资源与环境学院本科人才培养方案

Undergraduate Program for College of Resources and Environment

(2023 版)

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中南民族大学简介

中南民族大学是直属于国家民族事务委员会的综合性普通高等学校，国家民族事务委员会、教育部、湖北省、武汉市共建高校，坐落于白云黄鹤的故乡——武汉南湖之滨。学校创建于 1951 年，是新中国成立后最早建立的民族高校之一。建校以来，学校始终坚持社会主义办学方向，贯彻落实党的教育方针和民族政策，以铸牢中华民族共同体意识为主线，以立德树人为根本任务，各项事业获得了快速发展。

学校占地 1550 余亩，校舍面积 110 万余平米。校园内绿树成荫、花香四季，具有浓郁民族特色的现代建筑鳞次栉比，湖光山色与人文景观交相辉映，构成了教学、科研和生活的优美环境。

办学基础稳步夯实。学校现有 56 个民族的全日制博士、硕士、本科、预科等各类学生 29000 余人。学校现有 4 个一级学科博士点，25 个学术型一级学科硕士点，23 个专业型硕士点。现有本科招生专业 77 个，涵盖 10 大学科门类。

获批一流本科专业建设点 52 个（国家级 24 个），环境工程专业、计算机科学与技术专业通过工程教育专业认证，获得国家级“新工科”项目 4 项、“新农科”项目 5 项、“新文科”项目 4 项，获批国家级一流本科课程 15 门、教育部课程思政示范项目 2 项。2018 年 1 月，学校入选湖北省“国内一流大学建设高校”，其中民族学、化学和药学 3 个学科入选“国内一流学科建设学科”。2017 年，民族学在教育部学科评估中被评为 A 类学科；化学、工程学、材料科学 3 个学科进入 ESI 学科排名全球前 1%。现有教职工 2200 余人，各类专任教师 1400 余人，专任教师中具有博士学位的占 60%。拥有“黄大年式教师团队”，引培了国家“杰青”、国家“优青”、国家“万人计划”领军人才等一批高层次人才。近五年，学校获批国家级科研项目 301 项，其中重大重点项目 36 项；发表 CSSCI 期刊论文 815 篇；发表 SCI 期刊论文 1976 篇；出版高水平学术专著 279 部，获批授权发明专利 498 项，获省部级科研奖励 122 项；制定中药材艾叶国际标准 1 项；湖北全面小康建设研究院入选 2017 年度中国核心智库，建成“国家级科技企业孵化器”、国家级“互联网+中华文明”全国示范基地。学校位列 2019 年全国高校 C 刊论文发表数量排行榜第 86 位，自然指数 2020 年度排 124 位，学报人文社科版、自科版全部入选“RCCSE 中国核心学术期刊”A 等级。

学校影响不断扩大。2012 年，学校获批国家级教师教学发展示范中心，是非“985”“211”高校中唯一获批单位；2001 年、2006 年、2016 年，连续三次在教育部本科教学水平评估中成绩优异。2017 年 8 月，获评“全国创新创业教育深化改革示范高校”。2017 年 9 月，学校人才培养成果入选中共中央宣传部等部门主办的“砥砺奋进的五年”大型成就展。建校 71 年来，累计培养了 17 万余名高素质人才。近年来，学校承担扶持人口较少民族发展“十三五”规划编制工作，利用自身科研优势建设多个服务民族地区产业发展平台，推进国家民委派

驻武陵山片区联络员、“1221”精准扶贫工作、驻村扶贫工作队、“616”对口支援长阳县、对口支援三峡库区移民工程、定点帮扶恩施市基础教育、博士服务团、“三万”活动、科技副县长、基层高质量发展专才支持计划等工程，累计派出干部、教师 144 人次，投入各类扶贫专项资金 5000 余万元，先后与恩施州、铜仁市、张家界市、湘西州、怀化市、黔西南州等签订战略合作协议，全面加强与武陵山片区、巴林右旗、德保县、乐安县等地区在人才培养、智库服务、科学研究与成果转化、文化建设、农产品销售渠道拓展等领域的深度合作。学校与境外50余所大学建立了校际交流与合作关系，与武汉大学、重庆大学等数十家国内高校开展联合培养、互访互学等深度合作。

