理				✓										
		灾害学原理		✓												
		矿业技术经济学				✓										
		安全管理学		✓							✓					
		安全心理学		✓												
		人工智能与专家系统		✓												
		机械设计基础	✓													
		工程力学 A		✓												
		工程热力学与传热学 C		✓												
		流体力学 D		✓												
		系统可靠性分析									✓					
		安全检测与监测		✓							✓					
√		燃烧与爆炸学		✓			✓									
	√	安全信息系统						✓								
√		岩体力学		✓							✓					
√		安全人机工程		✓							✓					
√		危险辨识与风险评价		✓							✓					

专业 核心 课程	专业 特色 课程	课程名称	安全工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
√		职业安全卫生								√				
√		安全系统工程		√							√			
		安全科技前沿		√								√		
		公共安全信息技术前沿										√		
		安全工程专业外语									√			
√		地质灾害预报与防治				√								
		空间信息应急技术						√						
		公共安全与应急管理						√						
		化工安全					√							
√		采矿概论				√								
		矿业系统工程				√								
		爆破工程				√			√					
√		防火防爆工程					√							
		安全经济学		√						√				
√		工矿通风与空调				√								
√		矿山安全评价				√				√				
√		建设工程施工安全							√	√				
		地下空间工程							√					
		交通运输安全技术							√					
		安全法规			√									
		军事训练											√	
		认识实习（含地质实习）										√		
		电工电子实习 B								√				
		机械制造工程实训 C								√				
		机械设计基础课程设计								√				
		专业综合实验				√	√	√		√				
		生产实习											√	√
		能力拓展训练											√	√
		安全工程数字化训练						√						
		毕业实习										√	√	
		毕业设计（论文）								√	√	√		

### 三、课程教学进程图

#### III Teaching Process Map



#### 四、理论教学建议进程表

#### IV Theory Course Schedule

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major		
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur					
通 识 课 程  Public Basic Courses	必 修 课  Required Courses	4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1-6				
		4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1-6				
		4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		1-6				
		4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		1-6				
		1060003130	军事理论 Military Theory	1	32			16		1				
		1050001130	心理健康教育 Mental Health Education	1	16					2				
		4210001110	体育 1 Physical Education I	1	32					1				
		4210002110	体育 2 Physical Education II	1	32					2	体育 1			
		4210003110	体育 3 Physical Education III	1	32					3	体育 2			
		4210004110	体育 4 Physical Education IV	1	32					4	体育 3			
		4030002110	大学英语 A1 College English A I	3	64				16	1				
		4030003110	大学英语 A2 College English A II	3	64				16	2	大学英语 A1			
		4030004110	大学英语 A3 College English A III	3	64				16	3	大学英语 A2			
		4030005110	大学英语 A4 College English A IV	3	64				16	4	大学英语 A3			
		4120017110	大学计算机基础 Foundation of Computer	2	32		12			1				
		程序设计语言课程组(三选一, 3 学分) Courses of Computer Program Design (select one out of two, Credits: 3)												
				4120023110	计算机程序设计基础(C 语言) Fundamentals of Computer Program Design(C)	3	48		12			2		
				4120025110	计算机程序设计基础(VB 语言) Fundamentals of Computer Program Design(VB language)	3	48		12			2		
				4120024110	计算机程序设计基础(FORTRAN 语言) Fundamentals of Computer Program Design(FORTRAN)	3	48		12			2		
				小计 Subtotal		35	736		24	64	64			
选 修 课  Elective Courses	创新创业类 Innovation and Entrepreneurship Courses			全校学生要求至少取得 9 个学分, 且必须选修艺术体育类课程中的艺术类相关课程, 取得至少 2 个学分。理工科专业学生至少选修一门人文社科类或经济管理类课程, 其他专业学生至少选修一门科学技术类课程。 All students are required to obtain at least 9 credits, and must select art courses from Art and Physical Education Courses to obtain at least 2 credits. Science and engineering students should select at least one course from Arts and Social Science Courses or Economy and Management Courses, and other students should select at least one course from Science and Technology Courses.										
	人文社科类 Arts and Social Science Courses													
	经济管理类 Economy and Management Courses													

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major		
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur					
		科学技术类 Science and Technology Courses												
		艺术体育类 Art and Physical Education Courses												
学 科 大 类 课 程  Basic Disciplinary Courses	必 修 课  Required Courses	4010107110	专业导论 Introduction to Specialty	1	16					1				
		4050063110	高等数学 A1 Advanced Mathematics A1	5	80					1				
		4050064110	高等数学 A2 Advanced Mathematics A2	5	80					2				
		4050229110	线性代数 Linear Algebra	2.5	40					2				
		4060027110	地质学 Physical Geology	2.5	40					2				
		4080041110	工程图学 C Engineering Graphics C	4	64		8			2				
		4050058110	概率论与数理统计 B Probability and Statistics A	3	48					3				
		4050460130	大学物理 B Physics B	5	80					3				
		4050461130	物理实验 B Physics Lab. B	1	32	32				4				
		4100012110	电工与电子技术基础 C Fundamentals of Electrical Engineering & Electric C	4	64	10				4				
		4200184130	物理化学 C Physical Chemistry C	4	64					4				
		测量课程组（二选一，3.5 学分） Surveying courses (Choice one freely, Crs:3.5)												
		4060241120	矿山测量 Mining Surveying	3	48		10	16			3			
	4060272120	GPS 原理及测量应用 GPS Principle and Its Application in Surveying	3	48		10	16			3				
	小计 Subtotal				40	656	42	18	16					
	选 修 课  Elective Courses	4060128110	资源工程 CAD Resource Engineering CAD	2	32		24			2				
		4060118110	虚拟现实技术 Virtual Reality	2	32	12				3				
		4060124110	灾害防治理论与技术 Calamity Prevention theory and technology	2	32					3				
		4060091110	矿业工程项目管理 Engineering project management	2	32					3				
4060125110		灾害学原理 Disaster Science	2	32					3					
4060301130		矿业技术经济学 Mining Economics	2	32					4					
4060129110		安全管理学 Safety Management	2	32					4					

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur			
		4060324130	安全心理学 Safety Psychology	2	32			8		4		
		4060100110	人工智能与专家系统 AI & ES	2	32					4		
		小计 Subtotal		18	288	12	24	8				
		修读说明：要求至少选修 6 学分。 NOTE: Minimum subtotal credits: 6.										
专业 课程  Specialized Courses	必修课 Required Courses	4080061110	机械设计基础 Foundation of Machine Design	3.5	56	6				4		
		4050071110	工程力学 A Engineering Mechanics A	4	64					4		
		4060325130	系统可靠性分析 System Reliability analysis	2	32					4		
		4050014110	工程热力学与传热学 C Engineering Thermodynamics and Heat Transfer C	3	48	8				5	流体力学 D	
		4050136110	流体力学 D Fluid Mechanics D	2	32	6				5		
		4060121110	岩体力学 Rock Mechanics	2.5	40					5	工程力学 A	
		4060011110	安全人机工程 Safety Man-Machine Engineering	2	32	8				5		
		4060327130	安全信息系统 Safety Information System	3	48			16		6		
		4060326130	燃烧与爆炸学 Combustion and Explosion	2.5	40	8				6		
		4060240120	安全检测与监测 Safety Detection and Monitoring	2.5	40			8		6		
		4060223120	安全系统工程 Safety System Engineering	3	48			16		6		
		4060114110	危险辨识与风险评价 Hazard Identification & Risk Assessment	2	32					7		
		4060126110	职业安全卫生 Occupational Safety and Health	2	32					7		
			小计 Subtotal		34	544	36		40			
		选修课 ELECTIVE Courses	4060328130	安全工程专业外语 Specialized English of Safety Engineering	2	32					5	
	4060077110		地质灾害预报与防治 Geological Disaster Prediction	2	32					5		
	4060014110		爆破工程 Blasting Engineering	2.5	40	8				5		
	4060364140		空间信息应急技术 Spatial Information Emergency Technology	3	48	16				5		
	4060329130		采矿概论 Mining Exploitation	3	48					6		
	4060029110		防火防爆工程 Fire Prevention and Protection	2.5	40	8				6	燃烧与爆炸学	
	4060230120		工矿通风与空调 Mine and Industry Ventilation & Air-Conditioning	2	32			8		6		

