# 人文地理与城乡规划专业 2017 版本科培养方案
# Undergraduate Education Plan for Specialty in Human Geography & Urban and Rural Planning (2017)

| | | | |
|---|---|---|---|
| 专业名称<br>Major | **人文地理与城乡规划**<br>Human Geography & Urban and Rural Planning | 主干学科<br>Major Disciplines | **地理学、规划类**<br>Geography, Urban and Rural Planning |
| 计划学制<br>Duration | **四年**<br>4 Years | 授予学位<br>Degree Granted | **理学学士**<br>Bachelor of Science |
| 所属大类<br>Disciplinary | **地理科学类**<br>Geography | 大类培养年限<br>Duration | **1 年**<br>1 year |

**最低毕业学分规定**

**Graduation Credit Criteria**

| 课程分类 Course Classification / 课程性质 Course Nature | 通识教育课程 Public Basic Courses | 专业教育课程 Specialized Courses | 个性课程 Personalized Course | 集中性实践教学环节 Practice Courses | 课外学分 Study Credit after Class | 总学分 Total Credits |
|---|---|---|---|---|---|---|
| 必修课 Required Courses | 29 | 69.5 | \ | 26.5 | \ | 170 |
| 选修课 Elective Courses | 9 | 20 | 6 | \ | 10 | |

## 一、培养目标与毕业要求

### Ⅰ Educational Objectives &Requirement

### （一） 培养目标

本专业培养掌握人文地理与城乡规划的基础理论、专业知识、基本方法和实践技能，“适应能力强、实干精神强、创新意识强”，具有一定国际视野，能够在规划、国土、房地产、交通、环境等行业从事研究、设计、应用和管理工作的卓越人才。学生毕业后 5 年应达到以下目标：

（1） 具有良好的人文素养、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，具有可持续发展意识。

（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社会科学知识，并能熟练运用相关知识解决区域规划、国土规划、城乡规划与建设管理、土地资源管理、生态规划、环境保护等实际问题。

（3） 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。

（4） 具有良好的表达能力、沟通协调能力、团队意识和合作精神，具有独立思考，终身学习的能力。

（5） 能够适应社会经济发展及行业转型升级需要，具备创新精神和国际化视野，能够推动人文地理与城乡规划领域的创新发展。

**Educational Objectives**

This major cultivate excellent talents who will master the fundamental theory, professional knowledge, basic methods and practical skills of Human Geography & Urban and Rural Planning, have strong “adaptive

capacity", "spirit of hardworking" and "consciousness of innovation", and are able to work on research, design, application and management in such fields asplanning, land, real estate, transportation, and environment. The graduates should achieve the following targets five years after graduation:

1. Have good humanistic quality, professional spirit, social responsibility and engineering ethics, focus on contemporary global and social issues, and have the consciousness of sustainable development.
2. Have the required knowledge of natural sciences, humanities and social sciences to work in the field of scientific research, planning and design practices and management servicesin Human Geography & Urban and Rural Planning, and be proficientin usingsuchknowledge to solve practical problems in regional planning, land planning, urban-rural planning and construction management, land resources management, ecological planning, environmental protection etc.
3. Be skillful at the methods and technologies of data collection, data analysis, problem induction and synthesis, as well as planformulation, implementation and management, which are required in the area of human geography and urban-rural planning.
4. Have good expression skills, communication and coordination capability, good sense of team and cooperation spirit, as well as the ability of independent thinking and lifelong learning.
5. Be capable of meeting the demand of social & economic development and industrial transformation and upgrading, have a good spirit of innovation and international version, and be able to promote innovative development in Human Geography & Urban and Rural Planning.

**（二） 毕业要求**

（1） 工程知识：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） 问题分析：能够利用本专业的基本理论知识和方法技术进行自主发现、自主分析和自主解决与区域经济和城乡规划相关的科学技术问题，具有逻辑思维和辩证思维的能力、科学思维方法以及创新意识。

（3） 设计/开发解决方案：掌握计算机辅助设计技术，掌握城乡规划制图的一般方法、步骤和规范。

（4） 研究：具备自然、社会、经济等基础资料调查收集的能力，并可以利用相关数据对人文地理和规划领域的现象和问题进行研究和分析，并提出优化方案。

（5） 使用现代工具：熟练掌握 3S 技术、地理计量与统计、空间分析等工具手段。

（6） 工程与社会：了解当代社会问题和社会需求，熟悉国家在规划相关领域的法规、政策及技术规范要求，在规划实践中综合考虑经济、环境、法律、安全和伦理等制约因素。

（7） 环境和可持续发展：能够理解和评价城乡规划建设实践对环境、社会可持续发展的影响。

（8） 职业规范：具有良好的思想素质、身体素质、心理素质、文化修养和社会责任感，能够在规划实践中理解并遵守工程职业道德和行为规范。

（9） 个人和团队：具有良好的团队意识和合作精神，能够在多学科背景下的团队中承担团队成员以及负责人的角色。

（10）沟通：学生具有良好的口头和书面表达和交流能力，具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

（11）项目管理：理解并掌握国土、区域、城乡、环境等规划领域的管理原理与决策方法，并能在多学科环境中应用。

（12）终身学习：具有进行终身学习的愿望和能力，掌握运用现代信息技术跟踪并获取信息的方法，熟悉并适应人文地理与城乡规划领域的发展动态和方向。

**Requirement**

1. Master the relevant knowledge of natural sciences, humanities and social sciences that required in the professional filed.

2. Be able to employ the basic theories, methods and technologiesin the professional field toconductindependent discovery and analysis, and toindependentlyresolve the related scientific and technical problemsin regional economic development and urban-rural planning, and master the ability of logical thinking and dialectical thinking,the methods of scientific thinking, and the consciousness of innovation.
3. Master the technique of computer aided design, and the general methods, procedures and specifications in urban-rural planning charting.
4. Master the ability of collecting natural, social, economic and other basic data, and be able to use these data to investigate and analyze thephenomena and questionsin human geography and planning, and to propose optimized solutions.
5. Proficiently master 3S technologies, geographical statistics, and spatial analysis.
6. Be familiar with contemporary social demands and social issues and the relative national laws, regulations, policies and technical specifications in the planning fields, and be conscious of the economic, environmental, legal, safety and ethical constraints in planning practices.
7. Be able to understand and evaluate the impacts of the urban and rural planning and construction on the sustainability of environment and society.
8. Have good ideological quality, physical quality, psychological quality, cultural cultivation and social responsibility,be able to understand and comply with engineering ethics and code of conduct in practices.
9. Have a good sense of team and cooperation spirit, and be able to fulfill the role of either a member or a leader in a multi-disciplinary team.
10. Have good oral and written expression and communication skills, have a certain international vision, and be able to communicate and exchange ideas in a cross-cultural context.
11. Understand and master the management principles and decision-making methods in the fields of land, regional, urban and rural, and environmental planning, and be able to apply them in a multi-disciplinary context.
12. Have the desire and ability for lifelong learning, able to employ modern information technologies to track and acquire information, and be familiar with and adapt to the development frontiersand trends of Human Geography & Urban and Rural Planning.

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 | | | | √ | √ |

## 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、人文地理学、经济地理学、区域分析与规划、城乡规划原理、城市详细规划、土地评价与土地管理、计量地理学、地图学、遥感原理与应用、地理信息系统概论。

Physical Geography, Human Geography, Economic Geography, Regional Analysis and Planning, Principles of Urban and Rural Planning, Urban Detailed Planning, Land Evaluation and Management, Quantitative Geography, Cartography,Principles and Applications of Remote Sensing, Introduction to Geographic Information System.

### （二） 专业特色课程：

景观生态学、城市地理学、区域资源与环境监测、国土规划、景观规划与管理、房地产管理、社会调查研究方法。

Landscape Ecology,Urban Geography, Regional Resources and Environment Monitor, National Land Planning, Landscape Planning and Management, Real Estate Management, Social Research Methods.

附：毕业要求实现矩阵：

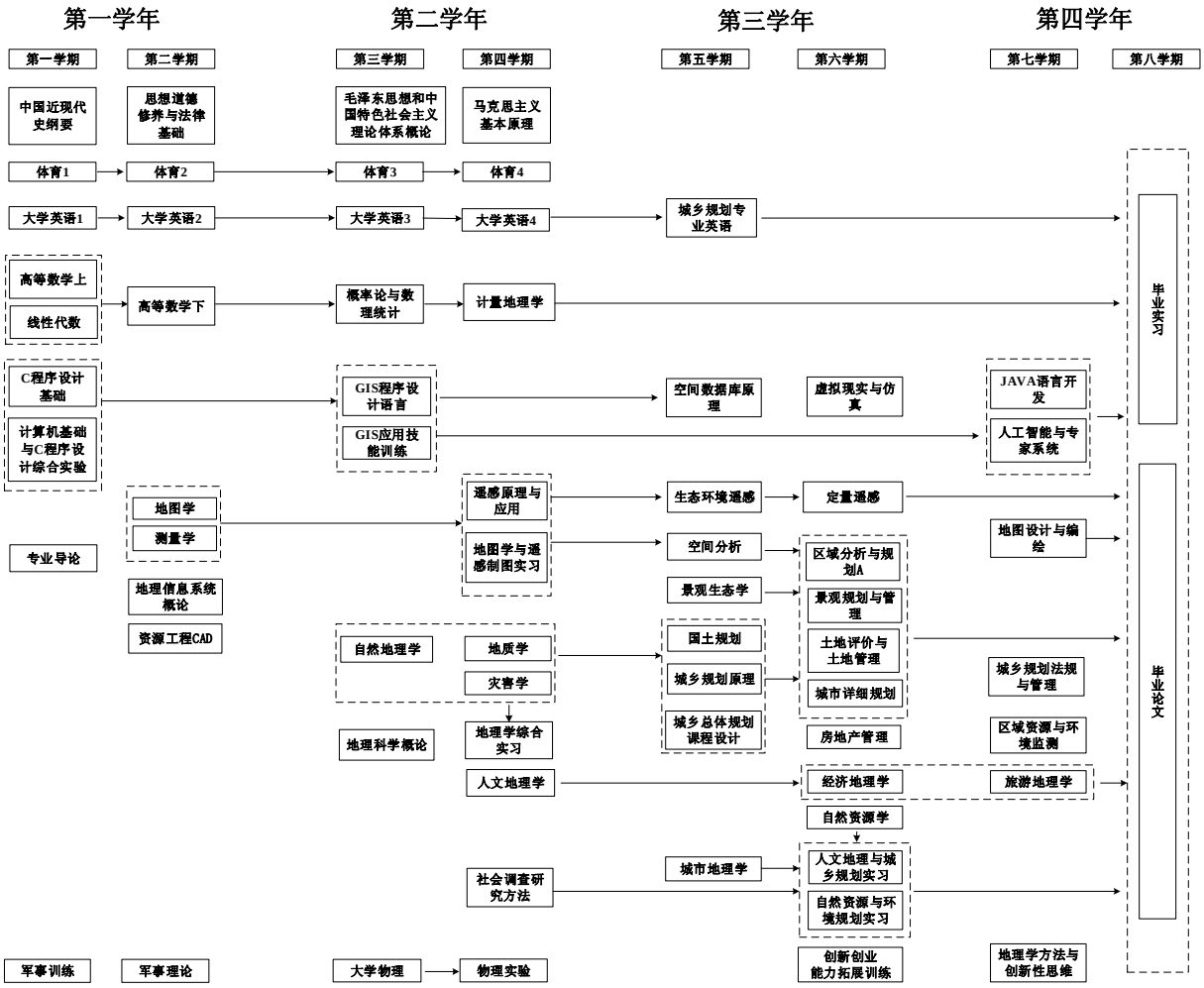
| 专业核心课程 | 专业特色课程 | 课程名称 | 人文地理与城乡规划专业毕业要求 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | （1） | （2） | （3） | （4） | （5） | （6） | （7） | （8） | （9） | （10） | （11） | （12） |
| | | 思想道德修养与法律基础 | | | | | | √ | | √ | | | | |
| | | 中国近现代史纲要 | | | | | | | | √ | | | | |
| | | 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 | | | | | | | | √ | | √ | | |
| | | C 程序设计基础 | √ | | | | | | | | | | | |
| | | 计算机基础与 C 程序设计综合实验 | √ | | | √ | | | | | | | | |
| | | 专业导论 | √ | √ | | | | | | | | | | |
| | | 高等数学 | √ | √ | | | | | | | | | | |
| | | 线性代数 | √ | √ | | | | | | | | | | |
| | | 测量学 | √ | | | | √ | | | | | | | |
| √ | | 地图学 | √ | | | | √ | | | | | | | |

| 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) |
| | | 地理科学概论 | √ | | | | | | | | | | | |
| | | GIS 程序设计语言 | | | √ | | √ | | | | | | | |
| √ | | 自然地理学 | √ | | | | | | | | | | | |
| | | 概率论与数理统计 | √ | √ | | | | | | | | | | |
| | | 大学物理 | √ | | | | | | | | | | | |
| | | 物理实验 | | | | √ | | | | | | | | |
| | | 地质学 | √ | | | | | | | | | | | |
| √ | | 遥感原理与应用 | √ | | | √ | √ | | | | | | | |
| √ | | 地理信息系统概论 | √ | | | | √ | | | | | | | |
| √ | | 计量地理学 | | | | √ | √ | | | | | | | |
| √ | | 人文地理学 | √ | √ | | √ | | | | | | | | |
| | √ | 国土规划 | | √ | √ | | | √ | | | | | | |
| √ | | 城乡规划原理 | | √ | √ | | | √ | | | | | | |
| | | 地理学方法与创新性思维 | | √ | | | | | | | | | | √ |
| √ | | 经济地理学 | √ | | | √ | | | | | | | | |
| √ | | 城市详细规划 | | √ | √ | | | √ | | | | | | |
| √ | | 土地评价与土地管理 | | √ | | √ | | √ | | | | | | |
| √ | | 区域分析与规划 | | √ | √ | √ | | √ | | | | | | |
| | | 资源工程 CAD | | | √ | | √ | | | | | | | |
| | | 虚拟现实与仿真 | | | | | √ | | | | | | | |
| | | 灾害学 | √ | | | | | | √ | | | | | |
| | √ | 房地产管理 | | | | | | | | | | | √ | |
| | | 空间数据库原理 | | | | √ | √ | | | | | | | |
| | √ | 景观生态学 | √ | | | | | | √ | | | | | |
| | √ | 城市地理学 | √ | | | √ | | | | | | | | |
| | | 空间分析 | | | | √ | √ | | | | | | | |

| 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） |
| | | 生态环境遥感 | | | | | √ | | √ | | | | | |
| | | 自然资源学 | √ | | | | | | | | | | | |
| | √ | 景观规划与管理 | | √ | √ | | | | | | | | √ | |
| | | 地图设计与编绘 | | | √ | | √ | | | | | | | |
| | | 旅游地理学 | √ | | | √ | | | | | | | | |
| | | JAVA 语言开发 | | | √ | | √ | | | | | | | |
| | | 城乡规划法规与管理 | | | | | | √ | | | | | | |
| | | 人工智能与专家系统 | | | √ | | √ | | | | | | | |
| | √ | 区域资源与环境监测 | | | | √ | | | √ | | | | | |
| | √ | 社会调查研究方法 | | √ | | √ | | | | | | | | |
| | | 定量遥感 | | | | √ | √ | | | | | | | |
| | | 城乡规划专业英语 | | | | | | | | | | √ | | √ |
| | | 军事训练 | | | | | | | | √ | √ | | | |
| | | GIS 应用技能训练 | | √ | √ | √ | √ | | | | | | | |
| | | 地理学综合实习 | √ | | | | | √ | | | √ | √ | | |
| | | 地图学与遥感制图实习 | √ | √ | | | √ | | | | √ | √ | | |
| | | 城乡总体规划课程设计 | | √ | √ | | | √ | | | √ | √ | √ | |
| | | 人文地理与城乡规划实习 | | √ | | √ | | √ | | | √ | √ | | |
| | | 自然资源与环境规划实习 | | √ | | √ | | | √ | | √ | √ | | |
| | | 创新创业能力拓展训练 | | √ | | | | | | √ | √ | √ | √ | √ |
| | | 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （一）通识教育必修课程 General Education Required Courses | | | | | | | | | |
| 4220002110 | 中国近现代史纲要 Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 1 | |
| 4220001110 | 思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 2 | |
| 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 | | 3 | |
| 4220005110 | 马克思主义基本原理 Marxism Philosophy | 3 | 48 | | | 8 | | 4 | |
| 1060003130 | 军事理论 Military Theory | 1 | 32 | | | | 16 | 2 | |
| 4210001170 | 体育 1 Physical Education Ⅰ | 1 | 26 | | | | | 1 | |
| 4210002170 | 体育 2 Physical Education Ⅱ | 1 | 34 | | | | | 2 | |
| 4210003170 | 体育 3 Physical Education Ⅲ | 1 | 34 | | | | | 3 | |
| 4210004170 | 体育 4 Physical Education Ⅳ | 1 | 34 | | | | | 4 | |
| 4030002180 | 大学英语 1 College English 1 | 3 | 60 | | | | 12 | 1 | |
| 4030003180 | 大学英语 2 College English Ⅱ | 2 | 44 | | | | 12 | 2 | 大学英语 1 |
| 4030004180 | 大学英语 3 College English Ⅲ | 2 | 44 | | | | 12 | 3 | 大学英语 2 |
| 4030004180 | 大学英语 4 College English IV | 2 | 44 | | | | 12 | 4 | 大学英语 3 |
| 4120335170 | C 程序设计基础 Fundamentals of Computer Program Design(C) | 2 | 32 | | | | | 1 | |
| 4120336170 | 计算机基础与 C 程序设计综合实验 Fundamentals of Computer and Comprehensive Experiment in Program Design (C) | 1 | 32 | 32 | | | | 1 | |
| 小 计 Subtotal | | 29 | 640 | 32 | 0 | 48 | 64 | | |