立德树人成效显著。学校深入学习贯彻党的二十大精神，持续贯彻中央民族工作会议、全国民族团结进步表彰大会、全国高校思想政治工作会议和全国教育大会等精神，围绕“中华民族一家亲、同心共筑中国梦”主题，大力开展“五个认同”教育，被国务院、国家民委、湖北省、武汉市授予“民族团结进步模范单位”“民族团结进步模范集体”“全国民族团结进步创建活动示范高校”等称号。多次被湖北省委评为“党建工作先进单位”“先进党委中心组”“先进基层党组织”，连续 19 年被评为湖北省最佳文明单位，连续多年获得教育部、湖北省高校校园文化建设优秀成果奖，涌现出“全国模范教师”“全国师德标兵”“国家民委‘三全育人’模范”“湖北省十佳班主任”“中国大学生年度人物”“中国大学生自强之星标兵”等一大批优秀师生代表。

进入新时代，启航新征程。学校坚持以习近平新时代中国特色社会主义思想为指导，认真学习贯彻习近平总书记关于加强和改进民族工作的重要思想、关于教育的重要论述，把握新发展阶段，贯彻新发展理念，着眼国家战略需求，服务地方经济社会发展，以铸牢中华民族共同体意识为主线，以立德树人为根本任务，围绕“四个服务”办学要求，大力实施“质量立校、学科兴校、人才强校、特色荣校”战略，努力建设国内一流、人民满意的高水平现代化综合大学，培养德智体美劳全面发展的社会主义建设者和接班人。

University Profile

South-Central Minzu University is a comprehensive university directly under the State Ethnic Affairs Commission. Located on the shore of the South Lake in Wuhan, home to the "White Clouds and Yellow Cranes", it is also an institution of higher learning jointly built by the State Ethnics Affairs Commission, the Ministry of Education, provincial government in Hubei and municipal government in Wuhan city. Founded in 1951, SCMZU is one of the earliest universities for nationalities established since the founding of the People's Republic of China. Since its establishment, SCMZU has been unwavering in following the socialist path of education and implementing the Party's policies on education and ethnic affairs. It has achieved rapid and overall development by focusing on forging a sense of the Chinese national community and taking morality and virtue education as the cornerstone.

The university covers a ground area of 1,550 mu and boasts a building area of more than one million square meters. It has a beautiful campus where leafy trees abound and flowers give out fragrances all year around; the campus also features tidily arranged modern buildings with ethnic characteristics. Here the landscape and cultural attractions complement each other, making the campus an ideal place for teaching/learning, scientific research, and living.

The university has laid down a solid foundation for education. Currently it has 29,000 students from all 56 ethnic groups in China, including full-time preparatory students, undergraduates, master's students, and doctorate students. It has four doctoral programs of first-level disciplines; 25 academic master programs of first-level disciplines, and 20 professional master programs. It has 82 undergraduate programs, covering 10 major disciplines. It has 34 designated first-class undergraduate programs (14 of which are national programs). With its environmental engineering program obtaining the professional certification for engineering education, the university has been granted four national "new engineering" programs, five "new agricultural" programs, and four "new humanities" programs. It has nine national first-class undergraduate courses and two ministerial-level ideological and political theory demonstration courses. In January 2018, the university was listed in the "Universities to Be Developed as National First-Class Institutions of Higher Learning" in Hubei Province, with its three disciplines of ethnology, chemistry, and pharmaceutical sciences recognized as "national first-class discipline development programs". In 2017, its discipline of ethnology was approved as an A-category discipline in the discipline appraisal by the Ministry of Education; its three disciplines of chemistry, engineering, and material science were placed among the top 1% on the ESI rankings. It has a faculty and staff of more than 1,400, while 58% of the full-time teachers are PhDs. Having a team of Huang Danian-type teachers, who are with high-quality and innovation-driven professionals, it has brought in and cultivated a bunch of top talents such as the "national outstanding youths", "national excellent youths", and teachers included in the national "10,000 talent initiative". During the 13th Five-year Plan period, it was granted 291 national scientific research projects, 36 of which are major projects; it had 761 CSSCI

papers published and 131 of them by authoritative journals such as Social Sciences in China; it had 1,372 SCI papers published, with 279 in the top section; it had 245 high-level academic monographs published, was granted 271 invention patents, and won 123 provincial/ministerial-level prizes and awards; it specified one international standard for mugwort, a Chinese medicinal herb; its Institute of Hubei Comprehensive Moderately Prosperous Society Development was accepted into the China core think tank for the year 2017, while it completed its "National Tech Enterprise Incubator" and its national demonstration base for national "Internet + Chinese Civilization". The university was ranked 86th in terms of quantities of published CSSCI papers in 2019; its natural index was ranked at 124th place in 2020; the humanity and social science edition and natural sciences edition of its journal were both listed as A class for the RCCSE China Core Academic Journal.