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur			
		4060074110	矿山安全评价 Mine Safety Assessment	2	32					7		
		4060094110	矿业系统工程 Mining Systems Engineering	3	48					7		
		4060061110	建设工程施工安全 Construction Safety	2	32					7		
		4060026110	地下空间工程 Underground Engineering	2	32					7		
		4200317130	化工安全 Chemical engineering safety	2	32					7		
		4060331130	公共安全应急与管理 Public Safety and Emergency Management	2	32					7		
		4060062110	交通运输安全技术 Transportation Safety	2	32					7		
		4060330130	安全经济学 Safety Economics	2	32					7		
		4060008110	安全法规 Safety Law	2	32					7		
		小计 Subtotal		36	576	32		8				
修读说明：要求至少选修 18 学分。 NOTE: Minimum subtotal credits: 18												
个性化课程 Personalized Course	选修课 Elective Courses	4060330130	安全科技前沿 Safety Engineering Frontier	2	32					4		
		4060329130	公共安全信息技术前沿 Information Frontier of Public Safety	2	32					5		
		小计 Subtotal		4	64							
修读说明：学生从以上个性课程和学校发布的其它专业的个性课程列表中选课，要求至少选修 10 学分。 NOTE: Students can choose any courses from above courses or other majors' personalized courses released by the university. Minimum subtotal credits: 10.												

## 五、集中性实践教学环节

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crs	建议修读学期 Suggested Term
1060002110	军事训练 Military Training	3	1.5	1
4060332130	认识实习(含测量和地质) Field trip I (including practice of survey and geology)	1.5	1.5	4(暑期)
4100069110	电工电子实习 B Electrics Practice B	1	1	4
4080151110	机械制造工程实训 C Machinery Manufacturing Engineering Practice C	2	2	5

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 CrS	建议修读学期 Suggested Term
4080146110	机械设计基础课程设计 Course Design on Foundation of Machine Design	2	2	5
4060271120	专业综合实验 General Experimentation for Safety Engineering	3	3	6
4060334130	生产实习 Field Trip	2	2	6
4060336130	能力拓展训练 Ability Development Training	1	1	6(暑期)
4060335130	安全工程数字化训练 Digital Training of Safety Engineering	2	2	7
4060337130	毕业实习 Graduation Practice	2	2	8
4060144110	毕业设计(论文) Graduation Thesis	15	10	8
小计 Subtotal		34.5	28	

## 六、修读指导

### VI Recommendations on Course Studies

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

Situation & Policy, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7<sup>th</sup> term. The course will be arranged by the University Students' Affairs' Department in each school.

学院教学责任人：袁艳斌  
专业培养方案责任人：陈先峰

# 【矿物加工工程专业】2014 版本本科培养方案

## Undergraduate Program for Specialty in Mineral Processing Engineering Specialty (2014)

专业名称	矿物加工工程	主干学科	矿业工程
Major	Mineral Processing	Major Disciplines	Mining Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering

### 最低毕业学分规定

#### Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识课程 Public Basic Courses	学科大类课程 Basic Courses in General Discipline	专业课程 Courses in Specialty	个性课程 Personalized Course	集中性实践 Practice Courses	课外学 Extracurricular Credits	总学分 Total Credits
必修课 Required Courses	35	56	25.5	\	31	\	190
选修课 Elective Courses	9	5.5	8	10	\	10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirement

##### (一) 培养目标

- (1) 具备矿物（非金属、金属）分选加工、矿物材料制备、矿产资源综合利用相关的基础知识和基本技能，了解专业发展前沿方向，具有创新意识和国际视野与对外交流能力。
- (2) 具有人文社会科学素养，身心健康，具备良好的敬业精神、社会责任感和工程职业道德，关注当代全球和社会问题，具有与矿业工程相关的质量意识、矿产资源开发伴随的环境保护意识和安全意识。
- (3) 具有从事矿物加工工程领域科学研究、工程设计和技术服务等工作所需的数理化知识和其它相关自然科学知识，并能将化学和矿业相关知识运用于解决工程问题。
- (4) 具有综合运用矿物加工科学理论和工程技术分析、设计、开发矿产资源综进行合利用的能力。
- (5) 精通矿物加工工程工艺设计方法和设计软件，具备试验研究（实验室、工业）能力。
- (6) 具有良好的口头和书面表达和交流沟通能力、良好的团队意识和合作精神，具有终身学习的能力。
- (7) 能在矿物加工工程与矿物材料等相关领域从事建设规划、工程设计、生产与经营管理、研究开发等方面工作的工程技术人才，经过五年左右发展成为矿业工程师。

##### (I) Educational Objectives

- (1) To possess the basic knowledge and basic skills of mineral (non-metal and metal) separation processing, mineral materials preparation and comprehensive utilization of mineral resources, to understand the professional development direction of the frontier, and to possess innovative consciousness, international vision and the skill of external exchange.
- (2) To possess the humanities and social science literacy, physical and mental health, good professional spirit, the sense of social responsibility and engineering occupation morality, pay attention to contemporary global and social issues, and to possess the quality consciousness related to mining engineering, the environmental protection consciousness and safety consciousness accompany with mineral resources exploitation.
- (3) To possess the related knowledge of mathematics, physics, chemistry and some other natural science that are required in the mineral processing engineering fields of scientific research, engineering design and technical service work, and to possess the ability to apply the related knowledge of chemistry and mining to the settlement of engineering issues.
- (4) To possess the ability to apply mineral processing science theory and engineering technology to analyse, design, exploit and utilize mineral resources synthetically.

- (5) To be proficient in design methods and design software of mineral processing engineering process, and possess the ability to do the experimental studies both in laboratory and industry.
- (6) To possess good oral, writing and communicating abilities, and good team consciousness and cooperation spirit, and have the lifelong learning ability.
- (7) To be an engineering and technical personnel who is engaged in construction program, engineering design, production and operating management, and research and development(R & D) in the related fields of mineral processing engineering and mineral materials, and then to develop into a mining engineer in five years.

## (二) 毕业要求

- (1) 学生应掌握从事本专业领域所需的数学、相关的化学、物理等自然科学及经济和管理知识。
- (2) 学生应掌握本专业的基本理论知识和工程基础知识，能够利用矿物加工原理性知识进行自主发现、自主设计和自主解决与矿物加工工程相关的科学问题。
- (3) 学生应掌握与矿业工程有关的地质学、矿石学、流体力学、机械设计、电工与电子技术、计算机应用的工程基础知识；应掌握矿物加工工艺、矿物材料技术、化学选矿及其相关的理论知识和专业知识；应具有包括专业认识实习、生产实习、毕业实习在内的系统工程实践的经历。
- (4) 学生应具备进行矿物加工工艺实验的能力，能够设计和实施矿石的可选性试验研究，熟悉生产规模的扩大选矿实验研究的方法，具备对实验的结果进行合理分析的能力。
- (5) 学生应掌握设计矿石的粉碎、选矿及矿物深加工工艺的方法，了解现场试验与生产运行的基本规律。
- (6) 具有综合运用矿物加工理论和技术手段设计矿物加工工艺的能力，设计过程中能够综合考虑与工厂和当地经济、环境、法律、安全、健康、伦理等制约因素；
- (7) 学生掌握运用现代信息技术跟踪并获取矿业技术信息的方法，熟练进行文献检索和资料查询。
- (8) 学生具有良好的组织管理、口头书面表达和人际交往能力，具有良好的团队意识和合作精神。
- (9) 学生具有良好的思想素质、身体素质、心理素质、文化修养、社会道德和责任担当等人文素养。
- (10) 学生具有逻辑思维和辩证思维的能力，具有批判意识和求真务实的科学思维方法，具有追求创新的态度和意识，掌握矿物加工领域基本的创新方法。对终身学习有正确认识，具有不断学习和适应矿业技术不断发展的能力。
- (11) 具有国际视野和跨文化的交流、竞争与合作能力，能熟练掌握一门外语进行技术沟通和交流。