| 课程编号<br>Course Number | 课 程 名 称<br>Course Title | 学分<br>Crs | 学时分配 Including | | | | | 建议修读学期<br>Suggested Term | 先修课程<br>Prerequisite Course |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时<br>Tot hrs. | 实验<br>Exp. | 上机<br>Ope-ration | 实践<br>Prac-tice | 课外<br>Extra-cur | | |
| （二）通识教育选修课程<br>General Education Elective Courses | | | | | | | | | |
| 创新创业类<br>Innovation and Entrepreneurship Courses<br>人文社科类<br>Arts and Social Science Courses<br>经济管理类<br>Economy and Management Courses<br>科学技术类<br>Science and Technology Courses<br>艺术体育类<br>Art and Physical Education Courses | 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并取得至少 2 个学分，在创新创业类课程中至少选修一门课程，在人文社科类或经济管理类课程中至少选修一门。<br>Students are required to abtain at least 9 credits，which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses. | | | | | | | | |
| （三）专业教育必修课程<br>Basic Disciplinary RequiredCourses | | | | | | | | | |
| 4060273130 | 专业导论<br>Introduction to Geographical Science | 1 | 16 | | | | | 1 | |
| 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 1 | |
| 4050063110 | 高等数学 A 上<br>Advanced Mathematics Ⅰ | 5 | 80 | | | | | 1 | |
| 4050064110 | 高等数学 A 下<br>Advanced Mathematics Ⅱ | 5 | 80 | | | | | 2 | 高等数学上 |
| 4060439170 | 测量学 D<br>Geomatics | 3 | 48 | | 10 | 16 | | 2 | |
| 4060437160 | 地图学 A<br>Cartography | 3.5 | 56 | 24 | | | | 2 | |
| 4060443170 | 地理信息系统概论<br>Introduction to Geographic Information System | 4 | 64 | 28 | | | | 2 | 地图学 |
| 4060320130 | 地理科学概论<br>Introduction to Geography | 2 | 32 | | | | | 3 | |
| 4060001110 | GIS 程序设计语言<br>GIS Programming Language | 3.5 | 56 | 24 | | | | 3 | C 程序设计基础 |
| 4060440170 | 自然地理学 C<br>Physical Geography | 2 | 32 | | | | | 3 | |
| 4050058110 | 概率论与数理统计 B<br>Probability and Mathematical Statistics | 3 | 48 | | | | | 3 | 高等数学 |
| 4050463130 | 大学物理 B<br>Physics | 5 | 80 | | | | | 3 | |
| 4050224110 | 物理实验 B<br>Physics Lab. | 1 | 32 | 32 | | | | 4 | 大学物理 |
| 4060441170 | 地质学 B<br>Physical Geology | 2 | 32 | | | | | 4 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4060442170 | 遥感原理与应用 B<br>Principles and Applications of Remote Sensing | 3.5 | 56 | 24 | | | | 4 | |
| 4060355140 | 计量地理学<br>Quantitative Geography | 3 | 48 | 24 | | | | 4 | 概率论与数理统计 |
| 4060451170 | 人文地理学 D<br>Human Geography | 3 | 48 | 16 | | | | 4 | |
| 4060287130 | 国土规划 B<br>National Land Planning | 2.5 | 40 | | | | | 5 | |
| 4060452170 | 城乡规划原理<br>Principles of Urban and Rural Planning | 2.5 | 40 | | | | | 5 | |
| 4060318130 | 经济地理学 A<br>Economic Geography | 2 | 32 | 8 | | | | 6 | |
| 4060453170 | 城市详细规划 C<br>Urban Detailed Planning | 2.5 | 40 | 16 | | | | 6 | |
| 4060396130 | 土地评价与土地管理 A<br>Land Evaluation and Management | 3 | 48 | 24 | | | | 6 | |
| 4060446170 | 区域分析与规划 D<br>Regional Analysis and Planning A | 3 | 48 | 24 | | | | 6 | |
| 4060323130 | 地理学方法与创新性思维<br>Geographical Methods and Creative Thinking | 2 | 32 | | | | | 7 | |
| 小 计 Subtotal | | 69.5 | 1128 | 244 | 10 | 16 | 0 | | |
| （四）专业教育选修课程<br>Specialized Elective Courses | | | | | | | | | |
| 4060128110 | 资源工程 CAD(B)<br>Resource Engineering CAD | 2 | 32 | 24 | | | | 2 | |
| 4060125110 | 灾害学<br>Disaster Science | 2 | 32 | | | | | 4 | |
| 4060068110 | 空间数据库原理<br>Principles of Spatial Database | 3.5 | 56 | 24 | | | | 5 | |
| 4060455170 | 城乡规划专业英语<br>Professional English for Urban and Rural Planning | 2 | 32 | | | | | 5 | 大学英语 3 |
| 4060447170 | 城市地理学 A<br>Urban Geography | 2 | 32 | 8 | | | | 5 | |
| 4060237120 | 空间分析 A<br>Spatial Analysis | 3 | 48 | 24 | | | | 5 | 地理信息系统概论 |
| 4060395130 | 生态环境遥感<br>Eco-Environmental Remote Sensing | 3 | 48 | 16 | | | | 5 | 遥感原理与应用 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4060445170 | 虚拟现实与仿真<br>Virtual Reality and Simulation | 2 | 32 | 16 | | | | 6 | |
| 4060030110 | 房地产管理<br>Real Estate Management | 2 | 32 | | | | | 6 | |
| 4060135110 | 自然资源学<br>Natural Resource | 3 | 48 | | | | | 6 | |
| 4060065110 | 景观规划与管理<br>Landscape Planning and Management | 2 | 32 | | | | | 6 | 自然地理学 |
| 4060281130 | 地图设计与编绘<br>Map Design and Compilation | 3 | 48 | 40 | | | | 7 | 地图学 |
| 4060095110 | 旅游地理学<br>Tourism Geography | 2 | 32 | | | | | 7 | 自然地理学 |
| 4060222120 | JAVA 语言开发 B<br>JAVA Language | 2 | 32 | | 16 | | | 7 | |
| 4060021110 | 城乡规划法规与管理<br>Urban and Rural Planning Regulations and Management | 2 | 32 | | | | | 7 | |
| 4060449170 | 人工智能与专家系统 B<br>AI & ES | 2 | 32 | 16 | | | | 7 | |
| 4060504170 | 区域资源与环境监测<br>Regional Resources and Environment Monitor | 3 | 48 | 16 | | | | 7 | |
| 小 计 Subtotal | | 40.5 | 648 | 184 | 16 | 0 | 0 | | |
| 修读说明：要求至少选修 20 学分。<br>NOTE：Minimum subtotal credits:20. | | | | | | | | | |
| （五）个性课程<br>Personalized Electice Courses | | | | | | | | | |
| 4060454170 | 社会调查研究方法 B<br>Social Research Methods | 2 | 32 | 12 | | | | 4 | |
| 4040054110 | 景观生态学 B<br>Landscape Ecology | 2 | 32 | | | | | 5 | |
| 4060345130 | 定量遥感<br>Quantitative Remote Sensing | 2 | 32 | 8 | | 8 | | 6 | |
| 小 计 Subtotal | | 6 | 96 | 20 | 0 | 8 | 0 | | |
| 修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分（其中以上课程至少选修 4 学分）。<br>NOTE: Sudents can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits (at least 4 credits from the above courses). | | | | | | | | | |

## 五、 集中性实践教学环节

## Ⅴ Practice Schedule

| 课程编号<br>Course Number | 实践环节名称<br>Practice Courses Name | 学分<br>Crs | 周数<br>Weeks | 建议修读学期<br>Suggested Term |
|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 1.5 | 3 | 1 |
| 4060255120 | GIS 应用技能训练 A<br>Practical Training on GIS | 2 | 2 | 3 |
| 4060450170 | 地理学综合实习<br>Comprehensive Practice of Geography | 2 | 2 | 4（假期） |
| 4060282130 | 地图学与遥感制图实习 B<br>Practice of Cartography and Remote Sensing Cartography | 2 | 2 | 4 |
| 4060456170 | 城乡总体规划课程设计<br>Exerciese in Urban and Rural Master Planning | 2 | 2 | 5 |
| 4060457170 | 人文地理与城乡规划实习<br>Practice of Human Geography & Urban and Rural Planning | 2 | 2 | 6 |
| 4060458170 | 自然资源与环境规划实习<br>Practice of Resource and Environmental Planning | 2 | 2 | 6 |
| 4060525170 | 创新创业能力拓展训练<br>Innovation and Entrepreneurship Ability Development Training | 1 | 1 | 6 |
| 4060148110 | 毕业实习<br>Graduation Practice | 2 | 2 | 8 |
| 4060529170 | 毕业论文<br>Graduation Thesis | 10 | 15 | 8 |
| 小　　计　Subtotal | | 26.5 | 33 | |

## 六、其它要求

## Ⅵ Recommendations on Course Studies

1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。

2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

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 2017 版本科培养方案
# Undergraduate Education Plan for Specialty in Geographic Information Science (2017)

| | | | |
|---|---|---|---|
| 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 | **1 年** |
| Disciplinary | Geography | Duration | 1 year |

**最低毕业学分规定**

**Graduation Credit Criteria**

| 课程分类 Course Classification / 课程性质 Course Nature | 通识教育课程 Public Basic Courses | 专业教育课程 Specialized Courses | 个性课程 Personalized Course | 集中性实践教学环节 Practice Courses | 课外学分 Study Credit after Class | 总学分 Total Credits |
|---|---|---|---|---|---|---|
| 必修课 Required Courses | 29 | 70.5 | \ | 25.5 | \ | 170 |
| 选修课 Elective Courses | 9 | 20 | 6 | \ | 10 | |

## 一、培养目标与毕业要求

### Ⅰ Educational Objectives &Requirement

### （一） 培养目标

本专业培养掌握地理信息科学的基础理论、专业知识、基本方法和实践技能，“适应能力强、实干精神强、创新意识强”，具有一定国际视野，能够在信息、资源、环境、国土、交通等行业从事系统研究、设计、应用和管理工作的卓越人才。学生毕业后 5 年应达到以下目标：

（1） 具有良好的人文素养、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，具有可持续发展意识。

（2） 具备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学、地理学和其它相关自然科学知识，并能将数学和其它科学工具运用于解决工程问题。

（3） 精通地理信息系统的工具和软硬件技术，具有在不同领域开展分析、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） 具有良好的表达能力、沟通协调能力、团队意识和合作精神，具有独立思考，终身学习的能力。

（5） 能够适应社会经济发展及行业转型升级需要，具备创新精神和国际化视野，能够推动地理信息科学领域的创新发展。

**Educational Objectives**

This major cultivate excellent talentswho will master the fundamental theory, professional knowledge, basic methods and practical skills of Geographical Information Science, have strong “adaptive capacity”,

“spirit of hardworking” and “consciousness of innovation”, and are able to work on system research, design, application and management in such fieldsas information, resources, environment, land and transportation. The graduates shouldachieve the following targets five years after graduation:

1. Have good humanistic quality, professional spirit, social responsibility and engineering ethics, focus oncontemporaryglobal and social issues, andhave the consciousness of sustainable development.
2. Have the required knowledge of mathematics,geography and other related natural sciences to work in the field of scientific research, engineering design and technical services, and be proficientin usingmathematical and other scientific tools to solve engineering problems.
3. Be proficient in various tools and software & hardware technologiesof the geographic information system,have the ability to conduct the analysis, design, development,testing andapplication ofgeographic information system, remote sensing processing system and global positioning system in different practical fields.
4. Have good expression skills, communication and coordination capability, good sense of team and cooperation spirit, as well as the ability of independent thinking and lifelonglearning.
5. Be capable of meeting the demand of social & economic development and industrial transformation and upgrading,have agoodspirit of innovation and international version, and be able to promote innovative development in Geographical Information Science.

**（二） 毕业要求**

（1） 工程知识：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） 问题分析：能够利用本专业的理论知识和工程基础知识进行自主发现、自主设计和自主解决与地理信息工程相关的科学问题，具有逻辑思维和辩证思维的能力、科学思维方法以及创新意识。

（3） 设计/开发解决方案：掌握地理信息系统的设计语言和开发平台，理解地理信息系统的设计方法和步骤，能够设计和实现基于二次开发的应用系统，实现对地理信息的采集、组织、存储、共享、分析和表达。

（4） 研究：能够基于地理信息科学的原理对复杂的工程问题进行研究，有效进行实验和模拟仿真设计与操作，并能够对实验结果进行分析和解释。

（5） 使用现代工具：掌握地理信息系统、遥感图像处理系统、导航定位系统的基本方法和技术，能够理解资源开发、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。

（6） 工程与社会：了解当代社会问题和社会需求，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。

（7） 环境和可持续发展：能够理解和评价针对复杂工程问题的地理信息工程实践对环境、社会可持续发展的影响。

（8） 职业规范：具有良好的思想素质、身体素质、心理素质、文化修养和社会责任感，能够在实践中理解并遵守工程职业道德和行为规范。

（9） 个人和团队：具有良好的团队意识和合作精神，能够在多学科背景下的团队中承担团队成员以及负责人的角色。

（10） 沟通：学生具有良好的口头和书面表达和交流能力，具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

（11） 项目管理：理解并掌握地理信息系统工程管理原理与决策方法，并能在多学科环境中应用。

（12） 终身学习：具有进行终身学习的愿望和能力，掌握运用现代信息技术跟踪并获取信息的方法，熟悉并适应地理信息领域的发展动态和方向。

**Requirement**

1. Master the relevant knowledge of mathematics, geography, computer science, remote sensing, cartography and managementthat required in the professional filed.
2. Be able to employprofessional theories and knowledge and engineering knowledge toconductindependent discovery and design, and to independentlyresolve the related scientific problemsingeographic information engineering, and master the ability of logical thinking and dialectical thinking,the methods of scientific thinking, and the consciousness of innovation.
3. Master the design language and development platform of Geographic Information System, and the capability to understand themethods and stepsin geographic information system designand to realize the acquisition, organization, storage, sharing, analysis and expression of geographic information.
4. Be able to conduct research on complex engineering problems based on the principles of Geographical Information Science, carry out experiments and simulation design and operation, and analyze and interpret the experimental results.
5. Master the basic methods and techniquesof geographic information system, remote sensing image processing system, navigation and positioning system, and understand the mode of theapplication ofGeographical Information Sciencein the field of resources exploitation, hazard controland environmental protection etc.
6. Be familiar with the contemporary social demands and social issues, and be conscious of the economic, environmental, legal, safety and ethical constraints in engineering design.
7. Be able to understand and evaluate the impacts of the geographical information engineering for complex engineering problemson the sustainability of environment and society.
8. Have good ideological quality, physical quality, psychological quality, cultural cultivation and social responsibility,be able to understand and comply withengineering ethics and code of conduct in practices.
9. Have a good sense of team and cooperation spirit, and be able to fulfill the role of either a member or a leader in a multi-disciplinary team.
10. Have good oral and written expression and communication skills, have a certain international vision, and be able to communicate and exchange ideas in a cross-cultural context.
11. Understand and master the management principles and decision-making methods of Geographical Information System engineering, and be able to apply them in a multi-disciplinary context.
12. Have the desire and ability for lifelong learning, able to employ modern information technologies to track and acquire information, and be familiar with and adapt to the development frontiersand trends of Geographical Information Science.

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 | | | | √ | |

| | 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 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：

自然地理学、地理信息系统概论、遥感原理与应用、空间分析、地图学、地理信息系统工程、空间数据库原理、GIS 程序设计语言、GIS 算法与数据结构、网络 GIS。

Physical Geography, Introduction to Geographic Information System, Principles and Applications of Remote Sensing, Spatial Analysis, Cartography, GIS Engineering, Principles of Spatial Database, GIS Programming Language,Algorithms and Data Structures of GIS, Web GIS.

### （二） 专业特色课程：

资源环境信息系统、计量地理学、生态环境遥感、矿山 GIS、定量遥感、人工智能与专家系统。

Resource and Environment Information System, Quantitative Geography, Eco-Environmental Remote Sensing, MineGIS, Quantitative Remote Sensing, Artificial Intelligence & Expert System.

附：毕业要求实现矩阵：

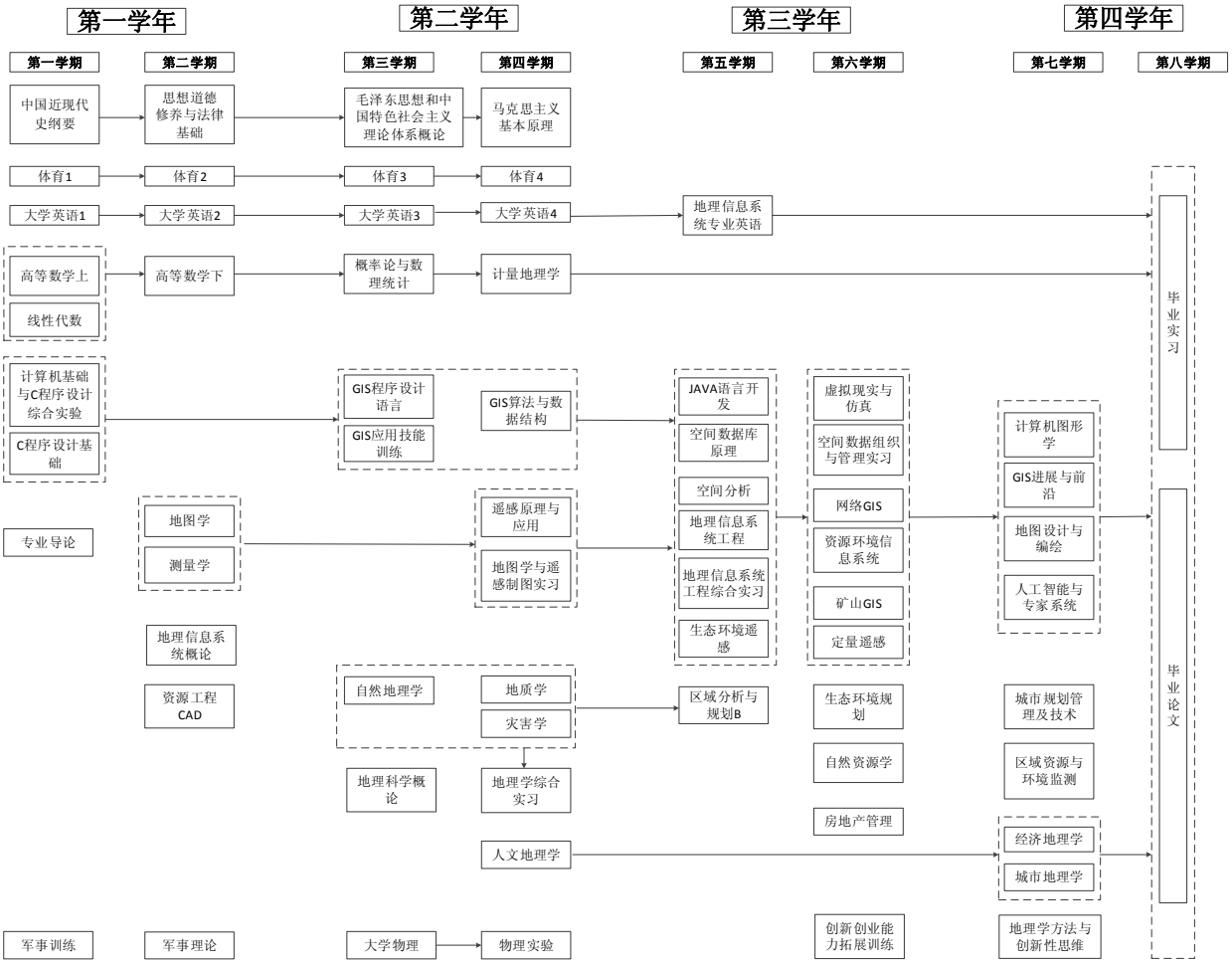
| 专业核心课程 | 专业特色课程 | 课程名称 | 地理信息科学专业毕业要求 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| | | 思想道德修养与法律基础 | | | | | | √ | | √ | | | | |
| | | 中国近现代史纲要 | | | | | | | | √ | | | | |
| | | 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 | | | | | | | | √ | | √ | | |
| | | C 程序设计基础 | √ | | √ | | | | | | | | | |
| | | 计算机基础与 C 程序设计综合实验 | √ | | √ | √ | | | | | | | | |
| | | 专业导论 | √ | √ | | | | | | | | | | |
| | | 高等数学 | √ | √ | | | | | | | | | | |
| | | 线性代数 | √ | √ | | | | | | | | | | |
| | | 测量学 | √ | | | | √ | | | | | | | |
| √ | | 地图学 | √ | | | | √ | | | | | | | |
| | | 地理科学概论 | √ | | | | | | | | | | | |
| √ | | GIS 程序设计语言 | √ | | √ | √ | | | | | | | | |