The influence of the university has kept increasing over time. In 2012, it was designated as a national demonstration center for teacher development; in 2001, 2006, and 2016 respectively, it obtained top grades in the appraisal of the undergraduate education level by the Ministry of Education. In August 2017, it was honored as "National Demonstration University for deepening reform in innovation-driven and entrepreneurship-oriented Education". In September 2017, its achievements in talent development were selected into the major exhibition of achievements "Five Years of Sheer Endeavor". For the past 70 years, it has accumulatively produced more than 170,000 high-level talents. In recent years, the university undertakes the compilation of the 13th Five-Year Plan for the development of ethnic groups with small populations; making use of its advantages in scientific research, it built multiple industrial development platforms for minority regions; it promoted "Ten Important Projects", that is, the appointment of liaison officer in Mount Wuling area dispatched by State Ethnic Affairs Commission;"1221"targeted poverty alleviation program; village-stationed poverty alleviation working team; "616" Changyang County-specific Support; Three Gorges Reservoir Area Migration Project-specific support; specific assistance for basic education in Enshi City; PhD service corps; "three 10,000" projects, which are rural development activities carried out by Hubei Provincial Committee of CPC and Hubei provincial government; deputy chief of county in charge of science and technology; support plan for developing high-quality grassroots-level talents. It dispatched a total of 144 cadres and teachers for these efforts and invested more than RMB50 million in various special poverty-alleviation funds. It has entered into strategic partnership agreements with Enshi Prefecture, Tongren City, Zhangjiajie City, Xiangxi Prefecture, Huaihua City, and Qianxinan Prefecture. It has made great efforts to carry out deep cooperation with the Mount Wuling area, Bairin Right Banner, Debao County, Le'an County, and others in terms of talent development, think tank service, scientific research and the commercialization of research achievements, cultural promotion, and the expansion of farm products sales channels. It established relationships of exchanges and cooperation with more than 50 universities overseas, while having deep cooperation with dozens of domestic universities such as Wuhan University and Chongqing University by a way of joint development, exchanges, and mutual visits.

The university has made impressive achievements in morality and virtue education for its students. It has studied and implemented the key message of the Party's 19th national congress and consistently implemented the key messages of the CCP Central Committee ethnic work meeting, national ethnic unity and progress award-presenting conference, national conference on ideological and political work in universities, national educational conference, and so forth. Centered on the theme of "Chinese Nation as Family, Working in Unison Toward Chinese Dream", it has worked hard on education in "Five Identities", thus winning such honors as "Exemplary Institution for National Unity and Progress", "Exemplary Group for National Unity and Progress", and "Demonstration University for Building Activities of National Unity and Progress Across China". For many times its CPC Committee has been honored as "Exemplary Institution in Party Building Work", "Exemplary Party Committee Central Team", and "Exemplary Grassroots Party Cell" by the CPC Committee of Hubei Province. For 19 consecutive years, it has been honored as the Most Civilized Institution of Hubei Province; for many years in a row, it has won the university campus cultural promotion achievement from the Ministry of Education and Hubei Provincial Department of Education; from it came a large number of excellent teachers and students, who have earned honors such as "National Exemplary Teacher", "National Role Model in Morality and Virtue as Teacher", "Top Ten Head Teacher of Hubei Province", "Chinese University Student of the Year", and "Chinese University Student Self-reliance Star".

In this new era, let us embark on a new journey. Guided by Xi Jinping's thought on socialism with Chinese characteristics in the new age, the university will seriously study and implement General Secretary Xi Jinping's important thought on strengthening and improving work involving ethnic affairs and his important views on educations. Seizing the opportunities available at this new stage of development, it will practice the new development philosophy. It will get aligned to the state's strategy and serve local socioeconomic development. It will focus on forging a sense of the Chinese national community and take morality and virtue education as the cornerstone; by meeting the "Four Services" educational requirements, it will make great efforts to implement the strategy of "Built on Quality, Prospering from Disciplines, Strengthened through Talents, Honored for Characteristics". And it will do its best to grow into one of China's first-class universities to the satisfaction of the Chinese people, fostering constructors and successors for the cause of Chinese style socialism who are developed morally, intellectually, physically and aesthetically.