## (II) Requirement

- (1) Students should master the natural science knowledge including mathematics, related chemistry and physics, and the knowledge of economy and management.
- (2) Students are supposed to master the professional knowledge of basic theories and engineering and discover, design and solve the scientific problems related to mineral processing independently by utilizing mineral processing theories.
- (3) Students are supposed to master the basic knowledge of Geology, Ore Petrology, Hydromechanics, Mechanical Design, Electrician and Electronic Technology, Computer Application Engineering Foundation. They also should master the theoretical knowledge and specialized knowledge of Mineral processing, Mineral Material technology and chemical processing. And they should have system engineering practice experiences that include professional cognition practice, production practice and graduation practice.
- (4) Students are supposed to possess the ability of doing mineral processing experiments, and designing and conducting the feasibility experiments of ores. They also should be familiar with the expansion of production scale of ore dressing experiments, and able to analyze the results of experiments reasonably
- (5) Students should learn to design the process of crush, mineral processing and dressing of ores, and realize the basic rules of field tests and production runs.
- (6) Students should master the ability to design the mineral processing by using the theories and technological means synthetically. They should take factories, local economy, environment, law, safety, healthy, ethic and other factors into comprehensive consideration.
- (7) Students should learn to obtain information about mining technology by using modern information technology and search the literature to found useful data skillfully.
- (8) Students should possess good organization and management, oral and written expression and interpersonal communication abilities, and possess good team consciousness and cooperation spirit.

- (9) Students should possess humanistic qualities including good thinking quality, physical quality, mental quality, cultural cultivation, social morality and responsibility.
- (10) Students should have the ability of logical thinking and dialectical thinking, have critical awareness and realistic and pragmatic scientific thinking methods, have the attitude and consciousness of the pursuit of innovation, and master the basic method of innovation in the field of mineral processing. And they should have a correct understanding of lifelong learning, and possess the ability of continuous learning and adapting to the continuous development of mining technology.
- (11) Students should possess international vision and the ability of cross-cultural communication, competition and cooperation, and master a foreign language skillfully to make technical communication.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5	培养目标 6	培养目标 7
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	✓		✓	✓		✓	✓

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

#### (一) 专业核心课程:

矿石学, 粉碎工程, 矿物加工工艺学, 矿物材料工艺学, 矿物加工试验研究方法, 矿物加工厂工艺设计, 化学选矿, 矿物加工测试技术

Core Courses:

Lithology, Comminution Engineering, mineral processing technology, mineral material technology, mineral processing experimental research methods, mineral processing plant process design, chemical mineral processing, Mineral Material Testing Techniques.

#### (二) 专业特色课程:

地质学, 二次资源开发利用, 矿物粉体工程, 非金属矿新型建筑材料, 选矿工艺与实例, 矿物生物技术, 矿业技术经济学, 烧结球团工艺学, 采矿概论, 矿物加工厂自动化

Characteristic Courses:

Physical Geology, Exploitation and Utilization of Secondary, Mineral Powder Technology, New Nonmetallic Mineral Building Materials, Technics and Examples of Mineral, Biotechnology of Minerals, Economics of Mining Technology, Sintering Pelletizing Process, Mining Introduction, Automation of Mineral Processing Plan.

附：毕业要求实现矩阵:

专业核心课程	专业特色课程	课程名称	矿物加工工程专业毕业要求										
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		思想道德修养与法律基础						✓			✓		
		中国近现代史纲要									✓		
		毛泽东思想和中国特色社会主义理论体系概论						✓			✓	✓	
		马克思主义基本原理								✓	✓	✓	

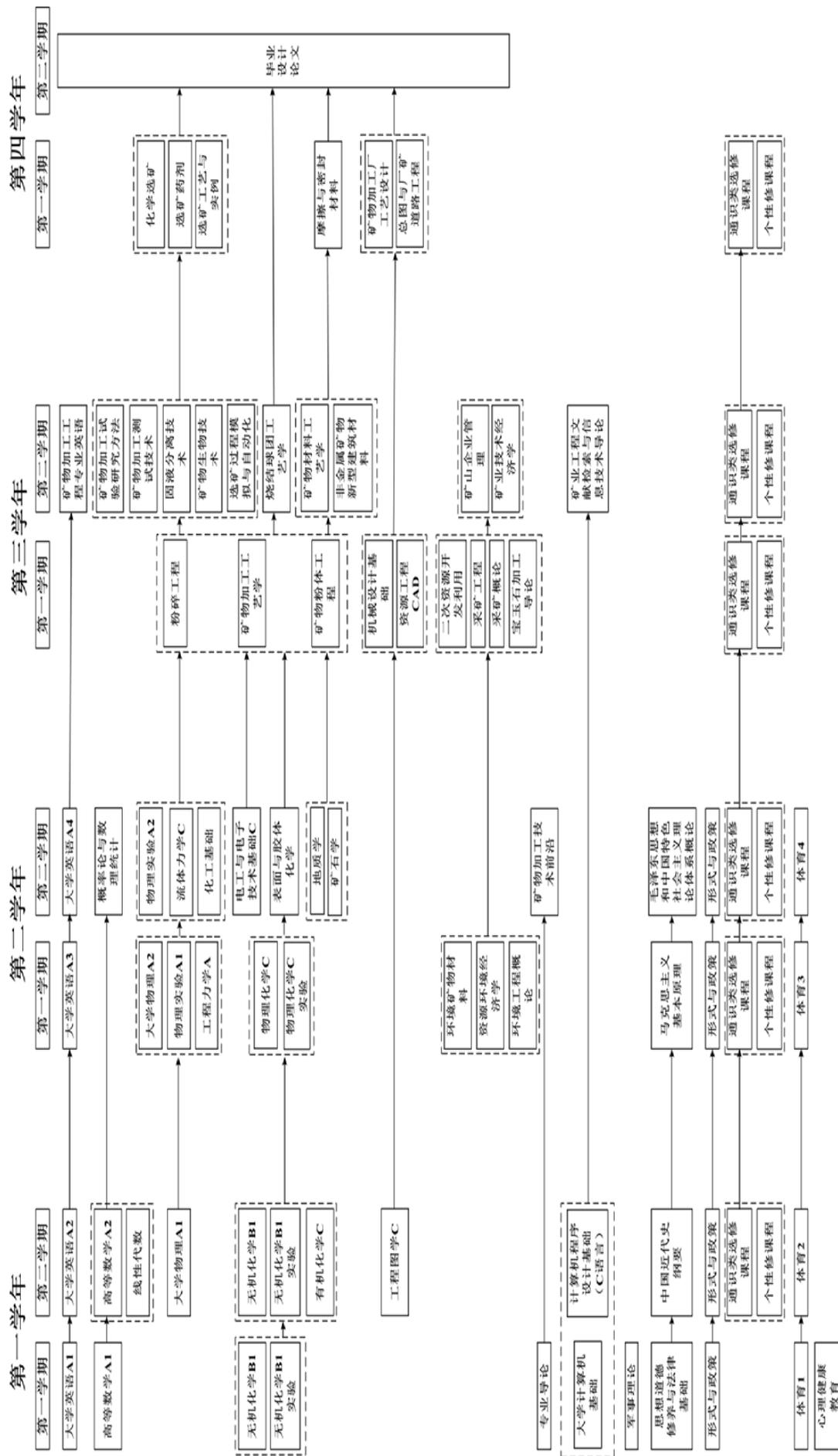
专业 核心 课程	专业 特色 课程	课程名称	矿物加工工程专业毕业要求										
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		军事理论						✓			✓		
		体育								✓	✓		
		大学英语						✓	✓	✓			✓
		大学计算机基础		✓	✓				✓				
		计算机程序设计基础		✓	✓								
		创新创业类公选课								✓	✓	✓	
		人文社科类公选课								✓	✓		
		经济管理类公选课	✓					✓					
		科学技术类公选课						✓	✓			✓	
		艺术体育类公选课									✓		
		心理健康教育									✓		
		专业导论		✓	✓	✓	✓	✓					
		高等数学 A	✓										
		线性代数	✓										
		概率论与数理统计 B	✓										
		大学物理 A	✓										
		物理实验 A	✓										
		工程图学 C		✓		✓	✓						
		工程力学 A		✓									
		无机化学 B	✓	✓	✓	✓	✓						
		无机化学实验 B	✓	✓	✓	✓	✓						
		物理化学 C		✓	✓	✓	✓						
		物理化学实验 C		✓	✓	✓	✓						
		资源工程 CAD		✓	✓		✓						
		表面与胶体化学		✓	✓	✓	✓					✓	
		电工与电子技术基础 C		✓	✓								
		机械设计基础		✓	✓								