| 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) |
| √ | | 自然地理学 | √ | | | | | | | | | | | |
| | | 概率论与数理统计 | √ | √ | | | | | | | | | | |
| | | 大学物理 | √ | | | | | | | | | | | |
| | | 物理实验 | | | | √ | | | | | | | | |
| | | 地质学 | √ | | | | | | | | | | | |
| √ | | 遥感原理与应用 | √ | | | √ | √ | | | | | | | |
| √ | | 地理信息系统概论 | √ | | | | √ | | | | | | | |
| | √ | 计量地理学 | | | | √ | √ | | | | | | | |
| √ | | 空间分析 | | | | | | | | | | | | |
| √ | | 地理信息系统工程 | | √ | √ | √ | | √ | | | | | | |
| √ | | 空间数据库原理 | | √ | √ | | √ | | | | | | | |
| | | 地理学方法与创新性思维 | | √ | | | | | | | | | | √ |
| √ | | GIS 算法与数据结构 | √ | | √ | | | | | | | | | |
| | √ | 资源环境信息系统 | | | √ | | | | √ | | | | | |
| √ | | 网络 GIS | | | √ | | √ | | | | | | | √ |
| | | 资源工程 CAD | | | √ | | √ | | | | | | | |
| | | 虚拟现实与仿真 | | | | √ | √ | | | | | | | |
| | | 灾害学 | √ | | | | | | √ | | | | | |
| | | 房地产管理 | | | | | | | | | | | √ | |
| | | JAVA 语言开发 | | | √ | | √ | | | | | | | |
| | | 区域分析与规划 | | √ | | | | √ | √ | | | | | |
| | | 人文地理学 | √ | | | | | √ | | | | | | |
| | √ | 生态环境遥感 | | | | √ | | | √ | | | | | |
| | | 生态环境规划 | | | | | | | √ | | | | | |
| | √ | 矿山 GIS | | | | | √ | | √ | | | | | |
| | | 自然资源学 | √ | | | | | | | | | | | |
| | | 计算机图形学 | | | √ | | √ | | | | | | | |
| | | GIS 进展与前沿 | √ | | | | | | | | | | | √ |
| | | 地图设计与编绘 | | | √ | | √ | | | | | | | |
| | | 经济地理学 | √ | | | | | √ | | | | | | |
| | | 区域资源与环境监测 | | | √ | | | | √ | | | | | |
| | | 城市规划管理及技术 | | | | | √ | | | | | | √ | |

| 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) |
| | | 城市地理学 | √ | | | √ | | | | | | | | |
| | √ | 定量遥感 | | | | | √ | | | | | | | |
| | | 地理信息系统专业英语 | | | | | | | | | | √ | | √ |
| | √ | 人工智能与专家系统 | | | | | √ | | | | | | | |
| | | 军事训练 | | | | | | | | √ | √ | | | |
| | | GIS 应用技能训练 | | √ | √ | √ | √ | | | | | | | |
| | | 地理学综合实习 | √ | | | | | √ | | | √ | √ | | |
| | | 地图学与遥感制图实习 | √ | √ | | | √ | | | | √ | √ | | |
| | | 地理信息系统工程综合实习 | | √ | √ | | √ | √ | | | √ | | | |
| | | 空间数据组织与管理实习 | | √ | √ | | √ | | | | √ | | | |
| | | 创新创业能力拓展训练 | | √ | | | | | | √ | √ | √ | √ | √ |
| | | 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （一）通识教育必修课程 General Education Required Courses | | | | | | | | | |
| 4220002110 | 中国近现代史纲要 Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 1 | |
| 4220001110 | 思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 2 | |
| 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 | | 3 | |
| 4220005110 | 马克思主义基本原理 Marxism Philosophy | 3 | 48 | | | 8 | | 4 | |
| 1060003130 | 军事理论 Military Theory | 1 | 32 | | | | 16 | 2 | |
| 4210001170 | 体育 1 Physical Education Ⅰ | 1 | 26 | | | | | 1 | |
| 4210002170 | 体育 2 Physical Education Ⅱ | 1 | 34 | | | | | 2 | |
| 4210003170 | 体育 3 Physical Education Ⅲ | 1 | 34 | | | | | 3 | |
| 4210004170 | 体育 4 Physical Education Ⅳ | 1 | 34 | | | | | 4 | |
| 4030002180 | 大学英语 1 College English 1 | 3 | 60 | | | | 12 | 1 | |
| 4030003180 | 大学英语 2 College English Ⅱ | 2 | 44 | | | | 12 | 2 | 大学英语 1 |
| 4030004180 | 大学英语 3 College English Ⅲ | 2 | 44 | | | | 12 | 3 | 大学英语 2 |
| 4030004180 | 大学英语 4 College English IV | 2 | 44 | | | | 12 | 4 | 大学英语 3 |
| 4120335170 | C 程序设计基础 Fundamentals of Computer Program Design(C) | 2 | 32 | | | | | 1 | |
| 4120336170 | 计算机基础与 C 程序设计综合实验 Fundamentals of Computer and Comprehensive Experiment in Program Design (C) | 1 | 32 | 32 | | | | 1 | |
| 小 计 Subtotal | | 29 | 640 | 32 | 0 | 48 | 64 | | |

| 课程编号<br>Course Number | 课 程 名 称<br>Course Title | 学分<br>Crs | 学时分配 Including | | | | | 建议修读学期<br>Suggested Term | 先修课程<br>Prerequisite Course |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时<br>Tot hrs. | 实验<br>Exp. | 上机<br>Ope-ration | 实践<br>Prac-tice | 课外<br>Extra-cur | | |
| （二）通识教育选修课程<br>General Education Elective Courses | | | | | | | | | |
| 创新创业类<br>Innovation and Entrepreneurship Courses<br>人文社科类<br>Arts and Social Science Courses<br>经济管理类<br>Economy and Management Courses<br>科学技术类<br>Science and Technology Courses<br>艺术体育类<br>Art and Physical Education Courses | 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并取得至少 2 个学分，在创新创业类课程中至少选修一门课程，在人文社科类或经济管理类课程中至少选修一门。<br>Students are required to abtain at least 9 credits，which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses. | | | | | | | | |
| （三）专业教育必修课程<br>Basic Disciplinary RequiredCourses | | | | | | | | | |
| 4060273130 | 专业导论<br>Introduction to Geographical Science | 1 | 16 | | | | | 1 | |
| 4050063110 | 高等数学 A 上<br>Advanced Mathematics Ⅰ | 5 | 80 | | | | | 1 | |
| 4050064110 | 高等数学 A 下<br>Advanced Mathematics Ⅱ | 5 | 80 | | | | | 2 | 高等数学上 |
| 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 1 | |
| 4060439170 | 测量学 D<br>Geomatics | 3 | 48 | | 10 | 16 | | 2 | |
| 4060437160 | 地图学 A<br>Cartography | 3.5 | 56 | 24 | | | | 2 | |
| 4060443170 | 地理信息系统概论<br>Introduction to Geographic Information System | 4 | 64 | 28 | | | | 2 | 地图学 |
| 4060320130 | 地理科学概论<br>Introduction to Geography | 2 | 32 | | | | | 3 | |
| 4060001110 | GIS 程序设计语言<br>GIS Programming Language | 3.5 | 56 | 24 | | | | 3 | |
| 4060440170 | 自然地理学 C<br>Physical Geography | 2 | 32 | | | | | 3 | |
| 4050058110 | 概率论与数理统计 B<br>Probability and Mathematical Statistics | 3 | 48 | | | | | 3 | 高等数学 |
| 4050463130 | 大学物理 B<br>Physics | 5 | 80 | | | | | 3 | |
| 4050224110 | 物理实验 B<br>Physics Lab. | 1 | 32 | 32 | | | | 4 | 大学物理 |
| 4060441170 | 地质学 B<br>Physical Geology | 2 | 32 | | | | | 4 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4060442170 | 遥感原理与应用 B<br>Principles and Applications of Remote Sensing | 3.5 | 56 | 24 | | | | 4 | |
| 4060355140 | 计量地理学<br>Quantitative Geography | 3 | 48 | 24 | | | | 4 | 概率论与数理统计 |
| 4060444170 | GIS 算法与数据结构 B<br>Algorithms and Data Structures of GIS | 3 | 48 | 24 | | | | 4 | 地理信息系统概论 |
| 4060237120 | 空间分析 A<br>Spatial Analysis | 3 | 48 | 24 | | | | 5 | 地理信息系统概论 |
| 4060227120 | 地理信息系统工程 B<br>GIS Engineering | 3.5 | 56 | 24 | | | | 5 | 地理信息系统概论 |
| 4060068110 | 空间数据库原理<br>Principles of Spatial Database | 3.5 | 56 | 24 | | | | 5 | |
| 4060394130 | 资源环境信息系统 B<br>Resource and Environment Information System | 3.5 | 56 | 24 | | | | 6 | 地理信息系统概论，遥感原理与应用，空间数据库原理 |
| 4060113110 | 网络 GIS<br>Web GIS | 3 | 48 | 18 | | | | 6 | 地理信息系统概论 |
| 4060323130 | 地理学方法与创新性思维<br>Geographical Methods and Creative Thinking | 2 | 32 | | | | | 7 | |
| 小 计 Subtotal | | 70.5 | 1144 | 294 | 10 | 16 | 0 | | |
| （四）专业教育选修课程<br>Specialized Elective Courses | | | | | | | | | |
| 4060128110 | 资源工程 CAD(B)<br>Resource Engineering CAD | 2 | 32 | 24 | | | | 2 | |
| 4060125110 | 灾害学<br>Disaster Science | 2 | 32 | | | | | 4 | |
| 4060248120 | 人文地理学 C<br>Human Geography | 2 | 32 | | | | | 4 | |
| 4060222120 | JAVA 语言开发 B<br>JAVA Language | 2 | 32 | | 16 | | | 5 | |
| 4060446170 | 区域分析与规划 D<br>Regional Analysis and Planning | 3 | 48 | 24 | | | | 5 | |
| 4060395130 | 生态环境遥感<br>Eco-Environmental Remote Sensing | 3 | 48 | 16 | | | | 5 | 遥感原理与应用 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4060448170 | 地理信息系统专业英语<br>Professional English for GIS | 2 | 32 | | | | | 5 | 大学英语 3 |
| 4060030110 | 房地产管理<br>Real Estate Management | 2 | 32 | | | | | 6 | |
| 4060316130 | 生态环境规划 C<br>Ecological Environment Planning | 3 | 48 | | | 16 | | 6 | |
| 4060239120 | 矿山 GIS(B)<br>Mine GIS | 3 | 48 | 20 | | | | 6 | 地理信息系统概论 |
| 4060135110 | 自然资源学<br>Natural Resource | 3 | 48 | | | | | 6 | |
| 4060060110 | 计算机图形学 B<br>Computer Graphics | 2 | 32 | 12 | | | | 7 | |
| 4060221110 | GIS 进展与前沿<br>Progress in GIS | 2 | 32 | | | | | 7 | |
| 4060281130 | 地图设计与编绘<br>Map Design and Compilation | 3 | 48 | 40 | | | | 7 | 地图学 |
| 4060318130 | 经济地理学 A<br>Economic Geography | 2 | 32 | 8 | | | | 7 | |
| 4060504170 | 区域资源与环境监测<br>Regional Resources and Environment Monitor | 3 | 48 | 16 | | | | 7 | |
| 4060016110 | 城市规划管理及技术<br>Urban Planning Management and Technology | 2 | 32 | | | | | 7 | |
| 4060447170 | 城市地理学 A<br>Urban Geography | 2 | 32 | 8 | | | | 7 | |
| 小 计 Subtotal | | 43 | 688 | 168 | 16 | 16 | 0 | | |
| 修读说明：要求至少选修 20 学分。<br>NOTE：Minimum subtotal credits:20. | | | | | | | | | |
| （五）个性课程<br>Personalized Electice Courses | | | | | | | | | |
| 4060445170 | 虚拟现实与仿真<br>Virtual Reality and Simulation | 2 | 32 | 16 | | | | 6 | |
| 4060345130 | 定量遥感<br>Quantitative Remote Sensing | 2 | 32 | 8 | | 8 | | 6 | |
| 4060449170 | 人工智能与专家系统 B<br>Artificial Intelligence & Expert System | 2 | 32 | 16 | | | | 7 | |
| 小 计 Subtotal | | 6 | 96 | 40 | 0 | 8 | 0 | | |
| 修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分（其中以上课程至少选修 4 学分）。<br>NOTE: Sudents can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits (at least 4 credits from the above courses). | | | | | | | | | |

## 五、 集中性实践教学环节

## Ⅴ Practice Schedule

| 课程编号<br>Course Number | 实践环节名称<br>Practice Courses Name | 学分<br>Crs | 周数<br>Weeks | 建议修读学期<br>Suggested Term |
|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 1.5 | 3 | 1 |
| 4060255120 | GIS 应用技能训练 A<br>Practical Training on GIS | 2 | 2 | 3 |
| 4060450170 | 地理学综合实习<br>Comprehensive Practice of Geography | 2 | 2 | 4（假期） |
| 4060282130 | 地图学与遥感制图实习 B<br>Practice of Cartography and Remote Sensing Cartography | 2 | 2 | 4 |
| 4060262120 | 地理信息系统工程综合实习<br>Practice of GIS | 2 | 2 | 5 |
| 4060298130 | 空间数据组织与管理实习<br>Practice of Spatial Data Organization and Management | 2 | 2 | 6 |
| 4060520170 | 创新创业能力拓展训练<br>Innovation and Entrepreneurship Ability Development Training | 2 | 2 | 6 |
| 4060153110 | 毕业实习<br>Graduation Practice | 2 | 2 | 8 |
| 4060526170 | 毕业论文<br>Graduation Thesis | 10 | 15 | 8 |
| 小　　计　Subtotal | | 25.5 | 32 | |

## 六、其它要求

## Ⅵ Recommendations on Course Studies

1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。

2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

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 2017 版本科培养方案
# Undergraduate Education Plan for Specialty in Environmental Engineering (2017)

| | | | |
|---|---|---|---|
| 专业名称<br>Major | **环境工程**<br>Environmental Engineering | 主干学科<br>Major Disciplines | **土木工程，化工与制药工程，生物工程**<br>Civil engineering, Chemical and Pharmaceutical Engineering, Biological Engineering |
| 计划学制<br>Duration | **四年**<br>4 Years | 授予学位<br>Degree Granted | **工学学士**<br>Bachelor of Engineering |
| 所属大类<br>Disciplinary | **环境科学与工程类**<br>Environment Science & Engineering | 大类培养年限<br>Duration | **1 年**<br>1 year |

**最低毕业学分规定**

**Graduation Credit Criteria**

| 课程分类 Course Classification / 课程性质 Course Nature | 通识教育课程 Public Basic Courses | 专业教育课程 Specialized Courses | 个性课程 Personalized Course | 集中性实践教学环节 Practice Courses | 课外学分 Study Credit after Class | 总学分 Total Credits |
|---|---|---|---|---|---|---|
| 必修课 Required Courses | 29 | 67.5 | \ | 28.5 | \ | 170 |
| 选修课 Elective Courses | 9 | 20 | 6 | \ | 10 | |

## 一、培养目标与毕业要求

### Ⅰ Educational Objectives &Requirement

### （一）培养目标

依托我校的行业和学科优势，培养德智体全面发展，掌握环境工程学科的基础理论和基本技能，具备很强的工程实践能力、具有创新精神和科学态度，知识能力素质协调发展，具有较强的社会交往能力和心理适应能力，具有国际视野和一定的领导意识和组织管理能力、有社会责任感和团队合作精神，成为具有较强环境工程实践能力和创新能力的高级工程技术人才和管理人才。毕业 5 年后可达到：

1、掌握并熟悉本专业或相关行业有关标准、规范，掌握环保技术规范中环境保护关键控制点，了解环保相关法律法规中明确的违法违规内容，结合理论知识、技术规范以及法律法规解决工程设计问题，规避项目运营的环保风险，能独立解决本专业及相关领域复杂工程问题。

2、适应地区与国家发展战略和经济建设和矿业、建材、化工等行业环境保护需要，能在政府、规划、经济、环保、设计、研究部门和学校等企事业单位从事污染控制工程设计、运行管理、清洁生产管理等工作，具有研究开发环境工程领域新产品、新设备的能力。

可将上述目标归纳为以下四点：

目标 1：德智体全面发展，掌握环境工程学科的基础理论和基本技能，具备很强的工程实践能力、具有创新精神和科学态度，知识能力素质协调发展，具有较强的社会交往能力和心理适应能力；

目标 2：适应地区与国家发展战略和经济建设和矿业、建材、化工等行业环境保护需要，毕业 5 年后能在政府、规划、经济、环保、设计、研究部门和学校等企事业单位，从事污染控制工程设计、运行管理、清洁生产管理等工作，具有研究开发环境工程领域新产品、新设备的能力；

目标 3：具有与时俱进的适应与学习能力，掌握并熟悉本专业或相关行业有关标准、规范，掌握环

保技术规范中环境保护关键控制点，了解环保相关法律法规中明确的违法违规内容，结合理论知识、技术规范以及法律法规解决工程设计问题，规避项目运营的环保风险，能独立解决本专业及相关领域复杂工程问题。

目标 4：具有国际视野和一定的领导意识和组织管理能力、有社会责任感和团队合作精神，成为具有较强环境工程实践能力和创新能力的高级工程技术人才和管理人才。

**（Ⅰ）Educational Objectives**

Relying on our school industries and academic strengths, training all-round development of moral, physical, environmental engineering disciplines grasp the basic theory and basic skills, with strong engineering practice ability, with innovative spirit and scientific attitude, knowledge and ability to coordinate the quality of Development, with strong ability of social interaction and psychological adaptability, with an international perspective and a certain sense of leadership and organizational management skills, social responsibility and team spirit to become a strong environmental engineering practice and innovative ability of advanced engineering technology Talent and management personnel. 5 years after graduation, students can be achieved:

1. To master and be familiar with the relevant standards and norms in this profession or related industries, to master the key control points of environmental protection in the environmental protection technical specifications, to understand the contents of the illegal and illegal ones explicitly stipulated in laws and regulations related to environmental protection, to solve the engineering design with theoretical knowledge, technical specifications and laws and regulations Problems, to circumvent the environmental risks of the operation of the project, and to independently solve the complex engineering problems in this major and related fields.
2. To adapt to regional and national development strategy and economic construction and mining, building materials, chemical industry environmental protection needs, in the government, planning, economics, environmental protection, design, research departments and schools and other enterprises and institutions engaged in pollution control engineering design, operation Management, cleaner production management and other work, with research and development of environmental engineering new products and new equipment capabilities.

The above objectives can be summarized into the following four points:

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. To adapt to regional and national development strategy and economic construction and environmental protection needs of mining, building materials, chemical industry and other industries, after graduating five years in the government, planning, economics, environmental protection, design, research departments and schools and other enterprises and institutions engaged in pollution control projects Design, operation and management, cleaner production management and other work, with research and development of environmental engineering new products and new equipment capabilities;
3. Have the ability to adapt and learn with the times, master and be familiar with relevant standards and norms in this profession or related industries, master the key control points of environmental protection in the environmental protection technical specifications, and understand the contents of unlawful and illegal activities explicitly stipulated in laws and regulations related to environmental protection, combined with theoretical knowledge , Technical specifications and laws and regulations to solve engineering design problems, to avoid environmental risks of project operations, can independently solve the professional and related fields of complex engineering issues.
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） 工程知识：能够将数学、自然科学、工程基础和专业知识用于解决复杂工程问题。
2） 问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析复杂工程问题，以获得有效结论。
3） 设计/开发解决方案：能够设计针对复杂工程问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。
4） 研究：能够基于科学原理并采用科学方法对复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。
5） 使用现代工具：能够针对复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。
6） 工程与社会：能够基于工程相关背景知识进行合理分析，评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。
7） 环境和可持续发展：能够理解和评价针对复杂工程问题的专业工程实践对环境、社会可持续发展的影响。
8） 职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。
9） 个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。
10）沟通：能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。
11）项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。
12）终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

**（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、大气污染控制、固体废物处理处置、环境质量评价等。

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

### （二） 专业特色课程：

环境专业导论、物理污染控制、水处理管网工程、水污染控制、大气污染控制、固体废物处理与处置、创新创业能力拓展训练等。

Characteristic Courses: Introduction to environmental specialty, Physical Pollution Control, Water Treatment Pipe Network Engineering，Water Pollution Control, Air Pollution Control, Solid Waste Treatment and Disposal, Ability of innovation and Entrepreneurship, etc.