资源与环境学院简介

资源与环境学院现有环境科学、环境工程、水文与水资源工程、资源循环科学与工程 4 个本科专业，其中环境科学和环境工程专业入选湖北省普通高等学校战略性新兴（支柱）产业人才培养计划，环境工程专业入选湖北省一流专业建设点。环境工程专业 2020 年通过了国际通行的工程教育专业认证，为国家民委院校首个通过专业。在研究生教育方面，学院现有环境科学与工程学术型硕士点、环境化学学术型硕士点和资源与环境领域工程专业型硕士点，环境工程学科为湖北省楚天学者设岗学科。

学院拥有一支结构合理、奋发有为的师资队伍，现有教职员工 50 人。现有教授 9 人（其中二级教授 1 人，三级教授 2 人），副教授 14 人，包括教育部新世纪优秀人才 3 人、国家民委突出贡献专家 1 人及湖北省有突出贡献中青年专家 2 人。我院现有在校本科生 880 余人，研究生 153 人。

学院现有 7000 平米的综合实验楼，建有环境监测实验室、环境工程综合实验室、水力学实验室、资源加工实验室、虚拟仿真实验室等专业教学实验室 18 个，另有 400 平米分析测试中心 1 个，校内气象站 1 个，工程设计资料室 1 个。学院现有湖北省重金属污染防治工程技术研究中心、资源转化与污染控制国家民委重点实验室等研究机构，其中“碳族废物资源化利用重点实验室”于 2016 年获批为全国循环经济工程实验室。学院已与美国加州大学、英国布里斯托尔大学、加拿大康考迪亚大学等高校建立了交流与合作，推进人才培养和科学研究。与广西中信大锰集团、长江三峡集团、湖北兴发集团、武汉水务集团等企业及众多环保部门建立了实践教学和产学研基地。学院坚持以人才培养为中心，并注重教学与科研相融合。学院现有 6 个科研团队——分别是重金属污染控制与含碳废物的能源化利用团队、环境材料和环境控制化学团队、碳基材料与环境修复团队、生态毒理与 VOCs 污染控制团队、矿产资源综合利用团队、水资源利用与水环境治理团队。优质的学术环境、前沿的科研平台，无不彰显着学院高亢的学术热情和务实的科研精神。近年来，学院共承担科研项目 240 余项，包括国家科技支撑计划项目、科技部 863 计划、国家自然科学基金等国家级项目 30 余项，到账经费 7000 余万元。近年，学院教师主持获得湖北省科技进步特等奖 1 项、三等奖 5 项，环境保护科学技术二等奖 1 项，湖北省自然科学二等奖、三等奖各 1 项，湖北省教学成果奖一等奖 1 项，国家民委教学成果奖二等奖 1 项。

学院积极融入“一带一路”、粤港澳大湾区建设等国家发展战略，积极拓展国际国内合作交流，承办了多个相关的国际学术会议，创建有品牌学术交流栏目——南湖环境讲坛，每年邀请国内外知名专家学者来学院学术讲座 10 余人次。自建院以来，学院先后举办了多次大型国内国际学术交流会议，2016 年，学院承办了第十六届世界催化大会卫星会议（环境催化国际研讨会）及第十一届海峡两岸催化学术会议，2017 年与清华大学环境学院共同承办持久性有机污染物论坛 2017 暨第十二届持久性有机污染物学术研讨会（POPs2017），2018 年、2022 年承办环境与能源科技国际研讨会，2020 年承办中国环境科学学会科学技术年会“乡村环境治理”分

会。学院资源与环境相关学科在国内已具有一定的影响力，特别是工业废水处理和环境催化领域相关研究已达到国内先进水平。

学院围绕“立德树人”的根本任务，优化“三全育人”工作机制，以“崇德、尚学、自然、和谐”为院训，积极推行导师制，“德智体美劳”五育并举，全方位培养学生。第一课堂学生学习氛围浓厚，学院所有科研团队实验室向本科生开放，鼓励学生利用课余时间开展科研创新；学院创新开展“绿色空间”科技文化节和“世界环境日”等品牌特色学生活动，进一步丰富第二课堂教育平台，提升了学生的综合素质。