专业 核心 课程	专业 特色 课程	课程名称	矿物加工工程专业毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		
		环境矿物材料		✓				✓							
		有机化学 C	✓	✓	✓	✓	✓								
		资源环境经济学	✓					✓					✓		
		流体力学		✓	✓		✓								
	✓	地质学		✓	✓			✓							
		化工基础		✓	✓	✓									
✓		矿石学		✓	✓	✓	✓								
✓		粉碎工程		✓	✓	✓	✓	✓							
✓		矿物加工工艺学		✓	✓	✓	✓	✓					✓		
✓		矿物加工试验研究方法		✓	✓	✓	✓	✓					✓		
✓		矿物加工测试技术		✓	✓	✓	✓	✓							
✓		化学选矿		✓	✓	✓	✓	✓							
✓		矿物加工厂工艺设计		✓	✓	✓	✓	✓							
✓		矿物材料工艺学		✓	✓	✓	✓	✓							
		环境工程概论					✓	✓							
	✓	二次资源开发利用		✓	✓	✓	✓	✓							
	✓	矿物粉体工程		✓	✓	✓	✓	✓							
	✓	矿物生物技术		✓	✓	✓	✓	✓							
		固液分离技术		✓	✓	✓	✓	✓							
	✓	矿物加工厂自动化		✓	✓	✓	✓	✓							
		矿山企业管理	✓			✓		✓							
	✓	选矿工艺与实例		✓	✓	✓	✓	✓							
	✓	非金属矿物新型建筑材料		✓	✓	✓	✓	✓							
		选矿药剂		✓	✓	✓	✓	✓							
	✓	矿业技术经济学	✓	✓									✓		
		摩擦与密封材料		✓	✓	✓	✓	✓							
	✓	烧结球团工艺学		✓	✓	✓	✓	✓							

专业 核心 课程	专业 特色 课程	课程名称	矿物加工工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
	✓	采矿概论		✓	✓	✓	✓	✓						
		总图与厂矿道路工程		✓	✓	✓	✓	✓						
		宝玉石加工导论									✓			
		矿物加工工程专业英语							✓			✓	✓	
		矿物加工技术前沿										✓	✓	
		矿业工程文献检索与信息技术导论							✓			✓	✓	
		军事训练								✓	✓			
		认识实习			✓	✓	✓	✓						
		电工电子实习			✓									
		机械设计基础课程设计			✓		✓	✓						
		机械制造工程实训 C			✓			✓						
		矿物鉴定实验			✓	✓	✓							
		矿物加工工艺学实验		✓	✓	✓	✓	✓				✓		
		矿石可选性综合实验		✓	✓	✓	✓	✓						
		矿物材料工艺学实验		✓	✓	✓	✓	✓						
		专业实习		✓	✓	✓	✓	✓						
		毕业实习		✓	✓	✓	✓	✓						
		毕业设计（论文）		✓	✓	✓	✓	✓	✓					

### 三、课程教学进程图

#### III Teaching Process Map



#### 四、理论教学建议进程表

#### IV Theory Course Schedule

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major		
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur					
通 识 课 程  Public Basic Courses	必 修 课  Required Courses	4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1-6				
		4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1-6				
		4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		1-6				
		4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		1-6				
		1050001130	心理健康教育 Mental health education	1	16					1-2				
		1060003130	军事理论 Military Theory	1	32			16		2-4				
		4210001110	体育 1 Physical Education I	1	32					1				
		4210002110	体育 2 Physical Education II	1	32					2	体育 1			
		4210003110	体育 3 Physical Education III	1	32					3	体育 2			
		4210004110	体育 4 Physical Education IV	1	32					4	体育 3			
		4030002110	大学英语 A1 College English A I	3	64				16	1				
		4030003110	大学英语 A2 College English A II	3	64				16	2	大学英语 A1			
		4030004110	大学英语 A3 College English A III	3	64				16	3	大学英语 A2			
		4030005110	大学英语 A4 College English A IV	3	64				16	4	大学英语 A3			
		4120017110	大学计算机基础 Foundation of Computer	2	32		12			1				
		程序设计语言课程组(三选一, 3 学分) Computer Program Design C Language Courses(Choice One freely)												
				4120023110	计算机程序设计基础(C 语言) Fundamentals of Computer Program Design(C Language)	3	48		12			2		
				4120024110	计算机程序设计基础(FORTRAN 语言) Fundamentals of Computer Program Design(FORTRAN Language)	3	48		12			2		
				4120025110	计算机程序设计基础(VB 语言) Fundamentals of Computer Program Design(VB Language)	3	48		12			2		
				小 计 Subtotal		35	736		24	64	64			
选 修 课  Elective Courses	创新创业类 Innovation and Entrepreneurship Courses	<p>全校学生要求至少取得 9 个学分, 且必须选修艺术体育类课程中的艺术类相关课程, 取得至少 2 个学分。理工科专业学生至少选修一门人文社科类或经济管理类课程, 其他专业学生至少选修一门科学技术类课程。</p> <p>All students are required to obtain at least 9 credits, and must select art courses from Art and Physical Education Courses to obtain at least 2 credits. Science and engineering students should select at least one course from Arts and Social Science Courses or Economy and Management Courses, and other students should select at least one course from Science and Technology Courses.</p>												
	人文社科类 Arts and Social Science Courses													
	经济管理类 Economy and Management Courses													

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Cr	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur			
		科学技术类 Science and Technology Courses										
		艺术体育类 Art and Physical Education Courses										
学 科 大 类 课 程 Basic Disciplinary Courses	必 修 课 Required Courses	4060214110	专业导论 Introduction to Materials Physics	1	16					1		
		4050063110	高等数学 A 上 Advanced Mathematics A I	5	80					1		
		4050064110	高等数学 A 下 Advanced Mathematics A II	5	80					2	高等数学 A 上	
		4200307120	无机化学 B 上 Chemistry B I	3	48					1		
		4200308120	无机化学 B 下 Chemistry B II	1.5	24					2	无机化学 B 上	
		4200309120	无机化学 B 实验上 Inorganic Chemistry B Experiment I	1	24	24				1		
		4200310120	无机化学 B 实验下 Inorganic Chemistry B Experiment II	0.5	24	24				2	无机化学 B 实验上	
		4080042110	工程图学 C Engineering Drawing C	4	64		8			2		
		4050229110	线性代数 Linear Algebra	2.5	40					2		
		4050021110	大学物理 A 上 Physics A I	3.5	56					2		
		4050022110	大学物理 A 下 Physics A II	3.5	56					3	大学物理 A 上	
		4050466130	物理实验 A 上 Physics Lab. A I	1	32	32				3		
		405046713	物理实验 A 下 Physics Lab. A II	1	32	32				4	物理实验 A 上	
		4050071110	工程力学 A Engineering Mechanics A	4	64	4				3		
		4200184130	物理化学 C Physical Chemistry C	4	64					3		
		4200185130	物理化学 C 实验 Physical Chemistry C Experimental	0.5	16	16				3		
		4050058110	概率论与数理统计 B Probability and Mathematics B	3	48					4		
		4060015110	表面与胶体化学 Surface and Colloid Chemistry	2.5	40					4	物理化学 C	
		4100012110	电工与电子技术基础 C	4	64	4	10			4	大学物理 A 下	
		4060128110	资源工程 CAD Resource Engineering CAD	2	32	24				5		
		4080061110	机械设计基础 Mechanical Design Basis	3.5	56	6				5		
				小 计 Subtotal		56	952	164	8			