附：毕业要求实现矩阵：

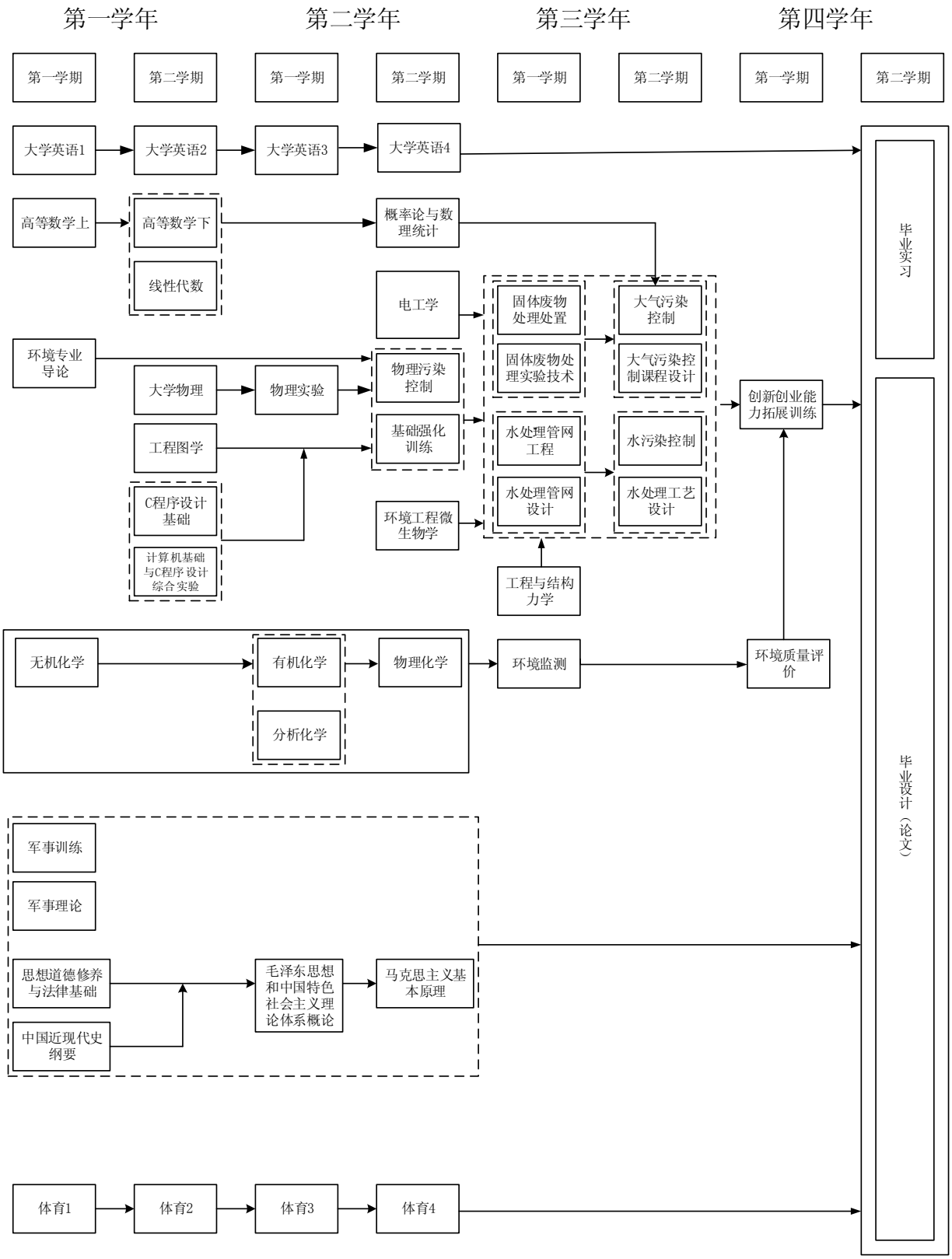
| 专业核心课程 | 专业特色课程 | 课程名称 | 环境工程专业毕业要求 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| | | 思想道德修养与法律基础 | | | | | | | | √ | | | | √ |
| | | 中国近现代史纲要 | | | | | | | | √ | | | | |
| | | 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 | | | | | | | | | √ | | | |

| 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) |
| | | 体育 | | | | | | | | | √ | | | √ |
| | | 大学英语 | | | | √ | | | | | · | √· | | √ |
| | | C 程序设计基础 | | √ | | | | | | | | | | |
| | | 计算机基础与 C 程序设计综合实验 | | √ | | | | | | | | | | √ |
| | √ | 环境专业导论 | √ | | | | | | √ | | | | | √ |
| | | 高等数学 | √ | | √ | | | | | | | | | |
| | | 无机化学 | √ | | | | | | | | | | | |
| | | 工程图学 | | | √ | | | | | | | | | |
| | | 线性代数 | √ | | √ | | | | | | | | | |
| | | 大学物理 | √ | | √ | | | | | | | | | |
| | | 有机化学 | √ | | | | | | | | | | | |
| | | 分析化学 | √ | | | | | | | | | | | |
| | | 物理化学 | √ | | | √ | | | | | | | | |
| | | 概率论与数理统计 | √ | | √ | | | | | | | | | |
| | | 电工学 | √ | | | | | | | | | | | |
| √ | | 环境工程微生物学 | | √ | | | | | | | | | | |
| | √ | 物理污染控制 | | √ | √ | | | | · | | | | | |
| | √ | 水处理管网工程 | | √ | √ | | | · | · | | | | | |
| | | 工程与结构力学 | | √ | | √ | | | | | | | | |
| √ | | 环境工程原理 | | √ | | √ | | | · | | | | | |
| √ | √ | 固体废物处理处置 | | √ | √ | | | | √ | | | | | |
| √ | | 环境监测 | | √ | | | | | | | | | | |
| √ | √ | 水污染控制 | | √ | √ | | | √ | | | | | | |
| √ | √ | 大气污染控制 | | √ | √ | | | | | | | | | |
| √ | | 环境质量评价 | | | | | √ | √ | √ | | | | | |
| | | 军事训练 | √ | · | · | · | | · | · | | | | | √ |
| | | 认识实习 | | | | | | | | √ | √ | | √ | |
| | | 基础强化训练 | | √ | √ | √ | | | | · | √ | · | | |
| | | 环境监测综合实验 | √ | | | √ | √ | | | | √ | √ | | |
| | | 水处理管网设计 | √ | | √ | | | √ | | √ | | | √ | |
| | | 水污染控制综合实验 | | | | √ | √ | | | | √ | √ | | |
| | | 大气污染控制实验技术 | | | | √ | √ | | | | √ | | | |
| | | 固体废物处理实验技术 | | | | √ | √ | | | | √ | | | |

| 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） |
| | | 水处理工艺设计 | | | √ | | | √ | | √ | | | √ | |
| | | 大气污染控制课程设计 | | | √ | | | √ | | √ | | | √ | |
| | | 固体废物处理工艺设计 | | | √ | | | √ | | √ | | | √ | |
| | | 微生物学实验技术 | | | | √ | √ | | | | √ | | | |
| | | 生产实习 | | | √ | | | √ | | √ | √ | | | |
| | √ | 创新创业能力拓展训练 | | | √ | | | √ | | √ | √ | | √ | √ |
| | | 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （一）通识教育必修课程<br>General Education Required Courses | | | | | | | | | |
| 4220001110 | 思想道德修养与法律基础<br>Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 1 | |
| 4220002110 | 中国近现代史纲要<br>Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 1 | |
| 4220003110 | 毛泽东思想和中国特色社会主义理论体系概论<br>Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics | 4 | 96 | | | 32 | | 3 | |
| 4220005110 | 马克思主义基本原理<br>Marxism Philosophy | 3 | 48 | | | 8 | | 4 | |
| 1060003130 | 军事理论<br>Military Theory | 1 | 32 | | | | 16 | 1 | |
| 4210001170 | 体育 1<br>Physical Education Ⅰ | 1 | 26 | | | | | 1 | |
| 4210002170 | 体育 2<br>Physical Education Ⅱ | 1 | 34 | | | | | 2 | |
| 4210003170 | 体育 3<br>Physical Education Ⅲ | 1 | 34 | | | | | 3 | |
| 4210004170 | 体育 4<br>Physical Education Ⅳ | 1 | 34 | | | | | 4 | |
| 4030002180 | 大学英语 1<br>College English 1 | 3 | 60 | | | | 12 | 1 | |
| 4030003180 | 大学英语 2<br>College English Ⅱ | 2 | 44 | | | | 12 | 2 | 大学英语 1 |
| 4030004180 | 大学英语 3<br>College English Ⅲ | 2 | 44 | | | | 12 | 3 | 大学英语 2 |
| 4030004180 | 大学英语 4<br>College English IV | 2 | 44 | | | | 12 | 4 | 大学英语 3 |
| 4120335170 | C 程序设计基础<br>Fundamentals of Computer Program | 2 | 32 | | | | | 2 | |
| 4120336170 | 计算机基础与 C 程序设计综合实验<br>Computer foundation and C programming comprehensive experiment | 1 | 32 | 32 | | | | 2 | |
| 小 计 Subtotal | | 29 | 640 | 32 | 0 | 48 | 64 | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （二）通识教育选修课程<br>General Education Elective Courses | | | | | | | | | |
| 创新创业类<br>Innovation and Entrepreneurship Courses | 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并取得至少 2 个学分，在创新创业类课程中至少选修一门课程，在人文社科类或经济管理类课程中至少选修一门。<br>Students are required to abtain at least 9 credits，which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses. | | | | | | | | |
| 人文社科类<br>Arts and Social Science Courses | | | | | | | | | |
| 经济管理类<br>Economy and Management Courses | | | | | | | | | |
| 科学技术类<br>Science and Technology Courses | | | | | | | | | |
| 艺术体育类<br>Art and Physical Education Courses | | | | | | | | | |
| （三）专业教育必修课程<br>Basic Disciplinary RequiredCourses | | | | | | | | | |
| 4060521170 | 环境专业导论<br>Introduction to environmental specialty | 1 | 16 | | | | | 1 | |
| 4050063110 | 高等数学 A 上<br>Advanced Mathematics Ⅰ | 5 | 80 | | | | | 1 | |
| 4050064110 | 高等数学 A 下<br>Advanced Mathematics Ⅱ | 5 | 80 | | | | | 2 | 高等数学上 |
| 4200357170 | 无机化学 B<br>Chemistry | 3 | 48 | | | | | 1 | |
| 4200358170 | 无机化学实验 B<br>Inorganic Chemistry Experiment | 1 | 32 | 32 | | | | 1 | |
| 4080373170 | 工程图学 B<br>Engineering Drawing | 3.5 | 72 | | | | 16 | 2 | |
| 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 2 | |
| 4050463130 | 大学物理 B<br>Physics | 5 | 80 | | | | | 2 | |
| 4050224110 | 物理实验 B<br>Physics Lab. | 1 | 32 | 32 | | | | 3 | |
| 4200274120 | 有机化学 C<br>Organic Chemistry | 3 | 48 | | | | | 3 | |
| 4200275120 | 有机化学实验 C<br>Organic Chemistry Experiment | 0.5 | 16 | 16 | | | | 3 | |
| 4200199120 | 分析化学 B<br>Analytical Chemistry | 2 | 32 | | | | | 3 | |
| 4200377170 | 分析化学实验 B<br>Analytical Chemistry Experiment | 1.5 | 48 | 48 | | | | 3 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4200256120 | 物理化学 C<br>Physical Chemistry | 4 | 64 | | | | | 4 | |
| 4200382170 | 物理化学实验 C<br>Physical Chemistry Experimental | 0.5 | 16 | 16 | | | | 4 | |
| 4050598170 | 概率论与数理统计 C<br>Probability and Mathematics | 2.5 | 40 | | | | | 4 | |
| 4100008110 | 电工学<br>Electrical Engineering | 3 | 48 | 8 | | | | 4 | |
| 4060289130 | 环境工程微生物学 B<br>Environmental Engineering Microbiology | 2 | 32 | | | | | 4 | |
| 4060531170 | 物理污染控制<br>Physical Pollution Control | 2.5 | 40 | 8 | | | | 4 | 大学物理 |
| 4060108110 | 水处理管网工程 C<br>WaterTreatment Pipe Network Engineering | 2 | 32 | | | | | 5 | |
| 4130570170 | 工程与结构力学<br>Engineering and Structural Mechanics | 3 | 48 | | | | | 5 | |
| 4060532170 | 固体废物处理处置<br>Solid Waste Treatment and Disposal | 2.5 | 40 | | | | | 5 | |
| 4060049110 | 环境监测 B<br>Environmental Monitoring | 2.5 | 40 | | | | | 5 | 分析化学 |
| 4060459170 | 水污染控制<br>Water Pollution Control | 3 | 48 | | | | | 6 | |
| 4060533170 | 大气污染控制<br>Air Pollution Control | 3.5 | 56 | | | | | 6 | |
| 4060365140 | 环境质量评价 D<br>Environmental Qulity Assessment | 2.5 | 40 | | | 8 | | 7 | |
| 小 计 Subtotal | | 67.5 | 1168 | 160 | 0 | 8 | 16 | | |
| （四）专业教育选修课程<br>Specialized Elective Courses | | | | | | | | | |
| 4060040110 | 环境材料概论<br>Introduction to Environmental Materials | 2 | 32 | | | | | 3 | |
| 4200237120 | 生物化学 D<br>Biological Chemistry | 2 | 32 | | | | | 3 | |
| 4060115110 | 文献检索<br>Literature Searching | 1 | 16 | | | | | 3 | |
| 4050134110 | 流体力学 C<br>Fluid Mechanics | 3 | 48 | 6 | | | | 3 | |
| 4060045110 | 环境管理与环境法规<br>Environmental Management and Laws | 2 | 32 | | | | | 3 | |
| 4060461170 | 环境地球科学概论<br>Introduction to Environmental Geosciences | 2 | 32 | | | | | 3 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4200369170 | 环境工程原理 B<br>Environmental Engineering Principle | 2.5 | 40 | 8 | | | | 5 | |
| 4060041110 | 环境工程设计基础<br>Environmental Engineering Design | 2 | 32 | | | | | 5 | |
| 4060039110 | 环境 CAD<br>Environmental CAD | 2 | 32 | | 20 | | | 5 | |
| 4060407140 | 清洁生产导论<br>Introduction of cleaner Production Technology | 2 | 32 | | | | | 5 | |
| 4060048110 | 环境化学 B<br>Environmental Chemistry | 2 | 32 | | | | | 5 | |
| 4060051110 | 环境科学专业英语<br>English for Environmental Science | 2 | 32 | | | | | 6 | |
| 4060288130 | 环境毒理学<br>Environmental toxicology | 2 | 32 | | | | | 6 | |
| 4060462170 | 现代环境测试技术 B<br>Modern Environmental Testing Technology | 2.5 | 40 | 16 | | | | 6 | |
| 4060046110 | 环境规划学 B<br>Environmental Planning | 2 | 32 | | | | | 6 | |
| 4060056110 | 环境土壤学<br>Environmental Soil | 2 | 32 | | | | | 6 | |
| 4060103110 | 生态工程学<br>Biology Engineering | 2 | 32 | | | | | 7 | |
| 4060299130 | 空气污染气象学<br>Air pollution meteorology | 2 | 32 | | | | | 7 | |
| 4060134110 | 自然灾害学<br>Natural Disaster | 2 | 32 | | | | | 7 | |
| 4060109110 | 水处理新工艺<br>New water Treatment Technology | 2 | 32 | | | | | 7 | |
| 4060042110 | 环境工程施工及概预算<br>Environmental Project Budget | 2 | 32 | | | | | 7 | |
| 4060129110 | 资源环境经济学<br>Resource and Environment Economics | 2 | 32 | | | | | 7 | |
| 小 计 Subtotal | | 45 | 720 | 30 | 20 | 0 | 0 | | |
| 修读说明：要求至少选修 20 学分。<br>NOTE：Minimum subtotal credits:20. | | | | | | | | | |
| （五）个性课程<br>Personalized Electice Courses | | | | | | | | | |
| 4060326130 | 环境科学与工程前沿<br>Frontiers of environmental science and Engineering | 2 | 32 | | | | | 5 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4060339130 | 环境监理概论<br>Introduction to Environmental Supervision | 2 | 32 | | | | | 6 | |
| 4060340130 | 环境监察概论<br>Introduction for Environmental Monitoring | 2 | 32 | | | | | 6 | |
| 小 计 Subtotal | | 6 | 96 | | | | | | |
| .修读说明：要求从以上推荐个性课程和学校发布的其他个性课程目录中选修，至少取得 6 学分，并且从以上推荐个性课程中至少选修 4 个学分。<br>NOTE：Students take at least 4 credits from the above courses.Minimum subtotal credits: 6. | | | | | | | | | |

**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 | 学分 Crs | 周数 Weeks | 建议修读学期 Suggested Term |
|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 1.5 | 3 | 1 |
| 4060198110 | 认识实习<br>Understanding of Specialty | 1 | 1 | 2 |
| 4060177110 | 基础强化训练<br>Foundation Strengthening Training | 1 | 1 | 4（暑期） |
| 4060311130 | 微生物学实验技术<br>Microbiology Experiment Technology | 1 | 1 | 4（分散） |
| 4060293130 | 环境监测综合实验<br>Environmental Monitoring Experiment | 1 | 1 | 5（分散） |
| 4060165110 | 固体废物处理实验技术<br>Experiment Technique of Solid waste disposal | 1 | 1 | 5（分散） |
| 4060306130 | 水处理管网设计<br>Design on Water Treatment Pipe Network | 2 | 2 | 5 |
| 4060285130 | 固体废物处理工艺设计<br>Design on Solid Waste Treatment Process | 1 | 1 | 5 |
| 4060309130 | 水污染控制综合实验<br>Experiment of Water pollution Control | 1 | 1 | 6（分散） |
| 4060156110 | 大气污染控制实验技术<br>Experiment Technique of Air pollution Control | 1 | 1 | 6（分散） |
| 4060397130 | 水处理工艺设计 B<br>Design on Water Treatment Process | 1 | 1 | 6 |
| 4060464170 | 大气污染控制课程设计<br>Course Design of Air Pollution Control | 1 | 1 | 6 |

| 课程编号<br>Course Number | 实践环节名称<br>Practice Courses Name | 学分<br>Crs | 周数<br>Weeks | 建议修读学期<br>Suggested Term |
|---|---|---|---|---|
| 4060203110 | 生产实习<br>Practice of Specialty | 2 | 2 | 6 |
| 4060463170 | 创新创业能力拓展训练<br>Ability of innovation and Entrepreneurship Training | 1 | 1 | 7 |
| 4060151110 | 毕业实习<br>Graduation Practice | 2 | 2 | 8 |
| 4060259120 | 毕业设计（论文）<br>Graduation Design (Thesis) | 10 | 15 | 8 |
| 小　　计　Subtotal | | 28.5 | 35 | |