学生专业知识扎实，创新能力强，综合素质高。近年来学生曾在大学生“挑战杯”多次获得省级一、二等奖，在全国大学生节能减排社会实践与科技竞赛等多项国家级赛事中载誉而归，数位本科生以第一作者发表 SCI 一区等高水平科研论文，在“垃圾投进趣·全国青年公益实践大赛”获得总冠军，每年均有学生获得国家、省级和校级大学生创新创业训练计划项目立项、结题，先后注册成立了多家创业公司，也涌现出了杨晨等湖北省向上向善好青年和全国“中国电信”奖学金获得者蓝际荣等众多优秀学生。

毕业生升学就业率高。2023 届毕业生考研升学率超过 42.86%，不少学生考入浙江大学、武汉大学、中山大学、华中科技大学等国内名校以及英国曼彻斯特大学、韩国首尔大学等国外名校深造。毕业生就业率稳定在 84.57%左右，就业主要分布在环境类上市公司、设计和科研院所等企业，也有环保局、水文局、国土资源局等公务员、事业单位部门，学生培养质量受到用人单位好评，获得良好的社会声誉。

College of Resources and Environment

The College offers four undergraduate programs (Environmental Science, Environmental Engineering, Hydrology and Water Resources Engineering, and Resources Circulation Science and Engineering). Both Environmental Science and Environmental Engineering were selected as the strategic new-type (pillar) industrial talent training program for general colleges and universities in Hubei Province. Environmental Engineering was accredited by China Engineering Education Accreditation in 2020，being the first university to be accredited in the National Ethnic Affairs Commission University system. The College offers a doctoral degree program in Environmental Chemistry, an academic master degree program in Environmental Science and Engineering, and a professional master degree program in Resources and Environmental Engineering. Moreover, Environmental Science and Engineering offers position for “Chutian” scholar.

There is a rational composition of staffs and faculties at the college with a number of 50 personal in total. There are 9 full-time professors (Tier II: 1, Tier III: 2), 14 full-time associate professors (3 recognized as outstanding talents in the new century by the Ministry of Education; 1 recognized as expert with outstanding contributions by the National Ethnic Affairs Commission; 2 recognized as young and middle-aged experts with outstanding contributions by Hubei Province). Currently, there is a total number of ~880 undergraduate students and 153 graduate students.

The College has 7,000 square meters of comprehensive laboratory building, including 18 professional teaching laboratories (Environmental Monitoring Laboratories, Hydraulics Laboratories, Environmental Engineering Laboratories, Virtual Simulation Laboratories, etc.) and an additional 400 square meters of Analysis and Testing Center, 1 Weather Station and 1 engineering design library. The college owns the Hubei Province Heavy Metal Pollution Prevention and Control Engineering Technology Research Center, National Ethnic Affairs Commission Key Laboratory of Resource Transformation and Pollution Control and other research institutions. Among them, the "Key Laboratory of Carbon Waste Resource Utilization" has been approved as the national circular economy engineering laboratory in 2016. The college has established exchanges and cooperation with the University of California, the University of Bristol in the United Kingdom, Concordia University in Canada and other universities to promote talent training and scientific research. Practical teaching and industry-academia-research bases have been established with Guangxi CITIC manganese Group, Three Gorges Corporation, Hubei Xingfa Group Co., Ltd, Wuhan Water Group and many other enterprises and environmental protection departments. The college emphasizes on talent training and focuses on the integration of teaching and research. There are 6 existing research groups, namely Heavy metal pollution prevention

and control, Environmental materials and environmental control chemistry, Carbon-based materials and environmental remediation, Ecotoxicology and VOCs pollution control, Resource planning and comprehensive utilization of mineral resources and Water pollution and control. The high-quality academic environment and cutting-edge research platforms all demonstrate the high academic enthusiasm and pragmatic research spirit of the college. In recent years, the college has undertaken more than 240 scientific research projects, including the national science and technology support plan, the subproject of the Ministry of Science and Technology's 863 plan, and the National Natural Science Foundation of China, with a total funding of more than 70 million yuan. Faculties at the college have won 1 special prize and 5 third prize of Hubei Province Science and Technology Progress Award, 1 second prize of Science and Technology Award of the Ministry of Environmental Protection, 1 second prize and 1 third prize of Hubei Province Natural Science Award, , 1 frist prize of Teaching Achievement Award of Hubei Province and 1 first prize of Teaching Achievement Award of National Ethnic Affairs Commission.