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur			
选修课 Elective Courses		4200247120	有机化学 C Organic Chemistry	3	48					2		
		4060052110	环境矿物材料 Environmental Mineral Materials	2	32					3		
		4060129110	资源环境经济学 Resource and Environment Economics	2	32					3		
		4050134110	流体力学 C Fluid Mechanics C	3	48	6				4		
		4060027110	地质学 Physical Geology	2.5	40					4		
		小 计 Subtotal			12.5	200	6					
		修读说明：要求至少选修 5.5 学分。 NOTE: Minimum subtotal credits: 5.5.										
专 业 课 Required Courses		4200014110	化工基础 Elementary Chemical Industry	3	48	8				4		
		4060243120	矿石学 Lithology	3	48	16				4		
		4060229120	粉碎工程 Comminution Engineering	3	48			16		5		
		4060246120	矿物加工工艺学 Mineral Processing Technology	5	80					5	表面与胶体化学	
		4060088110	矿物加工试验研究方法 Experimental Research Methods of Mineral Processing	2	32					6	表面与胶体化学 矿物加工工艺学	
		4060085110	矿物加工测试技术 Mineral Material Testing Techniques	2	32					6	矿石学	
		4060083110	矿物材料工艺学 Mineral Material Technology	2.5	40					6	矿物加工工艺学	
		4060232120	化学选矿 Chemical Mineral Processing	2	32					7	表面与胶体化学 无机化学 B	
		4060244120	矿物加工厂工艺设计 Process Design of Mineral Processing Plant	3	48			16		7	矿物加工工艺学	
		小 计 Subtotal			25.5	408	24		32			
选修课 Elective Courses		4060276130	环境工程概论 Environment Engineering Introduction	2	32					3		
		4060028110	二次资源开发利用 Exploitation and Utilization of Secondary	2	32					5		
		4060084110	矿物粉体工程 Mineral Powder Technology	2	32					5		
		4060089110	矿物生物技术 Biotechnology of Minerals	2	32					6		
		4060036110	固液分离技术 Solid-liquid Separation Techniques	2	32					6		
		4060312130	矿物加工厂自动化 Automation of Mineral Processing Plan	2	32					6	矿物加工工艺学	

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major	
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur				
		4060079110	矿山企业管理 Mine Corporation Management	2	32					6			
		4060031110	非金属矿物新型建筑材料 New Nonmetallic Mineral Building Materials	2	32					6			
		4060093110	矿业技术经济学 Economics of Mining Technology	2	32					6			
		4060119110	选矿工艺与实例 Technics and Examples of Mineral	2	32					7	矿物加工工艺学		
		4060120110	选矿药剂 Mineral Processing Reagents	2	32					7	矿物加工工艺学		
		小 计 Subtotal			22	352							
		修读说明：要求至少选修 8 学分 NOTE: Minimum subtotal credits:8.											
个性化课程 Personalized Course	选修课 Elective Courses	4060335130	矿物加工技术前沿 Advanced Mineral Processing Technology	2	32					4			
		4060217110	采矿概论 Mining Introduction	2	32					5			
		4060333130	宝玉石加工导论 Introduction of Gem Processing	2	32					5			
		4060102110	烧结球团工艺学 Sintering Pelletizing Process	2	32					6			
		4060334130	矿物加工工程专业英语 Specialty English	2	32					6			
		4060336130	矿业工程文献检索与信息技术导论 Mining Engineering Literature and Introduction to Information Technology	2	32					6			
		4060136110	总图与厂矿道路工程 Assembly Drawing and Road Engineering	2	32					7			
		4060096110	摩擦与密封材料 Frictional and Sealing Material	2	32					7			
		小 计 Subtotal			16	256							
		修读说明：学生可跨专业自主选择修读全校其他专业的课程，建议修读以上课程。要求至少选修 10 学分。 NOTE: Students can choose any courses from the other specialties, and are especially suggested to choose the courses above. Minimum subtotal credits: 10.											

## 五、集中性实践教学环节

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crts	建议修读学期 Suggested Term	第二专业 Second Major
1060002110	军事训练 Military Training	3	1.5	1	
4060199110	认识实习 Cognition Practice	1	1	2 (暑期)	
4100069110	电工电子实习 B Electric Practice	1	1	4	
4080146110	机械设计基础课程设计 Course Design on Foundation of Machine Design	2	2	5	

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crts	建议修读学期 Suggested Term	第二专业 Second Major
4080151110	机械制造工程实训 C Machinery Manufacturing Engineering Practice C	2	2	5	
4060269120	矿物系统鉴定实验 Mineral Identify	2	2	5	
4060207110	专业实习（生产实习） Professional (Production) Practice	3	3	6	
4060267120	矿物加工工艺学系统实验 1 Systematic Experiments of Mineral Processing Technology I	1.5	1.5	6	
4060268120	矿物加工工艺学系统实验 2 Systematic Experiments of Mineral Processing Technology II	2	2	7	
4060184110	矿石可选性综合实验 Serial Experiments of Ore Beneficiation Feasibility	1.5	1.5	7	
4060186110	矿物材料工艺学系统实验 Systematic Experiments of Mineral material Technology	1.5	1.5	7	
4060152110	毕业实习 Graduation Practice	2	2	8	
4060261120	毕业设计（论文） Graduation Design (Dissertation)	15	10	8	
小 计 Subtotal		37.5	31		

## 六、修读指导

### VI Recommendations on Course Studies

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

Situation & Policy, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7th term . The course will be arranged by the University Students' Affairs' Department in each school.

学院教学责任人：袁艳斌  
专业培养方案责任人：张凌燕

## 【矿物加工工程专业（卓越工程师班）】

### 2014 版本本科培养方案

## Undergraduate Education Plan for Specialty in Mineral Processing Engineering (Excellent Engineer Class) (2014)

专业名称	矿物加工工程	主干学科	矿业工程
Major	Mineral Processing	Major Disciplines	Mining Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	矿业类	大类培养年限	2年
Disciplinary	Mine	Duration	2 years

### 最低毕业学分规定

#### Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识课程 Public Basic Courses	学科大类课程 Basic Courses in General Discipline	专业课程 Courses in Specialty	个性课程 Personalized Course	集中性实践 Practice Courses	课外学 Extracurricular Credits	总学分 Total Credits
必修课 Required Courses	35	56	25.5	\	36.5	\	190
选修课 Elective Courses	9	6	12	\	\	10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirement

##### (一) 培养目标

- (1) 具备矿物（非金属、金属）分选加工、矿物材料制备、矿产资源综合利用相关的基础知识和基本技能，了解专业发展前沿方向，具有创新意识和国际视野与对外交流能力。
- (2) 具有人文社会科学素养，身心健康，具备良好的敬业精神、社会责任感和工程职业道德，关注当代全球和社会问题，具有与矿业工程相关的质量意识、矿产资源开发伴随的环境保护意识和安全意识。
- (3) 具有从事矿物加工工程领域科学研究、工程设计和技术服务等工作所需的数理化知识和其它相关自然科学知识，并能将化学和矿业相关知识运用于解决工程问题。
- (4) 具有综合运用矿物加工科学理论和工程技术分析、设计、开发矿产资源综进行合理利用的能力。
- (5) 精通矿物加工工程工艺设计方法和设计软件，具备试验研究（实验室、工业）能力。
- (6) 具有良好的口头和书面表达和交流沟通能力、良好的团队意识和合作精神，具有终身学习的能力。
- (7) 能在矿物加工工程与矿物材料等相关领域从事建设规划、工程设计、生产与经营管理、研究开发等方面工作的工程技术人才，经过五年左右发展成为矿业工程师。

##### (I) Educational Objectives

- (1) To possess the basic knowledge and basic skills of mineral (non-metal and metal)

separation processing, mineral materials preparation and comprehensive utilization of mineral resources, to understand the professional development direction of the frontier, and to possess innovative consciousness, international vision and the skill of external exchange.