**六、其它要求**

VI Recommendations on Course Studies

1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。

2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

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 2017 版本科培养方案
# Undergraduate Education Program for Specialty in Environmental Science(2017)

| | | | |
|---|---|---|---|
| 专业名称 | **环境科学** | 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, 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 | **1 年** |
| Disciplinary | Environment Science & Engineering | Duration | 1 year |

**最低毕业学分规定**

**Graduation Credit Criteria**

| 课程分类 Course Classification / 课程性质 Course Nature | 通识教育课程 Public Basic Courses | 专业教育课程 Specialized Courses | 个性课程 Personalized Course | 集中性实践教学环节 Practice Courses | 课外学分 Study Credit after Class | 总学分 Total Credits |
|---|---|---|---|---|---|---|
| 必修课 Required Courses | 29 | 70.5 | \ | 25.5 | \ | 170 |
| 选修课 Elective Courses | 9 | 20 | 6 | \ | 10 | |

## 一、培养目标与毕业要求

### Ⅰ Educational Objectives &Requirement

### （一）培养目标

依托我校的行业和地域优势，培养德智体全面发展，掌握环境科学学科的基础理论和基本技能，具备很强的规划管理分析能力、具有创新精神和科学态度，知识能力素质协调发展，具有较强的社会交往能力和心理适应能力，具有国际视野和一定的领导意识和组织管理能力、有社会责任感和团队合作精神，成为具有较强环境科学实践能力和创新能力的高级规划、管理、分析、咨询及环境修复人才。毕业 5 年后可达到：

1、掌握并熟悉本专业或相关行业有关标准、规范，掌握环保技术规范中环境保护关键控制点，了解环保相关法律法规中明确的违法违规内容，结合理论知识、技术规范以及法律法规解决工程设计问题，规避项目运营的环保风险，能独立解决本专业及相关领域复杂问题。

2、适应地区与国家发展战略和经济建设和矿业、建材、化工等行业环境保护需要，能在政府、规划、经济、环保、设计、研究部门和学校等企事业单位从事污染控制工程、清洁生产、排污权等工作，具有管理、规划、分析和研究开发环境专业领域新产品、新设备的能力；

可将上述目标归纳为以下四点：

目标 1：德智体全面发展，掌握环境科学学科的基础理论和基本技能，具备很强的规划管理分析能力、具有创新精神和科学态度，知识能力素质协调发展，具有较强的社会交往能力和心理适应能力；

目标 2：适应地区与国家发展战略和经济建设和矿业、建材、化工等行业环境保护需要，毕业 5 年后能在政府、规划、经济、环保、设计、研究部门和学校等企事业单位，从事污染控制工程、清洁生产、排污权等工作，具有管理、规划、分析和研究开发环境专业领域新产品、新设备的能力；

目标 3：具有与时俱进的适应与学习能力，掌握并熟悉本专业或相关行业有关标准、规范，掌握环保技术规范中环境保护关键控制点，了解环保相关法律法规中明确的违法违规内容，结合理论知识、技术规范以及法律法规解决工程设计问题，规避项目运营的环保风险，能独立解决本专业及相关领域复杂问题。

目标 4：具有国际视野和一定的领导意识和组织管理能力、有社会责任感和团队合作精神，成为具有较强环境科学实践能力和创新能力的高级规划、管理、分析、咨询及环境修复人才。

**（Ⅰ）Educational Objectives**

Relying on the industrial and geographical advantages of our school, we will cultivate the all-round development of moral, physical and mental health, master the basic theories and basic skills of environmental science disciplines, have strong planning and management analysis capabilities, be innovative and scientific, coordinate the development of knowledge and ability, Strong social communication skills and psychological adaptability, with an international perspective and a certain sense of leadership and organizational management skills, social responsibility and team spirit to become a strong environmental science practical ability and innovative senior planning, management, analysis , Consulting and environmental restoration personnel. 5 years after graduation, students can be achieved:

1. To master and be familiar with the relevant standards and norms in this profession or related industries, to master the key control points of environmental protection in the environmental protection technical specifications, to understand the contents of the illegal and illegal ones explicitly stipulated in laws and regulations related to environmental protection, to solve the engineering design with theoretical knowledge, technical specifications and laws and regulations Problems, to circumvent the environmental risks of the operation of the project, can independently solve the complex problems in the field of professional and related fields.

2. To adapt to regional and national development strategies and economic construction and environmental protection needs of mining, building materials, chemical industry and other industries, in the government, planning, economics, environmental protection, design, research departments and schools and other enterprises and institutions engaged in pollution control projects, cleaner production , Emission rights and other work, with management, planning, analysis and research and development of environmental professional fields of new products, new equipment capacity;

The above objectives can be summarized into the following four points:

(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) To adapt to regional and national development strategy and economic construction and environmental protection needs of mining, building materials, chemical industry and other industries, after graduating five years in the government, planning, economics, environmental protection, design, research departments and schools and other enterprises and institutions engaged in pollution control projects , Clean production, emission rights and other work, with management, planning, analysis and research and development of environmental professional fields of new products, new equipment capacity;

(3) Have the ability to adapt and learn with the times, master and be familiar with relevant standards and norms in this profession or related industries, master the key control points of environmental protection in the environmental protection technical specifications, and understand the contents of unlawful and illegal activities explicitly stipulated in laws and regulations related to environmental protection, combined with

theoretical knowledge , Technical specifications and laws and regulations to solve engineering design problems, to avoid environmental risks of project operations, can independently solve the professional and related fields of complex issues.

(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 life long learning.

**（二）毕业要求**

(1) 科学知识：能够将数学、自然科学、专业知识用于宏观分析解决复杂的专业问题。

(2) 问题分析：能够应用数学、自然科学和专业基础知识的基本原理，识别、表达、并通过文献研究分析复杂的专业问题，以获得有效结论。

(3) 分析/研发解决方案：具有水、气、声、固等污染控制新技术和新工艺的分析、研发能力

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

(5) 使用现代工具：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。

(6) 应用与社会：能够基于环境科学相关背景知识进行合理分析，评价专业实践和复杂专业问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任；

(7) 环境和可持续发展：能够理解和评价针对复杂专业问题的实践、活动对环境、社会可持续发展的影响。

(8) 职业规范：具有人文社会科学素养、社会责任感，理解并遵守职业道德和规范，履行责任。

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

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

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

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

**（Ⅱ）Graduation Requirement**

1. A grasp of the fundamental theory, basic knowledge and skills of environmental monitoring, environmental evaluation, environmental management and so on.
2. 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.
3. Be familiar with the policies and regulations about environmental protection, rational use of natural resources, sustainable development and intellectual property.
4. 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.
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 for 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：

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

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

### （二） 专业特色课程：

环境专业导论、环境化学、环境监测、环境规划学、环境质量评价、环境微生物学、大气污染控制、物理污染控制等、创新创业能力拓展训练等。

Introduction to environmental specialty, Environmental Chemistry, Environmental Monitoring, Environmental Planning, Environmental Quality Assessment, Environmental Microbiology， Air Pollution Control, Physical Pollution Control, etc.

附：毕业要求实现矩阵：

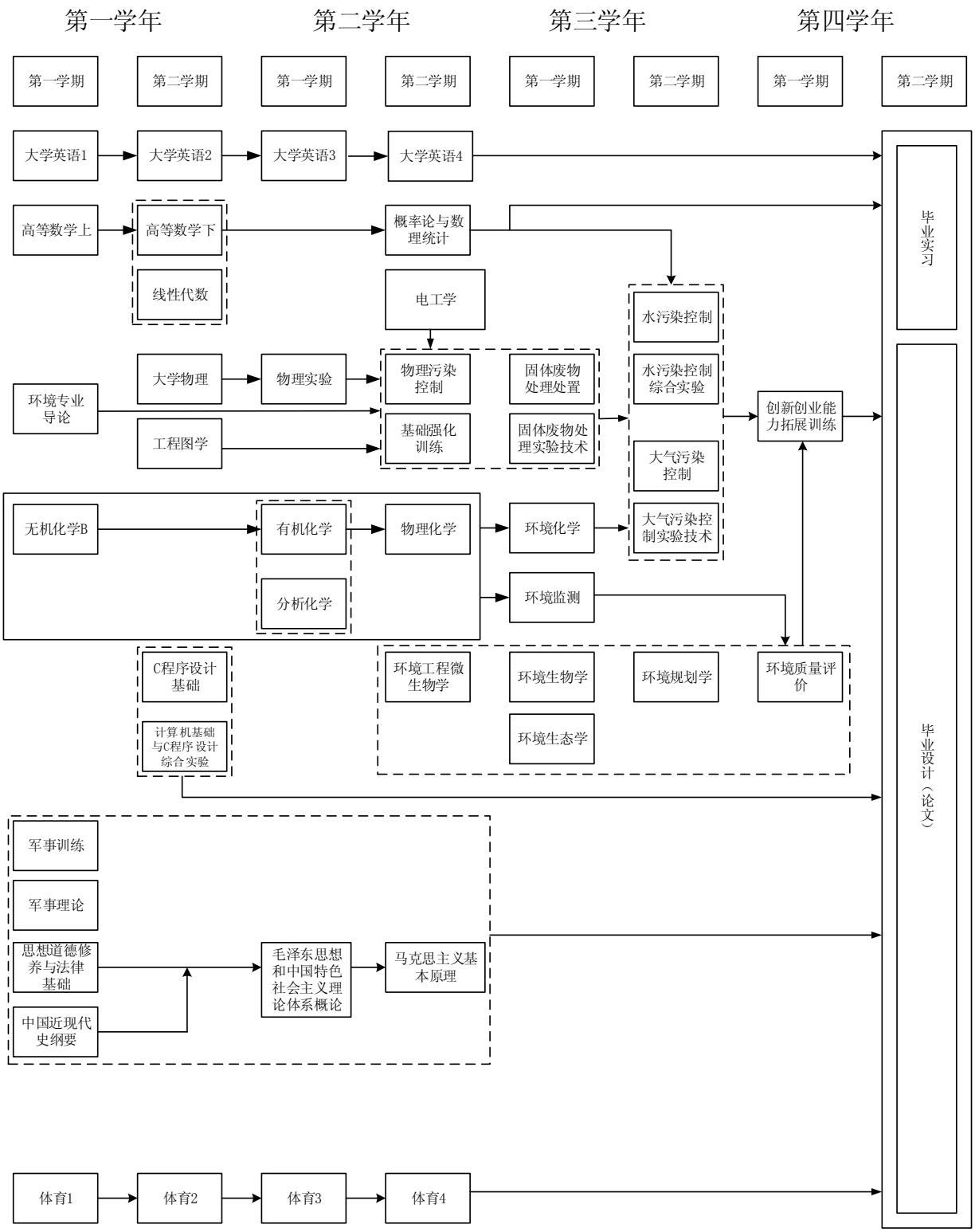
| 专业核心课程 | 专业特色课程 | 课程名称 | 环境科学专业毕业要求 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| | | 思想道德修养与法律基础 | | | | | | | | √ | | | | √ |
| | | 中国近现代史纲要 | | | | | | | | √ | · | | | |
| | | 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 | | | | | | | | | √ | | | √ |

| 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) |
| | | 大学英语 | | | | √ | | | | | · | √· | | √ |
| | | C 程序设计基础 | | √ | | | | | | | | | | |
| | | 计算机基础与 C 程序设计综合实验 | | √ | | | | | | | | | | √ |
| | √ | 环境专业导论 | √ | | | | | | √ | | | | | √ |
| | | 高等数学 | √ | | √ | | | | | | | | | |
| | | 无机化学 | √ | | | | | | | | | | | |
| | | 工程图学 | | | √ | | | | | | | | | |
| | | 线性代数 | √ | | √ | | | | | | | | | |
| | | 大学物理 | √ | | √ | | | | | | | | | |
| | | 有机化学 | √ | | | | | | | | | | | |
| | | 分析化学 | √ | | | | | | | | | | | |
| | | 物理化学 | √ | | | √ | | | | | | | | |
| | | 概率论与数理统计 | √ | | √ | | | | | | | | | |
| √ | | 环境生态学 | √ | | | | | | | | | | | |
| √ | √ | 环境微生物学 | | √ | | | | | | | | | | |
| | √ | 物理污染控制 | | √ | √ | | | | · | | | | | |
| √ | √ | 环境化学 | | √ | √ | | | · | · | | | | | |
| | | 环境工程原理 | | √ | | √ | | | | | | | | |
| √ | √ | 环境监测 | | √ | | √ | | | · | | | | | |
| | | 固体废物处理处置 | | √ | √ | | | | √ | | | | | |
| √ | √ | 环境生物学 | | √ | | | | | | | | | | |
| √ | | 水污染控制 | | √ | √ | | | √ | | | | | | |
| √ | √ | 大气污染控制 | | √ | √ | | | | | | | | | |
| √ | √ | 环境规划学 | | | | | √ | √ | √ | | | | | |
| √ | √ | 环境质量评价 | | √ | | | | | √ | | | | | |
| | | 军事训练 | √ | | | | | | | | | | | √ |
| | | 认识实习 | | | √ | √ | | | | √· | | · | √ | |
| | | 基础强化训练 | √ | | √ | √ | | √ | | | √ | √ | √ | |
| | | 环境监测综合实验 | √ | | | √ | √ | | | | √ | | | |

| 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) |
| | | 环境化学实验 | | | | √ | √ | | | | √ | √ | | |
| | | 固体废物处理工艺设计 | | | √ | | | | | √ | | | √ | |
| | | 环境工程综合设计 | | | √ | | | | | √ | | | √ | |
| | | 水污染控制综合实验 | | | | √ | √ | | | | √ | | | |
| | | 大气污染控制实验技术 | | | | √ | √ | | | | √ | | | |
| | | 微生物学实验技术 | | | | √ | √ | | | | √ | | | |
| | | 生产实习 | | | √ | | | √ | | √ | | | √ | |
| | √ | 创新创业能力拓展训练 | | | √ | | | √ | | √ | √ | | √ | √ |
| | | 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （一）通识教育必修课程<br>General Education Required Courses | | | | | | | | | |
| 4220001110 | 思想道德修养与法律基础<br>Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 1 | |
| 4220002110 | 中国近现代史纲要<br>Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 1 | |
| 4220003110 | 毛泽东思想和中国特色社会主义理论体系概论<br>Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics | 4 | 96 | | | 32 | | 3 | |
| 4220005110 | 马克思主义基本原理<br>Marxism Philosophy | 3 | 48 | | | 8 | | 4 | |
| 1060003130 | 军事理论<br>Military Theory | 1 | 32 | | | | 16 | 1 | |
| 4210001170 | 体育 1<br>Physical Education Ⅰ | 1 | 26 | | | | | 1 | |
| 4210002170 | 体育 2<br>Physical Education Ⅱ | 1 | 34 | | | | | 2 | |
| 4210003170 | 体育 3<br>Physical Education Ⅲ | 1 | 34 | | | | | 3 | |
| 4210004170 | 体育 4<br>Physical Education Ⅳ | 1 | 34 | | | | | 4 | |
| 4030002180 | 大学英语 1<br>College English 1 | 3 | 60 | | | | 12 | 1 | |
| 4030003180 | 大学英语 2<br>College English Ⅱ | 2 | 44 | | | | 12 | 2 | 大学英语 1 |
| 4030004180 | 大学英语 3<br>College English Ⅲ | 2 | 44 | | | | 12 | 3 | 大学英语 2 |
| 4030004180 | 大学英语 4<br>College English IV | 2 | 44 | | | | 12 | 4 | 大学英语 3 |
| 4120335170 | C 程序设计基础<br>Fundamentals of Computer Program | 2 | 32 | | | | | 2 | |
| 4120336170 | 计算机基础与 C 程序设计综合实验<br>Computer foundation and C programming comprehensive experiment | 1 | 32 | 32 | | | | 2 | |
| 小 计 Subtotal | | 29 | 640 | 32 | 0 | 48 | 64 | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （二）通识教育选修课程<br>General Education Elective Courses | | | | | | | | | |
| 创新创业类<br>Innovation and Entrepreneurship Courses | | 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并取得至少 2 个学分，在创新创业类课程中至少选修一门课程，在人文社科类或经济管理类课程中至少选修一门。<br>Students are required to abtain at least 9 credits，which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses. | | | | | | | |
| 人文社科类<br>Arts and Social Science Courses | | | | | | | | | |
| 经济管理类<br>Economy and Management Courses | | | | | | | | | |
| 科学技术类<br>Science and Technology Courses | | | | | | | | | |
| 艺术体育类<br>Art and Physical Education Courses | | | | | | | | | |
| （三）专业教育必修课程<br>Basic Disciplinary RequiredCourses | | | | | | | | | |
| 4060521170 | 环境专业导论<br>Introduction to Environmental Specialty | 1 | 16 | | | | | 1 | |
| 4200357170 | 无机化学 B<br>Chemistry | 3 | 48 | | | | | 1 | |
| 4200358170 | 无机化学实验 B<br>Inorganic Chemistry Experiment | 1 | 32 | 32 | | | | 1 | |
| 4050063110 | 高等数学 A 上<br>Advanced Mathematics Ⅰ | 5 | 80 | | | | | 1 | |
| 4050064110 | 高等数学 A 下<br>Advanced Mathematics Ⅱ | 5 | 80 | | | | | 2 | 高等数学上 |
| 4080373170 | 工程图学 B<br>Engineering Drawing | 3.5 | 72 | | | | 16 | 2 | |
| 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 2 | |
| 4050463130 | 大学物理 B<br>Physics | 5 | 80 | | | | | 2 | |
| 4050224110 | 物理实验 B<br>Physics Lab. | 1 | 32 | 32 | | | | 3 | |
| 4200274120 | 有机化学 C<br>Organic Chemistry | 3 | 48 | | | | | 3 | |
| 4200275120 | 有机化学实验 C<br>Organic Chemistry Experiment | 0.5 | 16 | 16 | | | | 3 | |
| 4200199120 | 分析化学 B<br>Analytical Chemistry | 2 | 32 | | | | | 3 | |
| 4200377170 | 分析化学实验 B<br>Analytical Chemistry Experiment | 1.5 | 48 | 48 | | | | 3 | |
| 4200256120 | 物理化学 C<br>Physical Chemistry | 4 | 64 | | | | | 4 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4200382170 | 物理化学实验 C<br>Physical Chemistry Experimental | 0.5 | 16 | 16 | | | | 4 | |
| 4050598170 | 概率论与数理统计 C<br>Probability and Mathematics | 2.5 | 40 | | | | | 4 | |
| 4060057110 | 环境微生物学<br>Environmental Microbiology | 2 | 32 | | | | | 4 | |
| 4060531170 | 物理污染控制<br>Physical Pollution Control | 2.5 | 40 | 8 | | | | 4 | 大学物理 |
| 4060294130 | 环境生态学 A<br>Environmental Ecology | 3 | 48 | 16 | | | | 4 | |
| 4060381150 | 环境化学 A<br>Environment Chemistry | 2.5 | 40 | | | | | 5 | |
| 4060292130 | 环境监测 A<br>Environmental Monitoring | 3 | 48 | | | | | 5 | 分析化学 |
| 4060534170 | 固体废物处理处置 B<br>Solid Waste Treatment and Disposal | 2 | 32 | | | | | 5 | |
| 4060055110 | 环境生物学 A<br>Environmental Biology | 2.5 | 40 | | | | | 5 | |
| 4060459170 | 水污染控制<br>Water Pollution Control | 3 | 48 | | | | | 6 | |
| 4060533170 | 大气污染控制<br>Air Pollution Control | 3.5 | 56 | | | | | 6 | |
| 4060234120 | 环境规划学 A<br>Environmental Planning | 3 | 48 | | | 16 | | 6 | |
| 4060365140 | 环境质量评价 D<br>Environmental Quality Assessment | 2.5 | 40 | | | 8 | | 7 | |
| 小 计 Subtotal | | 70.5 | 1216 | 168 | 0 | 24 | 16 | | |
| （四）专业教育选修课程<br>Specialized Elective Courses | | | | | | | | | |
| 4060040110 | 环境材料概论<br>Introduction to Environmental Materials | 2 | 32 | | | | | 3 | |
| 4200237120 | 生物化学 D<br>Biological Chemistry | 2 | 32 | | | | | 3 | |
| 4060115110 | 文献检索<br>Literature Searching | 1 | 16 | | | | | 3 | |
| 4050134110 | 流体力学 C<br>Fluid Mechanics | 3 | 48 | 6 | | | | 3 | |
| 4060045110 | 环境管理与环境法规<br>Environmental Management and Laws | 2 | 32 | | | | | 3 | |
| 4060461170 | 环境地球科学概论<br>Introduction to Environmental Geosciences | 2 | 32 | | | | | 3 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4200369170 | 环境工程原理 B<br>Environmental Engineering Principle | 2.5 | 40 | 8 | | | | 5 | |
| 4060041110 | 环境工程设计基础<br>Environmental Engineering Design | 2 | 32 | | | | | 5 | |
| 4060039110 | 环境 CAD<br>Environmental CAD | 2 | 32 | | 20 | | | 5 | |
| 4060407140 | 清洁生产导论<br>Introduction of cleaner Production Technology | 2 | 32 | | | | | 5 | |
| 4060440170 | 自然地理学 C<br>Physical Geography | 2 | 32 | | | | | 5 | |
| 4060110110 | 水文学与水资源<br>Water Resources and Hydrology | 2 | 32 | | | | | 5 | |
| 4060051110 | 环境科学专业英语<br>English for Environmental Science | 2 | 32 | | | | | 6 | |
| 4060288130 | 环境毒理学<br>Environmental toxicology | 2 | 32 | | | | | 6 | |
| 4060462170 | 现代环境测试技术 B<br>Modern Environmental Testing Technology | 2.5 | 40 | 16 | | | | 6 | |
| 4060056110 | 环境土壤学<br>Environmental Soil | 2 | 32 | | | | | 6 | |
| 4060382150 | 环境信息系统<br>Environmental Information System | 2 | 32 | | 8 | | | 6 | |
| 4060103110 | 生态工程学<br>Biology Engineering | 2 | 32 | | | | | 7 | |
| 4060299130 | 空气污染气象学<br>Air pollution meteorology | 2 | 32 | | | | | 7 | |
| 4060134110 | 自然灾害学<br>Natural Disaster | 2 | 32 | | | | | 7 | |
| 4060042110 | 环境工程施工及概预算<br>Environmental Project Budget | 2 | 32 | | | | | 7 | |
| 4060129110 | 资源环境经济学<br>Resource and Environment Economics | 2 | 32 | | | | | 7 | |
| 小 计 Subtotal | | 45 | 720 | 30 | | | | | |
| 修读说明：要求至少选修 20 学分。<br>NOTE：Minimum subtotal credits:20. | | | | | | | | | |
| （五）个性课程<br>Personalized Electice Courses | | | | | | | | | |
| 4060326130 | 环境科学与工程前沿<br>Frontiers of environmental science and Engineering | 2 | 32 | | | | | 5 | |
| 4060339130 | 环境监理概论<br>Introduction to Environmental Supervision | 2 | 32 | | | | | 6 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4060340130 | 环境监察概论<br>Introduction for Environmental Monitoring | 2 | 32 | | | | | 6 | |
| 小 计 Subtotal | | 6 | 96 | | | | | | |
| .修读说明：要求从以上推荐个性课程和学校发布的其他个性课程目录中选修，至少取得 6 学分，并且从以上推荐个性课程中至少选修 4 个学分。<br>NOTE：Students take at least 4 credits from the above courses.Minimum subtotal credits: 6. | | | | | | | | | |