The college actively integrates into national development strategies such as the “Belt and Road Initiative” and the construction of the Guangdong-Hong Kong-Macao Greater Bay Area, actively expands international and domestic cooperation and exchanges, and has hosted a number of relevant international academic conferences. The college has established exchanges and cooperation with universities such as the University of California, the University of Bristol in the United Kingdom, and Concordia University in Canada, and has created a brand academic exchange column - Nanhu Environmental Forum. Since the establishment of the college, the college has held many large-scale domestic and international academic conferences. In 2016, the college hosted the 16th Satellite Meeting of the World Congress on Catalysis (International Symposium on Environmental Catalysis), the 11th Cross-Strait Catalysis Conference in 2017, the International Symposium on Environment and Energy Science and Technology in 2018 and 2022, and the 2020 Science and Technology Conference of the Chinese Society of Environmental Science (CSES) on "Rural Environmental Governance" in 2020. Additionally, the college and the School of Environment of Tsinghua University co-hosted the Persistent Organic Pollutants (POPs) Forum 2017 and the 12th POPs Colloquium (POPs2017) in 2017. The school's resource and environment-related disciplines have a certain degree of influence in China, especially research in the field of industrial wastewater treatment and environmental catalytic has reached the advanced level in China.

The college implements the fundamental task of "cultivating people with morality", optimizes the working mechanism of "All-round education", takes "cultivating morality, honoring learning, nature, and harmony" as the school motto, and fully implements the undergraduate tutor system,emphasis

equally on the development of moral, intellectual, physical, aesthetics and labor educations.

There is a strong learning atmosphere in classrooms, and all the laboratories are open to undergraduates, encouraging students to carry out scientific research and innovation in their spare time; the College has innovatively carried out the "Green Space" Science and Technology and Culture Festival and the "World Environment Day" and other brand-name student activities, which have further enriched the educational platform of the second classroom and improved the comprehensive quality of the students.

Students have solid professional knowledge, strong innovation abilities and high comprehensive qualities. In recent years, students have won the first and second prizes at the provincial level in the Challenge Cup for college students many times, and have won a number of national competitions such as the National College Students' Energy Saving and Emission Reduction Social Practice and Science and Technology Competition, etc. Several undergraduates have published high-level scientific research papers as the first authors in top SCI journals, and have won the overall champion of the "Garbage Throwing into the Interests - National Youth Public Welfare Practice Competition". Every year, students have won the national, provincial and school-level college student innovation and entrepreneurship training program projects. The completion of the projects lead to registration of a number of start-up companies, as well as the emergence of students such as Yang Chen (Good young people in Hubei Province), and Lan Jirong (national "China Telecom" scholarship recipients).

The employment rate of graduates is high, with over 42.86% of the 2023 graduates going on to graduate school, and many of them have been admitted to famous domestic universities such as Zhejiang University, Wuhan University, Sun Yat-sen University, Huazhong University of Science and Technology, as well as famous foreign universities such as the University of Manchester of the United Kingdom and Seoul National University of South Korea. The employment rate of graduates is stable at about 84.57%, and the employment is mainly distributed in environmental related companies, design and scientific research institutes and other enterprises, as well as the Environmental Protection Bureau, Hydrological Bureau, Bureau of Land and Resources and other civil servants, institutions and departments, and the quality of the training of the students has been praised by the employers, and has gained a good reputation in the society.

专业简介

环境工程专业

本专业以工程教育认证的标准制定了完善的培养目标、培养方案、毕业要求和课程质量管理体系，以学生为中心，以产出为导向，坚持可持续改进的理念，培养学生解决复杂环境工程问题的能力。为毕业生走向世界提供国际统一的“通行证”。