- (2) To possess the humanities and social science literacy, physical and mental health, good professional spirit, the sense of social responsibility and engineering occupation morality, pay attention to contemporary global and social issues, and to possess the quality consciousness related to mining engineering, the environmental protection consciousness and safety consciousness accompany with mineral resources exploitation.
- (3) To possess the related knowledge of mathematics, physics, chemistry and some other natural science that are required in the mineral processing engineering fields of scientific research, engineering design and technical service work, and to possess the ability to apply the related knowledge of chemistry and mining to the settlement of engineering issues.
- (4) To possess the ability to apply mineral processing science theory and engineering technology to analyse, design, exploit and utilize mineral resources synthetically.
- (5) To be proficient in design methods and design software of mineral processing engineering process, and possess the ability to do the experimental studies both in laboratory and industry.
- (6) To possess good oral, writing and communicating abilities, and good team consciousness and cooperation spirit, and have the lifelong learning ability.
- (7) To be an engineering and technical personnel who is engaged in construction program, engineering design, production and operating management, and research and development(R & D) in the related fields of mineral processing engineering and mineral materials, and then to develop into a mining engineer in five years.

## (二) 毕业要求

- (1) 学生应掌握从事本专业领域所需的数学、相关的化学、物理等自然科学及经济和管理知识。
- (2) 学生应掌握本专业的基本理论知识和工程基础知识,能够利用矿物加工原理性知识进行自主发现、自主设计和自主解决与矿物加工工程相关的科学问题。
- (3) 学生应掌握与矿业工程有关的地质学、矿石学、流体力学、机械设计、电工与电子技术、计算机应用的工程基础知识;应掌握矿物加工工艺、矿物材料技术、化学选矿及其相关的理论知识和专业知识;应具有包括专业认识实习、生产实习、岗位实习、毕业实习在内的系统工程实践的经历。
- (4) 学生应具备进行矿物加工工艺实验的能力,能够设计和实施矿石的可选性试验研究,熟悉生产规模的扩大选矿实验研究的方法,具备对实验的结果进行合理分析的能力。
- (5) 学生应掌握设计矿石的粉碎、选矿及矿物深加工工艺的方法,了解现场试验与生产运行的基本规律。
- (6) 具有综合运用矿物加工理论和技术手段设计矿物加工工艺的能力,设计过程中能够综合考虑与工厂和当地经济、环境、法律、安全、健康、伦理等制约因素;
- (7) 学生掌握运用现代信息技术跟踪并获取矿业技术信息的方法,熟练进行文献检索和资料查询。
- (8) 学生具有良好的组织管理、口头书面表达和人际交往能力,具有良好的团队意识和

- 合作精神。
- (9) 学生具有良好的思想素质、身体素质、心理素质、文化修养、社会道德和责任担当等人文素养。
  - (10) 学生具有逻辑思维和辩证思维的能力，具有批判意识和求真务实的科学思维方法，具有追求创新的态度和意识，掌握矿物加工领域基本的创新方法。对终身学习有正确认识，具有不断学习和适应矿业技术不断发展的能力。
  - (11) 具有国际视野和跨文化的交流、竞争与合作能力，能熟练掌握一门外语进行技术沟通和交流。

## **( II ) Requirement**

- (1) Students should master the natural science knowledge including mathematics, related chemistry and physics, and the knowledge of economy and management.
- (2) Students are supposed to master the professional knowledge of basic theories and engineering and discover, design and solve the scientific problems related to mineral processing independently by utilizing mineral processing theories.
- (3) Students are supposed to master the basic knowledge of Geology, Ore Petrology, Hydromechanics, Mechanical Design, Electrician and Electronic Technology, Computer Application Engineering Foundation. They also should master the theoretical knowledge and specialized knowledge of Mineral processing, Mineral Material technology and chemical processing. And they should have system engineering practice experiences that include professional cognition practice, production practice and graduation practice.
- (4) Students are supposed to possess the ability of doing mineral processing experiments, and designing and conducting the feasibility experiments of ores. They also should be familiar with the expansion of production scale of ore dressing experiments, and able to analyze the results of experiments reasonably
- (5) Students should learn to design the process of crush, mineral processing and dressing of ores, and realize the basic rules of field tests and production runs.
- (6) Students should master the ability to design the mineral processing by using the theories and technological means synthetically. They should take factories, local economy, environment, law, safety, healthy, ethic and other factors into comprehensive consideration.
- (7) Students should learn to obtain information about mining technology by using modern information technology and search the literature to found useful data skillfully.
- (8) Students should possess good organization and management, oral and written expression and interpersonal communication abilities, and possess good team consciousness and cooperation spirit.
- (9) Students should possess humanistic qualities including good thinking quality, physical quality, mental quality, cultural cultivation, social morality and responsibility.
- (10) Students should have the ability of logical thinking and dialectical thinking, have critical awareness and realistic and pragmatic scientific thinking methods, have the attitude and consciousness of the pursuit of innovation, and master the basic method of innovation in the field of mineral processing. And they should have a correct understanding of lifelong learning, and possess the ability of continuous learning and adapting to the continuous development of mining technology.

- (11) Students should possess international vision and the ability of cross-cultural communication, competition and cooperation, and master a foreign language skillfully to make technical communication.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5	培养目标 6	培养目标 7
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	✓		✓	✓		✓	✓

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

#### (一) 专业核心课程：

矿石学，粉碎工程，矿物加工工艺学，矿物材料工艺学，矿物加工试验研究方法，矿物加工厂工艺设计，化学选矿，矿物加工测试技术

Core Courses:

Lithology, Comminution Engineering, mineral processing technology, mineral material technology, mineral processing experimental research methods, mineral processing plant process design, chemical mineral processing, Mineral Material Testing Techniques.

#### (二) 专业特色课程：

地质学，二次资源开发利用，矿物粉体工程，非金属矿新型建筑材料，选矿工艺与实例，矿业技术经济学，烧结球团工艺学，采矿概论，矿物加工厂自动化、机电一体化

Characteristic Courses:  
Physical Geology, Exploitation and Utilization of Secondary, Mineral Powder Technology, New Nonmetallic Mineral Building Materials, Technics and Examples of Mineral, Biotechnology of Minerals, Economics of Mining Technology, Sintering Pelletizing Process, Mining Introduction, Automation of Mineral Processing Plan, Mechanical and Electrical Integration.

附：毕业要求实现矩阵：

专业 核心 课程	专业 特色 课程	课程名称	矿物加工工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
		思想道德修养与法律基础						✓				✓		
		中国近现代史纲要										✓		