## 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 | 学分 Crs | 周数 Weeks | 建议修读学期 Suggested Term |
|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 1.5 | 3 | 1 |
| 4060198110 | 认识实习<br>Understanding of Specialty | 1 | 1 | 2 |
| 4060177110 | 基础强化训练<br>Foundation Strengthening Training | 1 | 1 | 4（暑期） |
| 4060311130 | 微生物学实验技术<br>Microbiology Experiment Technology | 1 | 1 | 4（分散） |
| 4060293130 | 环境监测综合实验<br>Environmental Monitoring Experiment | 1 | 1 | 5（分散） |
| 4060383150 | 环境化学实验<br>Environment Chemistry Experiment | 1 | 1 | 5（分散） |
| 4060165110 | 固体废物处理实验技术<br>Experiment Technique of Solid waste disposal | 1 | 1 | 5（分散） |
| 4060309130 | 水污染控制综合实验<br>Experiment of Water pollution Control | 1 | 1 | 6（分散） |
| 4060156110 | 大气污染控制实验技术<br>Experiment Technique of Air pollution Control | 1 | 1 | 6（分散） |
| 4060523170 | 环境工程综合设计<br>Design on Envirionmental Engineering | 1 | 1 | 6 |
| 4060201110 | 生产实习<br>Practice of Specialty | 2 | 2 | 6 |
| 4060463170 | 创新创业能力拓展训练<br>Ability of innovation and Entrepreneurship Training | 1 | 1 | 7 |
| 4060149110 | 毕业实习<br>Graduation Practice | 2 | 2 | 8 |
| 4060257120 | 毕业设计（论文）<br>Graduation Design (Thesis) | 10 | 15 | 8 |
| 小 计 Subtotal | | 25.5 | 32 | |

## 六、其它要求

## Ⅵ Recommendations on Course Studies

1、《形势与政策》和《心理健康教育》课程为课外必修课程, 分别计 2 个和 1 个课外学分。

2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程, 要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

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 2017 版本科培养方案
# Undergraduate Education Plan for Specialty in Mining Engineering (2017)

| | | | |
|---|---|---|---|
| 专业名称 | **采矿工程** | 主干学科 | **矿业工程** |
| Major | Mining Engineering | 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 | **1 年** |
| Disciplinary | Mining | Duration | 1 year |

**最低毕业学分规定**

**Graduation Credit Criteria**

| 课程分类 Course Classification / 课程性质 Course Nature | 通识教育课程 Public Basic Courses | 专业教育课程 Specialized Courses | 个性课程 Personalized Course | 集中性实践教学环节 Practice Courses | 课外学分 Study Credit after Class | 总学分 Total Credits |
|---|---|---|---|---|---|---|
| 必修课 Required Courses | 29 | 67 | \ | 29 | \ | 170 |
| 选修课 Elective Courses | 9 | 20 | 6 | \ | 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，“适应能力强、实干精神强、创新意识强”，具有一定国际视野，，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。

学生毕业 5 年左右能达到：

（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，有意愿并有能力服务社会；

（2） 具有深厚的采矿工程专业基础知识和理论，具备系统化的专业技能和实践能力，能胜任采矿工程行业工程技术应用、管理、研究或开发工作。

（3） 能利用多重技术手段和方法综合分析和解决复杂工程问题，能够在工作团队中作为技术骨干或管理者发挥作用。

（4） 能适应社会发展及变革，注重采矿工程行业与社会、环境和可持续发展的关系，具备创新精神和国际化视野，能推动采矿工程行业的创新发展。

**Educational Objectives**

Based on decades of discipline construction and development, Mining Engineering aims at cultivating senior engineering technical personnel with solid foundation, great capability and high quality to meet the needs of modern mining technology both home and abroad. Furthermore, the excellent graduates are provided with strong adaptability, good practical ability, great sense of innovation and international outlook 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, and etc. To be more specific, there are several aims to achieve for the high-level talents of Mining Engineering after graduation about 5 years:

1. possessing good humanistic and social science literacy, strong sense of social responsibility and engineering work ethic, willing and able to serve the society;
2. with mining engineering professional basic knowledge and theory, systematic professional skills and practical ability, be competent of mining engineering industry technology, management, research and development work.
3. using multiple techniques and methods to comprehensively analyze and solve complex engineering problems, work as a technical backbone or manager in the work team.
4. adapting to social development and change, paying attention to the relationship between mining engineering industry and society, environment and sustainable development, having the innovation spirit and internationalized vision, to promote innovation and development for the mining engineering industry.

**（二） 毕业要求**

（1） 工程知识：能够将数学、自然科学、工程基础和专业知识用于解决采矿工程专业的复杂工程问题。

（2） 问题分析：能够应用数学、自然科学和工程科学的基本原理，结合对科技文献研究的结果，识别、表达、分析采矿工程专业的复杂工程问题，以获得有效结论。

（3） 设计/开发解决方案：能够设计针对采矿工程复杂问题的解决方案，设计满足特定需求的采矿系统、方案或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

（4） 研究：能够基于自然科学基本原理和采矿专业基础知识，采用科学方法对采矿工程专业的复杂工程问题进行研究，设计实验、分析与解释数据，并通过信息综合得到合理有效的结论并应用于工程实践。

（5） 使用现代工具：能够针采矿工程专业的复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题进行建模、数值模拟和分析，并能够理解其局限性。

（6） 工程与社会：能够基于采矿工程相关的背景知识进行合理分析，评价采矿工程项目的设计、施工和运行方案，以及复杂工程问题解决方案，包括其对社会、健康、安全、法律以及文化的影响，并理解采矿工程师应承担的责任。

（7） 环境和可持续发展：能够理解和评价针对采矿工程专业的复杂工程问题的工程实践对环境、社会可持续发展的影响。

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

（9） 个人和团队：在解决采矿工程专业的复杂工程问题时，能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

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

（11） 项目管理：在与采矿工程专业相关的多学科环境中理解并掌握工程管理原理与经济决策方法，并具有一定的组织、管理和领导能力。

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

**GraduatedRequirement**

1. Engineering knowledge: the ability to use mathematics, natural sciences, engineering foundations and professional knowledge to solve the complex engineering problems of mining engineering.
2. Problem analysis: able to apply the basic principles of mathematics, natural science and engineering science, combined with the results of science and technology literature research, identify, expression, analysis the complex engineering problems of mining engineering to obtain a valid conclusion.
3. Design/development solution: able to design the solution for the complex problem solutions of mining engineering, designed the mining system, solution or process which can meet the specific needs, and can reflect innovation consciousness in the design process, consider the social, health, safety, legal, cultural and environmental factors.
4. Research: based on the basic principle of natural science and mining professional basic knowledge, adopting scientific method to research on the complex engineering problems of the mining engineering professional, design experiments, analyze and interpret data, and get the reasonable and effective conclusions by information comprehensive and applied them to the engineering practice.
5. Use of modern tools: developing, selecting and using appropriate technologies, resources, modern engineering tools and information technology tools, including modeling, numerical modeling and analysis of complex engineering issues, in response to complex engineering issues in mining engineering. And be able to understand its limitations.
6. Engineering and Society: being able to carry out a reasonable analysis based on the relevant background knowledge of mining engineering, to evaluate the design, construction and operation plans of mining engineering projects and solutions to complex engineering problems including social, health, safety, law and culture And understand the responsibilities that mining engineers should take.
7. Environment and Sustainable Development: understanding and evaluating the impact of engineering practice on environmental and social sustainable development for complex engineering problems in mining engineering.
8. Professional norms: understanding China's national conditions, with humanities, social science literacy and sense of social responsibility, to understand and abide by engineering ethics and norms in the practice of the project and fulfill their responsibilities.
9. Individuals and Teams: having ability to take on the role of individual, team member, and principal in a multidisciplinary team in solving complex engineering problems in mining engineering.
10. Communication: effective communication and exchange with industry peers and the general public on complex engineering issues in mining engineering, including the preparation of reports and designing drafts, presentation of speeches, and articulation of or response to directives. And having a certain international perspective to communicate and exchange in cross-cultural background.
11. Project Management: understanding and mastering the principles of project management and economic

decision-making in a multi-disciplinary environment related to mining engineering and having certain organizational, management and leadership skills.

12. Lifelong Learning: consciousness of autonomous learning and lifelong learning, capable of continuous learning and adaptation to 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：

地质学、测量学、工程力学、流体力学、岩体力学、爆破工程、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。

Geology, Metrology, Engineering Mechanics, Fluid Mechanics, Rock Mechanics, Blasting Engineering, Surface Mining, Underground Mining, Mine & Tunnel Engineering, Mine Lift and Transportation, Mine and Industrial Ventilation & Air-Conditioning.

### （二） 专业特色课程：

爆破工程、资源开发创新创业、矿业系统工程、井巷与隧道工程、工矿通风与空调、控制爆破、矿山企业管理、资源数字化技术、矿山工程测试技术、石材工程、边坡工程、资源数字化技术、地下空间工程。

Blasting Engineering, Innovation and Entrepreneurship of Resource Development, Mining Systems Engineering, Mine & Tunnel Engineering, Mine and Industrial Ventilation & Air-Conditioning, Demolition Blasting, Mine Enterprise Management, Digital Mine, Mine Engineering Testing Technology, Stone Material Project, Slope Engineering, Digital Mine, Underground Engineering.

附：毕业要求实现矩阵：

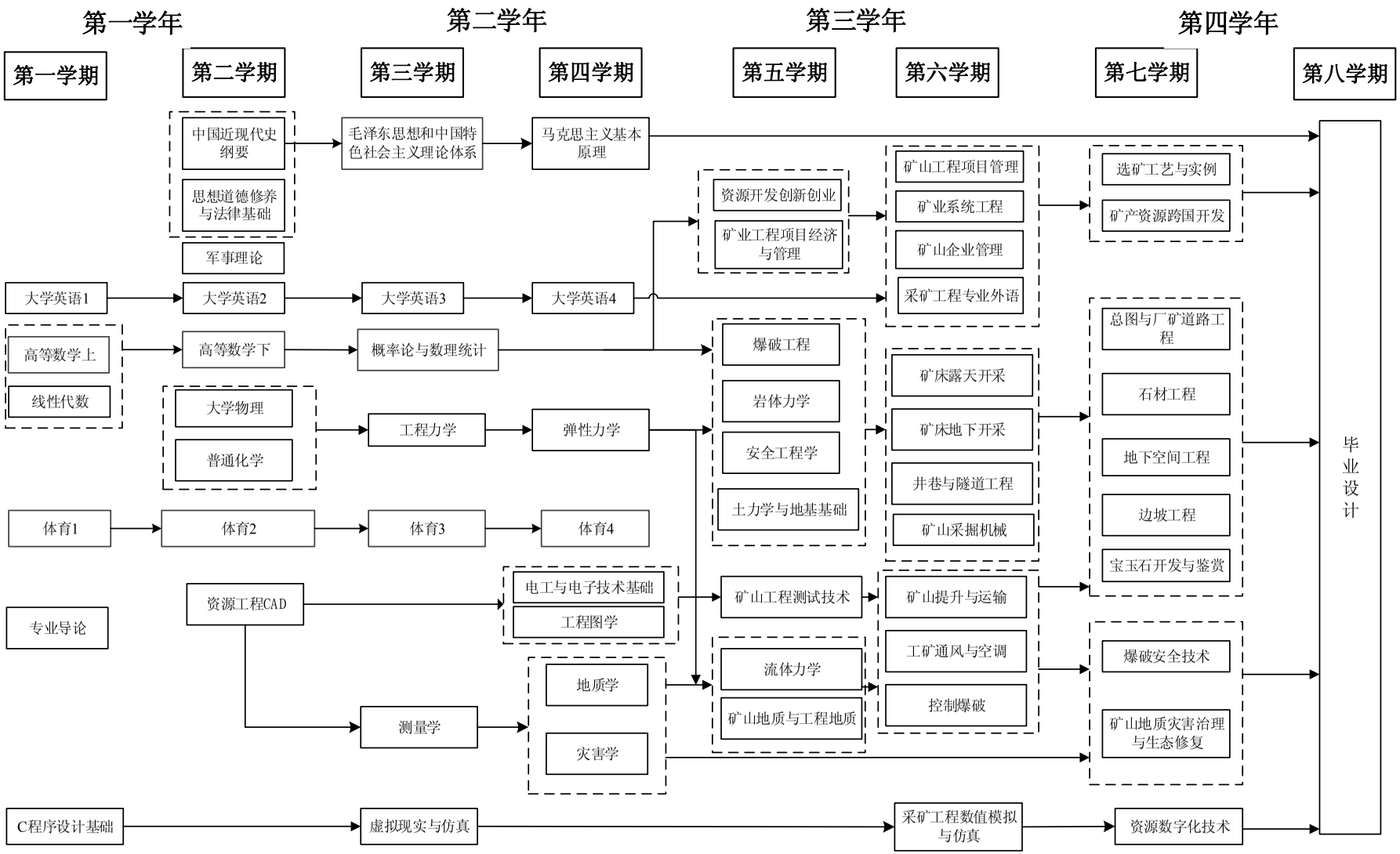
| 专业核心课程 | 专业特色课程 | 课程名称 | 采矿工程专业毕业要求 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| | | 思想道德修养与法律基础 | | | √ | | | √ | | √ | | | | |
| | | 中国近现代史纲要 | | | | | | | | √ | | | | √ |
| | | 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 | | | | | | | | | | √ | | √ |
| | | 计算机基础与 C 程序设计综合试验 | | | | | √ | | | | | | | |
| | | C 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 | √ | | | √ | | | | | | | | |
| | | 地质学 | √ | | | | | | √ | | | | | |
| | | 工程图学 | √ | | | | | | | | | | | |
| | | 大学物理 | √ | | | | | | | | | | | |
| | | 物理实验 | √ | | | √ | | | | | | | | |
| | | 电工与电子技术基础 | √ | √ | | | | | | | | | | |
| | | 测量学 | √ | | | | √ | | | | | | √ | |
| | | 普通化学 | √ | | | | | | | | | | | |
| | | 普通化学实验 | √ | | | √ | | | | | | | | |
| | | 工程力学 | √ | √ | | | | | | | | | | |
| | | 流体力学 | √ | √ | | | | | | | | | | |
| | | 资源工程 CAD | | | √ | | √ | | | | | | | |
| | | 虚拟现实与仿真 | | | | √ | √ | | | | | | | |
| | | 灾害学 | | | √ | | | √ | | | √ | | | |