本专业开设环境工程微生物学、环境监测、环境工程原理、水污染控制工程、大气污染控制工程、物理性污染控制工程、固体废弃物的处理与处置、环境规划与管理、环境影响评价等专业基础理论课程。本专业培养符合国家、区域及少数民族经济和社会发展需要，具备良好的思想品德、人文素养、职业道德和敬业精神，系统掌握环境工程专业基础知识和污染控制工程、资源利用及环境修复等方面的理论与实践技能，具备创新意识和持续学习能力，不断适应行业科学与技术进步，能够从事环境污染控制工程的设计及运营、环境管理、环境监测和水土环境保护及修复技术研发等环境保护事业的高级专门人才，成长为扎根地方尤其是民族地区从事环境保护的骨干人才。本科，学制四年，按环境科学与工程大类招生，招收理科生，毕业时若符合学位授予条件，即授予工学学士学位。

Environmental Engineering Program

The department of Environmental Engineering has customized a complete set of training goals, training plans, graduation requirements, and course quality management system based on the standards of China Engineering Education Accreditation. The philosophy is based on student-centered and output-oriented approaches, and adheres to the concept of sustainable improvement. The goal is to train students to acquire the capability to solve complex environmental engineering problems and to provide graduates with an internationally unified "passport" to the world.

The degree offers fundamental environmental engineering courses (theoretical) such as environmental engineering microbiology, environmental monitoring, environmental engineering principles, water pollution control engineering, air pollution control engineering, physical pollution control engineering, solid waste treatment and disposal, environmental planning and management, and environmental impact assessment. The Environmental Engineering program meets the needs of national, regional, and ethnic minorities' economic and social development, it aims to equip students with good ideological morality, humanistic quality, professional ethics and professionalism. Students should systematically masters the basic knowledge of environmental engineering and pollution control

engineering, resource utilization, and environmental restoration. Students possess theoretical and practical skills, innovative consciousness and continuous learning capabilities and be able to constantly adapt to the scientific and technological progress in the environmental engineering and related industries, and engage in environmental protection undertakings such as the design and operation of environmental pollution control projects, environmental management, environmental monitoring, water and soil environmental protection and restoration technology research and development. The trained students with the above professional talents will grow into the backbone talents who have taken root in local areas, especially in ethnic areas. This undergraduate program adapts a four-year curriculum system. Enrollment is based on the major categories of environmental science and engineering for science oriented students. If they meet the degree-granting conditions upon graduation, they will be awarded a bachelor's degree in engineering.

资源循环科学与工程专业

资源循环科学与工程专业是为解决国民经济发展面临的资源短缺和环境污染两大根本问题，于 2010 年经教育部批准设置的新兴交叉学科专业，2011 年被批准为国家首批战略性新兴产业急需特色本科专业。

本专业本着“宽口径、厚基础、重能力、求创新”的人才培养思路，通过组织多种教学活动，形成小班教学、“导师”引领和实践创新三者有机融合的特色人才培养模式。现开设资源加工过程与装备、化工原理、冶金原理、分离工程、固体废物处置与资源化、清洁生产与循环经济、环境工程学、工程测量学、画法几何&工程制图、程序设计语言（Python）等专业基础理论课程。本专业培养符合国家和区域低碳循环经济产业发展战略需求的，具有“资源-产品-再生资源-产品”的资源开发和循环可持续利用理念，具备一次资源加工、二次资源综合利用、清洁生产与循环经济、资源规划与管理等专业基础知识理论，系统掌握从“资源开发-高效利用-循环再生”各环节实现“环境源头保护”的科学方法，同时兼具实践和创新能力的高级专业人才。本科，学制四年，按环境科学与工程大类招生，招收理科生，毕业时若符合学位授予条件，即授予工学学士学位。

The major of Resources Circulation Science and Engineering is an emerging interdisciplinary major, which was set up by the Ministry of Education in 2010 to solve the two fundamental problems of resource shortage and environmental pollution faced by national economic development. In 2011, this major was further approved as the first batch of specialties urgently needed major for the national strategic emerging industries.

The idea of talent cultivation in this major is "broad-caliber, thick foundation, emphasis on ability, and pursuit of innovation". Through a variety of teaching activities, the major has formed a unique talent