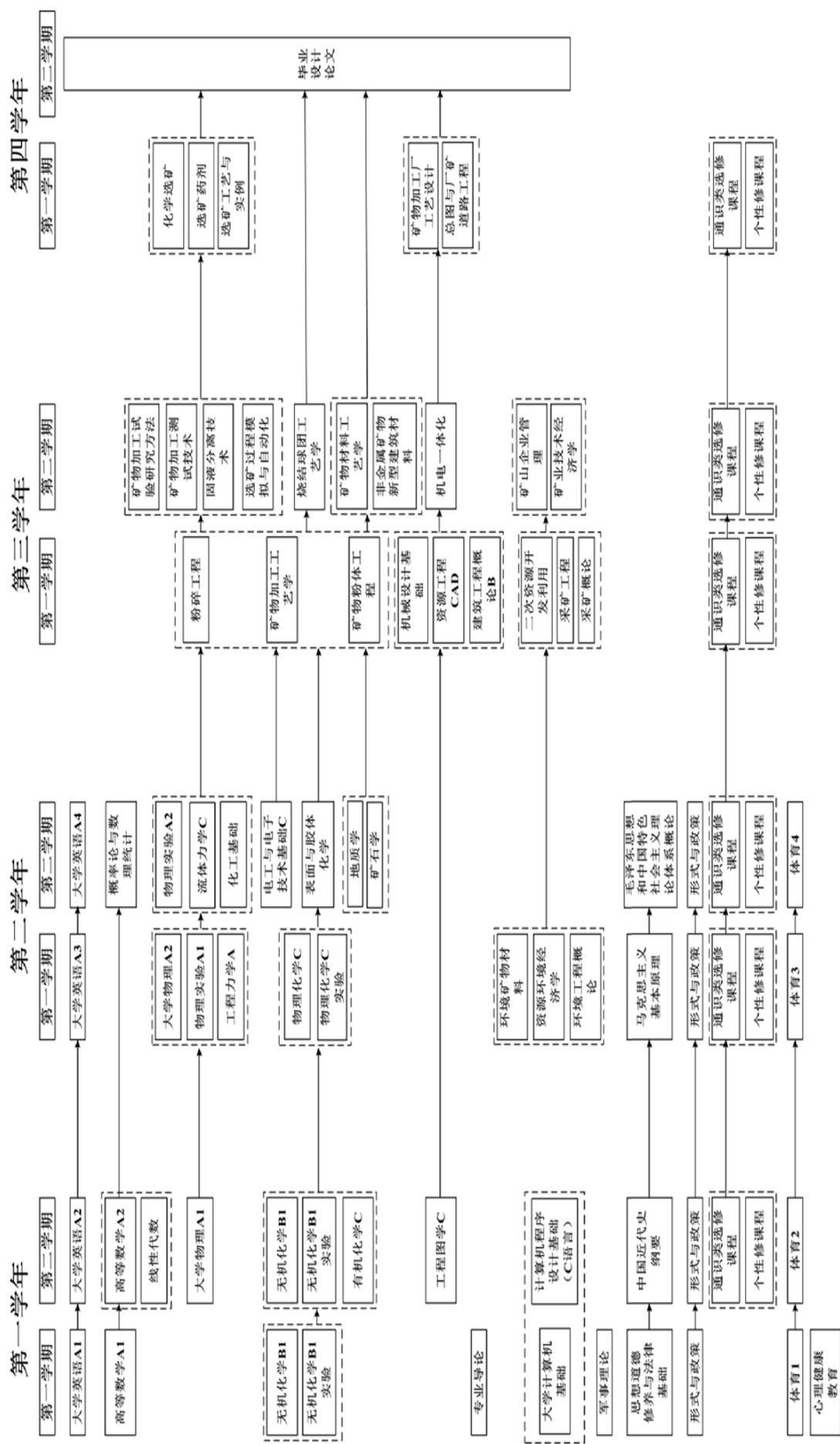
专业 核心 课程	专业 特色 课程	课程名称	矿物加工工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
		毛泽东思想和中国特色社会主义理论体系概论						✓				✓	✓	
		马克思主义基本原理									✓	✓	✓	
		军事理论						✓				✓		
		体育									✓	✓		
		大学英语						✓	✓	✓				✓
		大学计算机基础		✓	✓				✓					
		计算机程序设计基础		✓	✓									
		创新创业类公选课									✓	✓	✓	
		人文社科类公选课									✓	✓		
		经济管理类公选课	✓					✓						
		科学技术类公选课						✓	✓				✓	
		艺术体育类公选课										✓		
		心理健康教育										✓		
		专业导论		✓	✓	✓	✓	✓						
		高等数学 A	✓											
		线性代数	✓											
		概率论与数理统计 B	✓											
		大学物理 A	✓											
		物理实验 A	✓											
		工程图学 C		✓		✓	✓							
		工程力学 A		✓										
		无机化学 B	✓	✓	✓	✓	✓							
		无机化学实验 B	✓	✓	✓	✓	✓							
		物理化学 C		✓	✓	✓	✓							
		物理化学实验 C		✓	✓	✓	✓							

专业 核心 课程	专业 特色 课程	课程名称	矿物加工工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
		资源工程 CAD		✓	✓		✓							
		表面与胶体化学		✓	✓	✓	✓						✓	
		电工与电子技术基础 C		✓	✓									
		机械设计基础		✓	✓									
		有机化学 C	✓	✓	✓	✓	✓							
		环境矿物材料		✓					✓					
		资源环境经济学	✓						✓				✓	
✓		地质学		✓	✓				✓					
		流体力学		✓	✓			✓						
		建筑工程概论 B		✓	✓				✓					
✓		采矿概论		✓	✓	✓	✓	✓	✓					
✓		机电一体化		✓	✓				✓					
		总图与厂矿道路工程		✓	✓	✓	✓	✓	✓					
		化工基础		✓	✓	✓								
✓		矿石学		✓	✓	✓	✓	✓						
✓		粉碎工程		✓	✓	✓	✓	✓	✓					
✓		矿物加工工艺学		✓	✓	✓	✓	✓	✓				✓	
✓		矿物加工试验研究方法		✓	✓	✓	✓	✓	✓				✓	
✓		矿物加工测试技术		✓	✓	✓	✓	✓	✓					
✓		化学选矿		✓	✓	✓	✓	✓	✓					
✓		矿物加工厂工艺设计		✓	✓	✓	✓	✓	✓					
✓		矿物材料工艺学		✓	✓	✓	✓	✓	✓					
		环境工程概论						✓	✓					
✓		二次资源开发利用		✓	✓	✓	✓	✓	✓					
✓		矿物粉体工程		✓	✓	✓	✓	✓	✓					

专业 核心 课程	专业 特色 课程	课程名称	矿物加工工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
	✓	矿业技术经济学	✓	✓									✓	
	✓	烧结球团工艺学		✓	✓	✓	✓	✓						
	✓	矿物加工厂自动化		✓	✓	✓	✓	✓						
	✓	非金属矿物新型建筑材料		✓	✓	✓	✓	✓						
		固液分离技术		✓	✓	✓	✓	✓						
		选矿药剂		✓	✓	✓	✓	✓						
		矿山企业管理	✓			✓		✓						
	✓	选矿工艺与实例		✓	✓	✓	✓	✓						
		军事训练									✓	✓		
		认识实习			✓	✓	✓	✓						
		电工电子实习			✓									
		机械设计基础课程设计			✓		✓	✓						
		机械制造工程实训 C			✓			✓						
		矿物鉴定实验			✓	✓	✓							
		矿物加工工艺学实验		✓	✓	✓	✓	✓					✓	
		专业实习		✓	✓	✓	✓	✓						
		岗位实习		✓	✓	✓	✓	✓						
		矿物材料工艺学实验		✓	✓	✓	✓	✓						
		矿石可选性综合实验		✓	✓	✓	✓	✓						
		毕业实习		✓	✓	✓	✓	✓						
		毕业设计（论文）		✓	✓	✓	✓	✓	✓					

### 三、课程教学进程图

#### III Teaching Process Map



#### 四、理论教学建议进程表

#### IV Theory Course Schedule

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Cr.	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major		
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur					
通 识 课 程  Public Basic Courses	必 修 课  Required Courses	4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1-6				
		4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1-6				
		4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		1-6				
		4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		1-6				
		1050001130	心理健康教育 Mental health education	1	16					1-2				
		1060003130	军事理论 Military Theory	1	32			16		2-4				
		4210001110	体育 1 Physical Education I	1	32					1				
		4210002110	体育 2 Physical Education II	1	32					2	体育 1			
		4210003110	体育 3 Physical Education III	1	32					3	体育 2			
		4210004110	体育 4 Physical Education IV	1	32					4	体育 3			
		4030002110	大学英语 A1 College English A I	3	64				16	1				
		4030003110	大学英语 A2 College English A II	3	64				16	2	大学英语 A1			
		4030004110	大学英语 A3 College English A III	3	64				16	3	大学英语 A2			
		4030005110	大学英语 A4 College English A IV	3	64				16	4	大学英语 A3			
		4120017110	大学计算机基础 Foundation of Computer	2	32		12			1				
		程序设计语言课程组(三选一, 3 学分) Computer Program Design Language Courses (Choice One, Crs.: 3)												
				4120023110	计算机程序设计基础(C 语言) Fundamentals of Computer Program Design(C Language)	3	48		12			2		
				4120024110	计算机程序设计基础(FORTRAN 语言) Fundamentals of Computer Program Design(FORTRAN Language)	3	48		12			2		
				4120025110	计算机程序设计基础(VB 语言) Fundamentals of Computer Program Design(VB Language)	3	48		12			2		
				小 计 Subtotal		35	736		24	64	64			
	选 修 课  Elective Courses	创新创业类 Innovation and Entrepreneurship Courses		全校学生要求至少取得 9 个学分, 且必须选修艺术体育类课程中的艺术类相关课程, 取得至少 2 个学分。理工科专业学生至少选修一门人文社科类或经济管理类课程, 其他专业学生至少选修一门科学技术类课程。 All students are required to obtain at least 9 credits, and must select art courses from Art and Physical Education Courses to obtain at least 2 credits. Science and engineering students should select at least one course from Arts and Social Science Courses or Economy and Management Courses, and other students should select at least one course from Science and Technology Courses.										
人文社科类 Arts and Social Science Courses														
经济管理类 Economy and Management Courses														