| 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) |
| √ | √ | 爆破工程 | √ | √ | √ | | | | | | | | | |
| | | 爆破工程实验 | √ | √ | | √ | | | | | | | | |
| √ | | 岩体力学 | √ | √ | | √ | | | | | | | | |
| | | 岩体力学实验 | √ | √ | | √ | | | | | | | | |
| | √ | 资源开发创新创业 | | | | | | | | | | | √ | √ |
| | | 矿业工程项目经济与管理 | | | | | | | | | √ | | √ | |
| | | 矿山工程测试技术 | | | | √ | √ | | | | | | | |
| | | 矿山地质与工程地质 | √ | | | | | | √ | | | | | |
| | | 弹性力学 B | √ | | | √ | √ | | | | | | | |
| √ | | 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 | √ | | | | | | | | | | | |
| | | 采矿工程专业外语 | | √ | | | | | | | | √ | | √ |
| | √ | 控制爆破 | | | √ | √ | | √ | | | | | | |
| | √ | 矿业系统工程 | | √ | | √ | | | | | | | √ | |
| | √ | 矿业企业管理 | | | | | | √ | | | √ | | √ | |
| | | 土力学与地基工程 | √ | | | √ | | | | | √ | | | |
| | √ | 采矿工程数值模拟与仿真 | | | | √ | √ | | | | | | | |
| √ | √ | 资源数字化技术 | √ | | | | √ | | | | | | | |
| | | 矿山地质灾害治理与生态修复 | | | | | | √ | √ | | | | | |
| | | 总图与厂矿道路工程 | √ | | √ | | | | | | | | | |
| | | 矿山采掘机械 | | √ | √ | | | | | | | | | |
| | | 安全工程学 | | | √ | | | √ | | | √ | | | |
| | | 石材工程 | √ | | √ | | | | | | | | | |

| 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) |
| | | 选矿工艺与实例 | | | | | | | | | √ | | √ | |
| | | 爆破安全技术 | | | | | √ | √ | | | | | | |
| | | 地下空间工程 | √ | | | | | √ | | | √ | | | |
| | | 边坡工程 | √ | | | | | √ | | | √ | | | |
| | | 矿产资源跨国开发 | | | √ | | | √ | | | | √ | | √ |
| | | 宝玉石开发与鉴赏 | | | √ | | | | | √ | | | | |
| | | 军事训练 | | | | | | | | | √ | | | |
| | | 地质实习 | √ | | | | | | √ | | | √ | | |
| | | 认识实习 | | | | | | | | √ | | | √ | |
| | | 机械制造工程实训 | | √ | √ | | | | | | | | | |
| | | 创新创业能力训练 | | | √ | √ | | | | | | | √ | √ |
| | | 采矿工程全工艺综合实验 | | | √ | √ | | | | | | | | |
| | | 生产实习 | | √ | | | | | | | | √ | √ | |
| | | 工矿通风与空调课程设计 | | | √ | √ | | | | | | √ | | |
| | | 矿床露天开采设计 | | | √ | | √ | | | | | | | |
| | | 矿床地下开采设计 | | | √ | | √ | | | | | | | |
| | | 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （一）通识教育必修课程<br>General Education Required Courses | | | | | | | | | |
| 4220001110 | 思想道德修养与法律基础<br>Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 2 | |
| 4220002110 | 中国近现代史纲要<br>Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 2 | |
| 4220003110 | 毛泽东思想和中国特色社会主义理论体系概论<br>Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics | 4 | 96 | | | 32 | | 3 | |
| 4220005110 | 马克思主义基本原理<br>Marxism Philosophy | 3 | 48 | | | 8 | | 4 | |
| 1060003130 | 军事理论<br>Military Theory | 1 | 32 | | | | 16 | 2 | |
| 4210001170 | 体育 1<br>Physical Education Ⅰ | 1 | 26 | | | | | 1 | |
| 4210002170 | 体育 2<br>Physical Education Ⅱ | 1 | 34 | | | | | 2 | |
| 4210003170 | 体育 3<br>Physical Education Ⅲ | 1 | 34 | | | | | 3 | |
| 4210004170 | 体育 4<br>Physical Education Ⅳ | 1 | 34 | | | | | 4 | |
| 4030002180 | 大学英语 1<br>College English 1 | 3 | 60 | | | | 12 | 1 | |
| 4030003180 | 大学英语 2<br>College English Ⅱ | 2 | 44 | | | | 12 | 2 | 大学英语 1 |
| 4030004180 | 大学英语 3<br>College English Ⅲ | 2 | 44 | | | | 12 | 3 | 大学英语 2 |
| 4030004180 | 大学英语 4<br>College English Ⅳ | 2 | 44 | | | | 12 | 4 | 大学英语 3 |
| 4120335170 | C 程序设计基础<br>Foundation of C Language Design | 2 | 32 | | | | | 1 | |
| 4120336170 | 计算机基础与 C 程序设计综合实验<br>Comprehensive Experiments of Foundation of Computer and C Language Programming | 1 | 32 | 32 | | | | 1 | |
| 小 计 Subtotal | | 29 | 640 | 32 | 0 | 48 | 64 | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （二）通识教育选修课程<br>General Education Elective Courses | | | | | | | | | |
| 创新创业类<br>Innovation and Entrepreneurship Courses | 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并取得至少 2 个学分，在创新创业类课程中至少选修一门课程，在人文社科类或经济管理类课程中至少选修一门。<br>Students are required to abtain at least 9 credits，which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses. | | | | | | | | |
| 人文社科类<br>Arts and Social Science Courses | | | | | | | | | |
| 经济管理类<br>Economy and Management Courses | | | | | | | | | |
| 科学技术类<br>Science and Technology Courses | | | | | | | | | |
| 艺术体育类<br>Art and Physical Education Courses | | | | | | | | | |
| （三）专业教育必修课程<br>Basic Disciplinary RequiredCourses | | | | | | | | | |
| 4060275130 | 专业导论<br>Introduction to Specialty | 1 | 16 | | | | | 1 | |
| 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 1 | |
| 4200357170 | 无机化学 B<br>Chemistry | 3 | 48 | | | | | 1 | |
| 4200358170 | 无机化学实验 B<br>Inorganic Chemistry Experiment | 1 | 32 | 32 | | | | 1 | |
| 4050063110 | 高等数学 A 上<br>Advanced Mathematics Ⅰ | 5 | 80 | | | | | 1 | |
| 4050064110 | 高等数学 A 下<br>Advanced Mathematics Ⅱ | 5 | 80 | | | | | 2 | 高等数学上 |
| 4050463130 | 大学物理 B<br>Physics | 5 | 80 | | | | | 2 | |
| 4050224110 | 物理实验 B<br>Physics Lab. | 1 | 32 | 32 | | | | 3 | 大学物理 |
| 4050058110 | 概率论与数理统计 B<br>Probability and Mathematical Statistics | 3 | 48 | | | | | 3 | |
| 4060439170 | 测量学 D<br>Mining Surveying | 3 | 48 | | 10 | 16 | | 3 | |
| 4050072110 | 工程力学 B<br>Engineering Mechanics | 4 | 64 | | | | | 3 | |
| 4080373170 | 工程图学 B<br>Engineering Drawing | 3.5 | 72 | | | | **16** | 4 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4100012110 | 电工与电子技术基础 C<br>Fundamentals of Electrical Engineering & Electric Technology | 4 | 64 | 10 | | | | 4 | |
| 4060441170 | 地质学 B<br>Physical Geology | 2 | 32 | | | | | 4 | |
| 4050026110 | 弹性力学 B<br>Mechanics of Elasticity | 3 | 48 | | | | | 4 | 工程力学 |
| 4050136110 | 流体力学 D<br>Fluid Mechanics | 2 | 32 | 6 | | | | 5 | 工程力学 |
| 4060403130 | 爆破工程 B<br>Blasting Engineering | 2 | 32 | | | | | 5 | 工程力学 |
| 4060480170 | 爆破工程实验<br>Blasting Engineering Experiment | 1 | 32 | 32 | | | | 5 | 爆破工程 |
| 4060468170 | 岩体力学 B<br>Rock Mechanics | 2 | 32 | | | | | 5 | 弹性力学 |
| 4060481170 | 岩体力学实验<br>Rock Mechanics Experiment | 1 | 32 | 32 | | | | 5 | 岩体力学 |
| 4060517170 | 矿业工程项目经济与管理<br>Mining Engineering project Economics and management | 2 | 32 | | | | | 5 | |
| 4060482170 | 资源开发创新创业<br>Innovation and Entrepreneurship of Resource Development | 1 | 16 | | | | | 5 | |
| 4060071110 | 矿床露天开采<br>Surface Mining | 2 | 32 | | | | | 6 | |
| 4060070110 | 矿床地下开采 B<br>Underground Mining | 2 | 32 | | | | | 6 | |
| 4060064110 | 井巷与隧道工程 B<br>Mine & Tunnel Engineering | 2 | 32 | | | | | 6 | 岩体力学 |
| 4060034110 | 工矿通风与空调 B<br>Mine and Industry Ventilation & Air-Conditioning | 2 | 32 | | | | | 6 | 矿床地下开采 |
| 4060518170 | 矿业系统工程 B<br>Mining Systems Engineering | 2 | 32 | | | | | 6 | 概率论与数理统计 |
| 小 计 Subtotal | | 67 | 1152 | 144 | 10 | 16 | 16 | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （四）专业教育选修课程 Specialized Elective Courses | | | | | | | | | |
| 4060128110 | 资源工程 CAD(B) Resource Engineering CAD | 2 | 32 | 24 | | | | 2 | |
| 4060445170 | 虚拟现实与仿真 Virtual Reality Simulation | 2 | 32 | 16 | | | | 3 | |
| 4060125110 | 灾害学 Disaster Science | 2 | 32 | | | | | 4 | 地质学 |
| 4060483170 | 土力学与基础工程 E Soil Mechanics and Foundation Engineering | 2 | 32 | | | | | 5 | |
| 4060009110 | 安全工程学 B Safety Engineering | 2 | 32 | | | | | 5 | |
| 4060078110 | 矿山工程测试技术 Testing Techniques in mining | 2 | 32 | | | | | 5 | |
| 4060077110 | 矿山地质与工程地质 Mining Geology & Engineering Geology | 2 | 32 | | | | | 5 | 地质学 |
| 4060079110 | 矿山企业管理 Mine Enterprise Management | 2 | 32 | | | | | 6 | |
| 4060485170 | 矿山采掘机械 Excavation Equipment | 2 | 32 | | | | | 6 | |
| 4060081110 | 矿山提升与运输 Mine Lift and Transportation | 2 | 32 | | | | | 6 | 矿床地下开采 |
| 4060360130 | 采矿工程专业外语 Specialized English of Mining Engineering | 2 | 32 | | | | | 6 | |
| 4060069110 | 控制爆破 Demolition Blasting | 2 | 32 | | | | | 6 | 爆破工程 |
| 4060119110 | 选矿工艺与实例 Technics and Examples of Mineral | 2 | 32 | | | | | 7 | |
| 4060026110 | 地下空间工程 Underground Engineering | 2 | 32 | | | | | 7 | 岩体力学 |
| 4060131110 | 资源数字化技术 Digital Mine | 2 | 32 | | | | | 7 | |
| 4060484170 | 矿山地质灾害治理与生态修复 Mine Geological Disaster Management and Ecological Restoration | 2 | 32 | | | | | 7 | |
| 4060136110 | 总图与厂矿道路工程 Road Engineering | 2 | 32 | | | | | 7 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4060105110 | 石材工程<br>Stone Material Project | 2 | 32 | | | | | 7 | |
| 4060013110 | 爆破安全技术<br>Security Techniques of Blasting | 2 | 32 | | | | | 7 | 爆破工程 |
| 4060486170 | 边坡工程 A<br>Slope Engineering | 2 | 32 | | | | | 7 | 岩体力学 |
| 小 计 Subtotal | | 40 | 640 | 40 | 0 | 0 | 0 | | |
| 修读说明：要求至少选修 20 学分。<br>NOTE：Minimum subtotal credits:20. | | | | | | | | | |
| （五）个性课程<br>Personalized Electice Courses | | | | | | | | | |
| 4060488170 | 宝玉石开发与鉴赏<br>Development and Appreciation of Gem and Jade | 2 | 32 | | | | | 5 | |
| 4060361130 | 采矿工程数值模拟与仿真<br>Numerical Modeling and Simulation of Mining engineering | 2 | 32 | | | | | 6 | |
| 4060487170 | 矿产资源跨国开发<br>Mineral Resource Multinational Development | 2 | 32 | | | | | 7 | |
| 小 计 Subtotal | | 6 | 96 | 0 | 0 | 0 | 0 | | |
| 修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分。<br>NOTE: Sudents can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits. | | | | | | | | | |

## 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 | 学分 Crs | 周数 Weeks | 建议修读学期 Suggested Term |
|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 1.5 | 3 | 1 |
| 4060519170 | 地质实习 B<br>Geology Practice | 0.5 | 0.5 | 4（暑假） |
| 4060527170 | 采矿工程专业认识实习<br>Field trip | 2 | 2 | 4（暑假） |
| 4080151110 | 机械制造工程实训 C<br>Training on Mechanical Manufacturing Engineering | 2 | 2 | 4 |
| 4060489170 | 创新创业能力训练<br>Training of Innovation and Entrepreneurship Ability | 2 | 2 | 5 |

| 课程编号<br>Course Number | 实践环节名称<br>Practice Courses Name | 学分<br>Crs | 周数<br>Weeks | 建议修读学期<br>Suggested Term |
|---|---|---|---|---|
| 4060490170 | 采矿工程全工艺综合实验<br>Mining Engineering Comprehensive Experiment | 1 | 1 | 6 |
| 4060202110 | 生产实习 B<br>Field Trip | 2 | 2 | 6（暑假） |
| 4060163110 | 工矿通风与空调课程设计<br>Mine and Industry Ventilation & Air-Condition | 1 | 1 | 6 |
| 4060491170 | 矿床露天开采设计<br>Surface Mining Design | 2 | 2 | 7 |
| 4060492170 | 矿床地下开采设计<br>Underground Mining Design | 2 | 2 | 7 |
| 4060284130 | 工程设计数字化训练 B<br>Engineering Design Digital Training | 1 | 1 | 7 |
| 4060150110 | 毕业实习<br>Graduation Practice | 2 | 2 | 8 |
| 4060258120 | 毕业设计（论文）<br>Graduation Thesis | 10 | 15 | 8 |
| 小　　计　Subtotal | | 29 | 35.5 | |

## 六、其它要求

## Ⅵ Recommendations on Course Studies

1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。

2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人： 袁艳斌

专业培养方案责任人：叶海旺

# 矿物加工工程专业（卓越工程师班）2017 版本科培养方案
# Undergraduate Program for Specialty in Mineral Processing Engineering Specialty(Excellent Engineer Class) (2017)

| | | | |
|---|---|---|---|
| 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 | **1 年** |
| Disciplinary | Mining | Duration | 1 year |

**最低毕业学分规定**
**Graduation Credit Criteria**

| 课程类别 Course Classification / 课程性质 Course Nature | 通识教育课程 Public Basic Courses | 专业教育课程 Courses in Specialty | 个性课程 Personalized Course | 集中性实践 Practice Courses | 课外学分 Extracurricular Credits | 总学分 Total Credits |
|---|---|---|---|---|---|---|
| 必修课 Required Courses | 29 | 66.5 | \ | 37.5 | \ | 170 |
| 选修课 Elective Courses | 9 | 18 | \ | \ | 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、资源循环利用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、矿产资源开发及资源循环利用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和资源循环科学与工程领域科学研究、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与资源循环科学理论和工程技术分析、设计、开发矿产资源进行合理用的能力。

（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、矿物材料及资源循环利用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 recycling of 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 and recycling of resources,.
3. To possess the related knowledge of mathematics, physics, chemistry and some other natural science that are required in the mineral processing engineering and resource recycling science and 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 and recycling of resources 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, research and development(R & D) in the related fields of mineral processing engineering, mineral materials and recycling of resources, 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，并用于解决矿物加工工程领域复杂工程问题。

（2） 学生应掌握本专业的基本理论知识和工程基础知识，能够利用矿物加工与资源循环科学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与资源循环利用相关的科学问题。

（3） 学生应掌握与矿业工程有关工程基础知识和专业理论知识，能够设计针对矿物加工和资源循环利用领域复杂工程问题的解决方案，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

（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，了解资源循环利用的工艺和一般实验方法，具备对实验的结果进行合理分析的能力；并得到合理有效的结论。

（5） 学生掌握运用现代信息技术跟踪并获取矿业和资源循环技术信息的方法，熟练进行文献检索和资料查询，了解国内外矿物加工工程领域的理论前沿和发展动态，掌握现代分析测试工具和工程模拟软件进行科学研究和解决工程实际问题。

（6） 学生具有综合运用矿物加工与资源循环科学理论和技术手段设计矿物加工工艺和资源循环利用工艺的能力，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，掌握矿物加工与资源循环利用领域基本的创新方法，能够理解和评价针对复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

（8） 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，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

（9） 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。

（10） 能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、

陈述发言、清晰表达或回应指令，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。

（11） 学生应具有良好的生产组织、技术经济管理和工程项目实施能力，了解现场试验与生产运行的基本规律，并能在多学科环境中应用。

（12） 学生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。

**（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 and recycling of resources independently by utilizing mineral processing theories and resources recycling science.
3. Students are supposed to master the basic knowledge of of basic theories and professional theory of Mineral Engineering and design the solutions of the scientific problems by utilizing mineral processing theories and resources recycling science, as well as to reflect innovation consciousness in the design and development processes, taking factors including society, health, safety, laws, culture, and environment into considerations.
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, and recognize the experiment method and process of resources recycling.
5. Students should learn to obtain information about mining technology and resources recycling science by using modern information technology and search the literature to found useful data skillfully. and understand the theoretical frontiers and developments of mineral processing engineering. They should carry out scientific research and solve practical engineering problems with master modern analytical testing tools and engineering simulation software.
6. Students should master the ability to design the mineral and recycling of resources 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 have the ability of logical and dialectical thinking, critical consciousness and practical scientific thinking method and have the attitude and consciousness to pursue innovation, possess the basic innovation methods of mineral processing and resource recycling, understand and estimate the influences of engineering practice of complex engineering problems in the field of mineral processing on sustainable development of environment and society.
8. Students should possess good humanistic quality such as ideological quality, physical quality, psychological quality, cultural accomplishment, social morality and responsibility，and be able to play a role as an individual ethics and norms，and to fulfill the responsibilities.
9. Students should possess good organization and management, oral and written expression and interpersonal communication abilities, and possess good team consciousness and cooperation spirit.
10. Students be able to negotiate exchange with industry peers and the public on complex engineering problems in the field of mineral processing, including writing, designing and presenting reports clearly, and have certain international perspectives to communicate under the cross-cultural background.
11. Students should possess good production organization, technical and economic management and engineering project implementation capability, understand the basic rules of field test and production operation, and can be applied in multidisciplinary environment.

12. Students should have a correct understanding of lifelong learning, and possess the ability of continuous learning and adapting to the continuous development of mining technology.

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：

矿石学，粉碎工程，矿物加工工艺学，矿物加工试验研究方法，矿物加工厂工艺设计

Core Courses:

Lithology, Comminution Engineering, Mineral Processing Technology, Mineral Processing Experimental Research Methods, Mineral Processing Plant Process Design

### （二） 专业特色课程：

资源循环科学与工程概论，矿物材料工艺学，矿物加工测试技术，二次资源开发利用，非金属矿新型建筑材料，选矿药剂，湿法冶金，矿山企业管理与技术经济

Characteristic Courses:

Resource-recycling Science and Engineering, Mineral Material Technology, Mineral Material Testing Techniques, Exploitation and Utilization of Secondary, New Nonmetallic Mineral Building Materials, Regent of Mineral Processing, Hydrometallurgical， Economics and Management of Mining 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 | 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） | （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 | | | | | | | | | ✓ | ✓ | | ✓ |
| | | C 程序设计基础 | | | ✓ | | ✓ | ✓ | | | | | | |
| | | 计算机基础与 C 程序设计综合实验 | | | ✓ | | ✓ | ✓ | | | | | | |

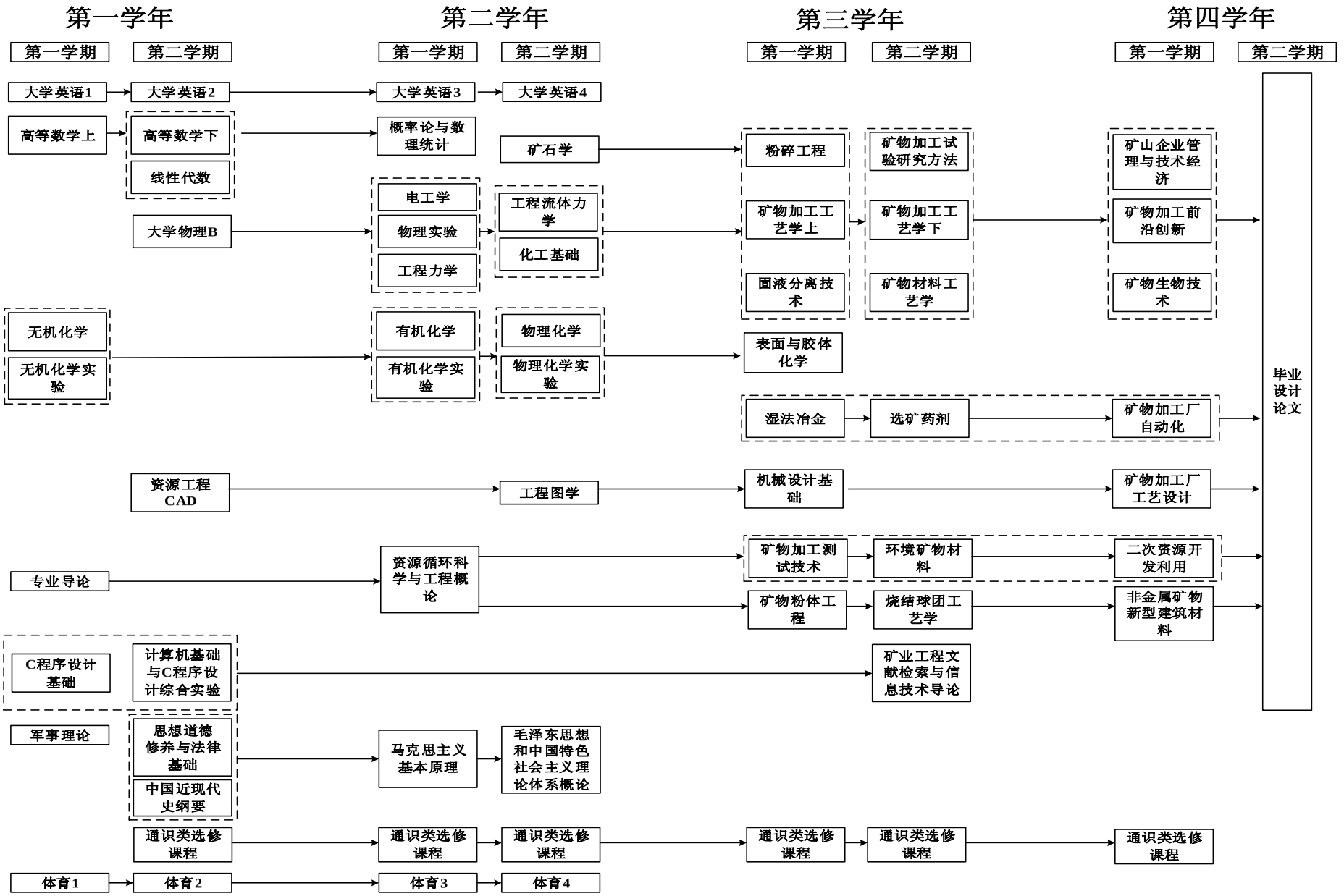
| 专业核心课程 | 专业特色课程 | 课程名称 | 矿物加工工程专业（卓越工程师班）毕业要求 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | （1） | （2） | （3） | （4） | （5） | （6） | （7） | （8） | （9） | （10） | （11） | （12） |
| | | 创新创业类通识选修课程 | | | | | | | ✓ | | | | | |
| | | 人文社科类通识选修课程 | | | | | | | | ✓ | | | | |
| | | 经济管理类通识选修课程 | ✓ | | | | | ✓ | | | | | ✓ | |
| | | 科学技术类通识选修课程 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | |
| | | 艺术体育类通识选修课程 | | | | | | | | ✓ | | | | |
| | | 专业导论 | | ✓ | ✓ | | | | | | | | | |
| | | 高等数学 | ✓ | | | | | | | | | | | ✓ |
| | | 线性代数 | ✓ | | | | | | | | | | | ✓ |
| | | 概率论与数理统计 | ✓ | | | | | | | | | | | ✓ |
| | | 大学物理 | ✓ | | | | | | | | | | | ✓ |
| | | 物理实验 | ✓ | | | | | | | | | | | ✓ |
| | | 工程图学 | | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 工程力学 | ✓ | ✓ | | | | | | | | | | ✓ |
| | | 无机化学 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 无机化学实验 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 物理化学 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 物理化学实验 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 资源工程 CAD | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | ✓ |
| | | 表面与胶体化学 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 电工学 | | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | | ✓ |
| | | 机械设计基础 | | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 环境矿物材料 | | ✓ | | | | ✓ | | | | ✓ | | |
| | | 有机化学 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 有机化学实验 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| | | 工程流体力学 | | ✓ | ✓ | | ✓ | | | | | | | ✓ |
| | | 化工基础 | | ✓ | ✓ | ✓ | | | | | | | | |
| ✓ | | 矿石学 | | ✓ | ✓ | ✓ | ✓ | | | | | | | |

| 专业核心课程 | 专业特色课程 | 课程名称 | 矿物加工工程专业（卓越工程师班）毕业要求 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | （1） | （2） | （3） | （4） | （5） | （6） | （7） | （8） | （9） | （10） | （11） | （12） |
| | ✓ | 资源循环科学与工程概论 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| ✓ | | 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 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| | ✓ | 湿法冶金 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| ✓ | | 矿物加工厂工艺设计 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | |
| ✓ | | 矿物材料工艺学 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |
| | ✓ | 二次资源开发利用 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |
| | | 矿物粉体工程 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |
| | | 固液分离技术 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| | | 矿物加工厂自动化 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | |
| | ✓ | 矿山企业管理与技术经济 | ✓ | | | ✓ | | ✓ | | | | ✓ | ✓ | |
| | ✓ | 选矿药剂 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| | ✓ | 非金属矿物新型建筑材料 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |
| | | 矿物加工前沿创新 | | | | | ✓ | | ✓ | | | ✓ | | ✓ |
| | | 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 | | | ✓ | | | ✓ | | | | | | ✓ |
| | | 矿物加工创新设计训练 | | | | | | ✓ | ✓ | | | ✓ | | |
| | | 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 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |

| 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） | （12） |
| | | 岗位实习 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |
| | | 毕业实习 | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |
| | | 毕业设计（论文） | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | |

## 三、课程教学进程图

## Ⅲ　Teaching Process Map


第一学年
第二学年
第三学年
第四学年
第一学期
第二学期
第一学期
第二学期
第一学期
第二学期
第一学期
第二学期
大学英语1
大学英语2
大学英语3
大学英语4
高等数学上
高等数学下
线性代数
概率论与数理统计
矿石学
粉碎工程
矿物加工试验研究方法
矿山企业管理与技术经济
电工学
物理实验
工程力学
大学物理B
工程流体力学
化工基础
矿物加工工艺学上
矿物加工工艺学下
矿物加工前沿创新
固液分离技术
矿物材料工艺学
矿物生物技术
无机化学
无机化学实验
有机化学
有机化学实验
物理化学
物理化学实验
表面与胶体化学
湿法冶金
选矿药剂
矿物加工厂自动化
毕业设计论文
资源工程CAD
工程图学
机械设计基础
矿物加工厂工艺设计
专业导论
资源循环科学与工程概论
矿物加工测试技术
环境矿物材料
二次资源开发利用
矿物粉体工程
烧结球团工艺学
非金属矿物新型建筑材料
C程序设计基础
计算机基础与C程序设计综合实验
矿业工程文献检索与信息技术导论
军事理论
思想道德修养与法律基础
中国近现代史纲要
马克思主义基本原理
毛泽东思想和中国特色社会主义理论体系概论
通识类选修课程
通识类选修课程
通识类选修课程
通识类选修课程
通识类选修课程
通识类选修课程
体育1
体育2
体育3
体育4

## 四、 理论教学建议进程表

## Ⅳ Theory Course Schedule

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| （一）通识教育必修课程 General Education Required Courses | | | | | | | | | |
| 4220001110 | 思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 2 | |
| 4220002110 | 中国近现代史纲要 Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 2 | |
| 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 | | 3 | |
| 4220005110 | 马克思主义基本原理 Marxism Philosophy | 3 | 48 | | | 8 | | 4 | |
| 1060003130 | 军事理论 Military Theory | 1 | 32 | | | | 16 | 2 | |
| 4210001170 | 体育 1 Physical Education Ⅰ | 1 | 26 | | | | | 1 | |
| 4210002170 | 体育 2 Physical Education Ⅱ | 1 | 34 | | | | | 2 | |
| 4210003170 | 体育 3 Physical Education Ⅲ | 1 | 34 | | | | | 3 | |
| 4210004170 | 体育 4 Physical Education Ⅳ | 1 | 34 | | | | | 4 | |
| 4030002180 | 大学英语 1 College English 1 | 3 | 60 | | | | 12 | 1 | |
| 4030003180 | 大学英语 2 College English Ⅱ | 2 | 44 | | | | 12 | 2 | 大学英语 1 |
| 4030004180 | 大学英语 3 College English Ⅲ | 2 | 44 | | | | 12 | 3 | 大学英语 2 |
| 4030004180 | 大学英语 4 College English IV | 2 | 44 | | | | 12 | 4 | 大学英语 3 |
| 4120335170 | C 程序设计基础 C Language Programming | 2 | 32 | | | | | 1 | |
| 4120336170 | 计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments | 1 | 32 | 32 | | | | 1 | |
| 小 计 Subtotal | | 29 | 640 | 32 | 0 | 48 | 64 | | |

| 课程编号<br>Course Number | 课 程 名 称<br>Course Title | 学分<br>Crs | 学时分配 Including | | | | | 建议修读学期<br>Suggested Term | 先修课程<br>Prerequisite Course |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时<br>Tot hrs. | 实验<br>Exp. | 上机<br>Ope-ration | 实践<br>Prac-tice | 课外<br>Extra-cur | | |
| （二）通识教育选修课程<br>General Education Elective Courses | | | | | | | | | |
| 创新创业类<br>Innovation and Entrepreneurship Courses | | 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并取得至少 2 个学分，在创新创业类课程中至少选修一门课程，在人文社科类或经济管理类课程中至少选修一门。<br>Students are required to abtain at least 9 credits，which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses. | | | | | | | |
| 人文社科类<br>Arts and Social Science Courses | | | | | | | | | |
| 经济管理类<br>Economy and Management Courses | | | | | | | | | |
| 科学技术类<br>Science and Technology Courses | | | | | | | | | |
| 艺术体育类<br>Art and Physical Education Courses | | | | | | | | | |
| （三）专业教育必修课程<br>Basic Disciplinary RequiredCourses | | | | | | | | | |
| 4060275130 | 专业导论<br>Introduction to Materials Physics | 1 | 16 | | | | | 1 | |
| 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 1 | |
| 4200357170 | 无机化学 B<br>Chemistry | 3 | 48 | | | | | 1 | |
| 4200358170 | 无机化学实验 B<br>Inorganic Chemistry Experiment | 1 | 32 | 32 | | | | 1 | 无机化学 |
| 4050063110 | 高等数学 A 上<br>Advanced Mathematics Ⅰ | 5 | 80 | | | | | 1 | |
| 4050064110 | 高等数学 A 下<br>Advanced Mathematics Ⅱ | 5 | 80 | | | | | 2 | 高等数学上 |
| 4050463130 | 大学物理 B<br>Physics | 5 | 80 | | | | | 2 | |
| 4050224110 | 物理实验 B<br>Physics Lab. | 1 | 32 | 32 | | | | 3 | |
| 4050071110 | 工程力学 A<br>Engineering Mechanics | 4 | 64 | 4 | | | | 3 | |
| 4200274120 | 有机化学 C<br>Organic Chemistry | 3 | 48 | | | | | 3 | |
| 4200275120 | 有机化学实验 C<br>Organic Chemistry Experiment | 0.5 | 16 | 16 | | | | 3 | 无机化学实验 |
| 4050598170 | 概率论与数理统计 C<br>Probability and Mathematics | 2.5 | 40 | | | | | 3 | |
| 4100008110 | 电工学<br>Electro technics | 3 | 48 | 8 | | | | 3 | 大学物理 |
| 4080373170 | 工程图学 B | 3.5 | 72 | | | | 16 | 4 | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| | Engineering Drawing | | | | | | | | |
| 4200256120 | 物理化学 C<br>Physical Chemistry | 4 | 64 | | | | | 4 | |
| 4200382170 | 物理化学实验 C<br>Physical Chemistry Experimental | 0.5 | 16 | 16 | | | | 4 | |
| 4130495170 | 矿石学 B<br>Lithology | 2.5 | 40 | 16 | | | | 4 | |
| 4080061110 | 机械设计基础<br>Mechanical Design Basis | 3.5 | 56 | 6 | | | | 5 | |
| 4060032110 | 粉碎工程 B<br>Comminution Engineering | 2 | 32 | | | | | 5 | |
| 4060496170 | 矿物加工工艺学 A1<br>Mineral Processing Technology Ⅰ | 3 | 48 | | | | | 5 | 表面与胶体化学 |
| 4060497170 | 矿物加工工艺学 A2<br>Mineral Processing Technology Ⅱ | 3 | 48 | | | | | 6 | 表面与胶体化学 |
| 4060498170 | 矿物加工试验研究方法 A<br>Experimental Research Methods of Mineral Processing | 2.5 | 40 | | | | | 6 | 矿物加工工艺学 |
| 4060083110 | 矿物材料工艺学<br>Mineral Material Technology | 2.5 | 40 | | | | | 6 | 矿物加工工艺学 |
| 4060086110 | 矿物加工厂工艺设计 B<br>Process Design of Mineral Processing Plant | 2 | 32 | | | | | 7 | 矿物加工工艺学 |
| 4060499170 | 矿物加工前沿创新<br>Innovation of Mineral Processing Technology | 1 | 16 | | | | | 7 | |
| 小 计 Subtotal | | 66.5 | 1128 | 130 | 0 | 0 | 16 | | |
| （四）专业教育选修课程<br>Specialized Elective Courses | | | | | | | | | |
| 4060128110 | 资源工程 CAD(B)<br>Resource Engineering CAD | 2 | 32 | 24 | | | | 2 | |
| 4060530170 | 资源循环科学与工程概论<br>resource recycling science and engineering | 2 | 32 | | | | | 3 | |
| 4130493170 | 工程流体力学 B<br>Fluid Mechanics | 2 | 32 | | | | | 4 | |
| 4200373170 | 化工基础 B<br>Elementary Chemical Industry | 2 | 32 | | | | | 4 | |
| 4060500170 | 表面与胶体化学 B<br>Surface and Colloid Chemistry | 2 | 32 | | | | | 5 | 物理化学 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | |
| 4060036110 | 固液分离技术<br>Solid-liquid Separation Techniques | 2 | 32 | | | | | 5 | |
| 4060084110 | 矿物粉体工程<br>Mineral Powder Technology | 2 | 32 | | | | | 6 | |
| 4060102110 | 烧结球团工艺学<br>Sintering Pelletizing Process | 2 | 32 | | | | | 6 | |
| 4060031110 | 非金属矿物新型建筑材料<br>New Nonmetallic Mineral Materials | 2 | 32 | | | | | 7 | |
| 4060501170 | 矿山企业管理与技术经济<br>Mine Corporation Management | 2 | 32 | | | | | 7 | |
| 矿物加工模块 | | | | | | | | | |
| 4060502170 | 湿法冶金<br>hydrometallurgical | 2 | 32 | | | | | 5 | 表面与胶体化学<br>无机化学上 |
| 4060120110 | 选矿药剂<br>Mineral Processing Reagents | 2 | 32 | | | | | 6 | 矿物加工工艺学 |
| 4060245120 | 矿物加工厂自动化<br>Automation of Mineral Processing Planand Automation | 2 | 32 | | | | | 7 | 矿物加工工艺学 |
| 矿物材料模块 | | | | | | | | | |
| 4060085110 | 矿物加工测试技术<br>Mineral Material Testing Techniques | 2 | 32 | | | | | 5 | |
| 4060052110 | 环境矿物材料<br>Environmental Mineral Materials | 2 | 32 | | | | | 6 | |
| 4060028110 | 二次资源开发利用<br>Exploitation and Utilization of Secondary | 2 | 32 | | | | | 7 | |
| 小 计 Subtotal | | 32 | 512 | 24 | 0 | 0 | 0 | | |
| 修读说明：本专业学生至少选修 18 学分，其中要求在矿物加工模块和矿物材料模块中二选一。<br>NOTE：Minimum subtotal credits:18. | | | | | | | | | |

## 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 | 学分 Crs | 周数 Weeks | 建议修读学期 Suggested Term |
|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 1.5 | 3 | 1 |
| 4060199110 | 认识实习<br>Cognition Practice | 1 | 1 | 4（暑期） |
| 4100069110 | 电工电子实习 B<br>Electric Practice | 1 | 1 | 4 |

| 课程编号 Course Number | 实践环节名称 Practice Courses Name | 学分 Crs | 周数 Weeks | 建议修读学期 Suggested Term |
|---|---|---|---|---|
| 4080151110 | 机械制造工程实训 C<br>Machinery Manufacturing Engineering Practice | 2 | 2 | 4 |
| 4080146110 | 机械设计基础课程设计<br>Course Design on Foundation of Machine Design | 2 | 2 | 5 |
| 4060536170 | 矿物系统鉴定实验 A<br>Mineral Identify Exp. | 2.5 | 2.5 | 5 |
| 4060524170 | 矿物加工创新设计训练<br>Innovation Design Training for Mineral Processing | 2 | 2 | 6 |
| 4060207110 | 专业实习（生产实习）<br>Professional (Production) Practice | 3 | 3 | 6 |
| 4060267120 | 矿物加工工艺学系统实验 B1<br>Systematic Experiments of Mineral Processing TechnologyⅠ | 1.5 | 1.5 | 6 |
| 4060268120 | 矿物加工工艺学系统实验 B2<br>Systematic Experiments of Mineral Processing TechnologyⅡ | 2 | 2 | 7 |
| 4060184110 | 矿石可选性综合实验 B<br>Serial Experiments of Ore Beneficiation Feasibility | 1.5 | 1.5 | 7 |
| 4060186110 | 矿物材料工艺学系统实验<br>Systematic Experiments of Mineral material Technology | 1.5 | 1.5 | 7 |
| 4060528170 | 矿物加工岗位实习<br>Occupation Practice | 4 | 4 | 7 |
| 4060152110 | 毕业实习<br>Graduation Practice | 2 | 2 | 8 |
| 4060261120 | 毕业设计(论文)<br>Graduation Design (Dissertation) | 10 | 15 | 8 |
| 小　　计 Subtotal | | 37.5 | 44 | |

## 六、其它要求

## Ⅵ Recommendations on Course Studies

1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。

2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人：袁艳斌

专业培养方案责任人：张凌燕