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Cr	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur			
		科学技术类 Science and Technology Courses										
		艺术体育类 Art and Physical Education Courses										
学 科 大 类 课 程  Basic Disciplinary Courses	必 修 课  Required Courses	4060214110	专业导论 Introduction to Materials Physics	1	16					1		
		4050063110	高等数学 A 上 Advanced Mathematics A I	5	80					1		
		4050064110	高等数学 A 下 Advanced Mathematics A II	5	80					2		
		4200307120	无机化学 B 上 Chemistry B I	3	48					1		
		4200308120	无机化学 B 下 Chemistry B II	1.5	24					2		
		4200309120	无机化学 B 实验上 Inorganic Chemistry B Experiment I	1	24	24				1		
		4200310120	无机化学 B 实验下 Inorganic Chemistry B Experiment II	0.5	24	24				2		
		4080041110	工程图学 B Engineering Drawing B	4	64		4			2		
		4050229110	线性代数 Linear Algebra	2.5	40					2		
		4050021110	大学物理 A 上 Physics A I	3.5	56					2		
		4050022110	大学物理 A 下 Physics A II	3.5	56					3		
		4050222110	物理实验 A 上 Physics Lab. A I	1	28	28				3		
		4050223110	物理实验 A 下 Physics Lab. A II	1	28	28				4		
		4050071110	工程力学 A Engineering Mechanics A	4	64	4				3		
		4200184120	物理化学 C Physical Chemistry C	4	64					3	无机化学 B 上 无机化学 B 下	
		4200185130	物理化学 C 实验 Physical Chemistry C Experimental	0.5	16	16				3		
		4050058110	概率论与数理统计 B Probability and Mathematics B	3	48					4	高等数学 A 上 高等数学 A 下	
		4060015110	表面与胶体化学 Surface and Colloid Chemistry	2.5	40					4	物理化学 C	
		4100012110	电工与电子技术基础 C	4	64	4	10			4	大学物理 A 下	
		4060128110	资源工程 CAD Resource Engineering CAD	2	32	24				5	大学计算机 基础	
4080061110	机械设计基础 Mechanical Design Basis	3.5	56	6				5				
		小 计 Subtotal		56	952	164	14					

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur			
选修课 Elective Courses		4200274120	有机化学 C Organic Chemistry	3	48					2		
		4060052110	环境矿物材料 Environmental Mineral Materials	2	32					3		
		4060129110	资源环境经济学 Resource and Environment Economics	2	32					3		
		4060027110	地质学 Physical Geology	2.5	40					4		
		4050134110	流体力学 C Fluid Mechanics C	3	48	6				4		
		4070093110	建筑工程概论 B Architecture Introduction B	1	16					5		
		4060217110	采矿概论 Mining Introduction	2	32					5		
		4080056110	机电一体化 Mechanical and Electrical Integration Introduction	2	32					6		
		4060136110	总图与厂矿道路工程 Assembly Drawing and Road Engineering	2	32					7		
			小 计 Subtotal	19.5	248	6						
	修读说明：要求至少选修 6 学分。 NOTE: Minimum subtotal class credits:6											
专业 课程 Specialized Courses	必修课 Required Courses	4200014110	化工基础 Elementary Chemical Industry	3	48	8				4	流体力学 C	
		4060243120	矿石学 Lithology	3	48	16				4		
		4060229120	粉碎工程 Comminution Engineering	3	48			16		5		
		4060246120	矿物加工工艺学 Mineral Processing Technology	5	80					5	表面与胶体化学	
		4060088110	矿物加工试验研究方法 Experimental Research Methods of Mineral Processing	2	32					6	表面与胶体化学	
		4060085110	矿物加工测试技术 Mineral Material Testing Techniques	2	32					6	矿石学	
		4060083110	矿物材料工艺学 Mineral Material Technology	2.5	40					6	矿物加工工艺学	
		4060232120	化学选矿 Chemical Mineral Processing	2	32					7	表面与胶体化学	
		4060244120	矿物加工厂工艺设计 Process Design of Mineral Processing Plant	3	48			16		7	矿物加工工艺学	
			小 计 Subtotal	25.5	408	24		32				
	选修课 Elective Courses		4060276130	环境工程概论 Environment Engineering Introduction	2	32					3	
		4060028110	二次资源开发利用 Exploitation and Utilization of Secondary	2	32					5		
		4060084110	矿物粉体工程 Mineral Powder Technology	2	32					5		
		4060093110	矿业技术经济学 Economics of Mining Technology	2	32					5		

课程类别 Course Classification	课程性质 Course Nature	课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course	第二专业 Second Major
					总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur			
		4060102110	烧结球团工艺学 Sintering Pelletizing Process	2	32					6		
		4060312130	矿物加工厂自动化 Automation of Mineral Processing Plant	2	32					6	矿物加工工艺学	
		4060031110	非金属矿物新型建筑材料 New Nonmetallic Mineral Building Materials	2	32					6		
		4060036110	固液分离技术 Solid-liquid Separation Techniques	2	32					6		
		4060079110	矿山企业管理 Mine Corporation Management	2	32					6		
		4060120110	选矿药剂 Mineral Processing Reagents	2	32					7	矿物加工工艺学	
		4060119110	选矿工艺与实例 Technics and Examples of Mineral	2	32					7	矿物加工工艺学	
		小 计 Subtotal		22	352							
修读说明：要求至少选修 12 学分 NOTE: Minimum subtotal credits:12												

## 五、集中性实践教学环节

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 Crts	建议修读学期 Suggested Term	第二专业 Second Major
1060002110	军事训练 Military Training	3	1.5	1	
4060199110	认识实习 Cognition Practice	1	1	2(暑期)	
4100069110	电工电子实习 Electric Practice	1	1	4	
4080146110	机械设计基础课程设计 Course Design on Foundation of Machine Design	2	2	5	
4080151110	机械制造工程实训 C Machinery Manufacturing Engineering Practice C	2	2	5	
4060269120	矿物系统鉴定实验 Mineral Identify	2	2	5	
4060207110	专业实习（生产实习） Professional (Production) Practice	3	3	6	
4060267120	矿物加工工艺学系统实验 1 Systematic Experiments of Mineral Processing Technology	1.5	1.5	6	
4060268120	矿物加工工艺学系统实验 2 Systematic Experiments of Mineral Processing Technology	2	2	7	
4060263120	岗位实习 Occupation Practice	5.5	5.5	7	
4060186110	矿物材料工艺学系统实验 Systematic Experiments of Mineral material Technology	1.5	1.5	7	
4060184110	矿石可选性综合实验 Serial Experiments of Ore Beneficiation Feasibility	1.5	1.5	7	
4060152110	毕业实习 Graduation Practice	2	2	8	

课程编号 Course Number	实践环节名称 Practice Courses Name	周数 Weeks	学分 CrS	建议修读学期 Suggested Term	第二专业 Second Major
4060261120	毕业设计（论文） Graduation Design (Dissertation)	15	10	8	
小 计 Subtotal		42.5	36.5		

## 六、修读指导

### VI Recommendations on Course Studies

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

Situation & Policy, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7th term . The course will be arranged by the University Students' Affairs' Department in each school.

学院教学责任人：袁艳斌  
专业培养方案责任人：张凌燕