cultivation model with the integration of small class teaching, "mentor" leadership and practical innovation. Fundament Resources Circulation Science and Engineering courses (theoretical) such as Resource Processing and Equipment, Chemical Engineering, Metallurgical Engineering, Separation Engineering, Disposal and Reuse of Solid Waste, Recycling Economy and Clean Production, Environmental Engineering, Engineering Surveying, Descriptive Geometry & Engineering Drawing, Resource Microbiology, Programming language (Python)are offered. This major is designed to cultivate professional talents who meet the strategic needs of national and regional low-carbon circular economy industry development, fulfil the concept of the multi-directional resource development, cycling and sustainable utilization of "resources-products-renewable resources-products", master the professional knowledge of development of natural primary resources, comprehensive utilization of secondary resources, cleaner production and circular economy, and resource recycling planning and management, acquire the ability to solve the science and engineering problems of comprehensive utilization of resources and environmental protection, accomplish the work in the field of resource recycling science and engineering, such as scientific research, engineering technology development, process design, industrial management and management planning, et al. This undergraduate program adapts a four-year curriculum system. Enrollment is based on the major categories of environmental science and engineering for science oriented students. If they meet the degree-granting conditions upon graduation, they will be awarded a bachelor's degree in engineering.

环境科学专业

环境科学是一门研究人类社会发展活动与环境演化规律之间相互作用关系，寻求人类社会与环境协同演化、持续发展途径与方法的学科。

本专业开设环境化学、现代环境分析、环境监测、环境影响评价、环境生态学、环境毒理学、环境微生物学、环境工程学、环境规划与管理等专业课程，注重污染物监测和分析方面的基本训练，培养学生掌握环境监测和环境影响评价的技能。本专业是一门综合研究"人类—环境"系统基本运动规律及其调控的学科，培养掌握环境自然科学、环境技术科学和环境人文社会科学等方面基础知识，具备环境科学的基本理论和基本技能的高级专业人才。学生毕业后，能在政府、企业与事业单位从事环境管理、环境科学研究、环保产品开发、环境监测和环境影响评价、自然资源与自然生态保护和管理规划工作。本科，学制四年，招理科生，毕业时若符合学位授予条件，即授予理学学士学位。

Environmental science is a discipline, seeking the interaction of the development of human society and environmental evolution, and exploring co-evolution of human society and environment as well as

new ways and methods of sustainable development.

The major offers Environmental Chemistry, Modern Environmental Analysis, Environmental Monitoring, Environmental Impact and Assessment, Environmental Ecology, Environmental Toxicology, Environmental Microbiology, Environmental Engineering, Environmental Planning and Management and other fundamental Environmental science courses, focusing on the basic training of pollutant monitoring and analysis, to develop students' skills in environmental monitoring and environmental impact assessment. This major is a comprehensive discipline involving the basic movement laws and regulations of the "human-environment" system, which aims to culture talents with the basic theories and skills of environmental science, mastering the basic knowledge of environmental natural science, environmental technology science and environmental humanity and social sciences. After graduation, students can be engaged in the work of environmental management, environmental scientific research, environmental protection product development, environmental monitoring and environmental impact assessment, natural resources and ecological protection and management planning in government, enterprises and institutions. This undergraduate program adapts a four-year curriculum system. Enrollment is based on the major categories of environmental science and engineering for science oriented students. If they meet the degree-granting conditions upon graduation, they will be awarded a bachelor's degree in science.

水文与水资源工程专业

水文与水资源工程是国民经济基础产业——水利中的重要专业领域之一，是水资源开发利用和管理中的一门重要的工程技术学科。

本专业开设自然地理学、气象学、水力学、水文学原理、水文统计、水文测验、水文预报、水文分析与计算、水利计算、水资源利用、水环境保护、地下水水文学、地理信息系统等课程。本专业培养适应国家经济社会发展需要，德、智、体、美、劳全面发展，具有良好的思想品德、人文素养、职业道德和敬业精神，具备扎实的基础知识，富有创新精神的水文与水资源工程专业高级专门人才。学生毕业后，能够在水利（水务）、国土、能源、交通、城建、农林、环保、地矿等部门从事水文、水资源、水环境及水生态领域的勘测、评价、规划、设计、预测预报、管理和科学研究等方面的工作。本科，学制四年，招理科生，毕业时若符合学位授予条件，即授予工学学士学位。

Hydrology and water resources engineering is one of the important professional fields in water conservancy, which is the basic industry of the national economy, and an important engineering technology discipline in the development, utilization and management of water resources.

This major offers courses in Physical Geography, Meteorology, Hydraulics, Principles of

Hydrology, Hydrological Statistics, Hydrometry, Hydrological Forecasting, Hydrological Analysis and Computation, Water Conservancy Computation, Water Resources Utilization, Protection of Water Environment, Groundwater Hydrology, Geographic Information System and so on. This major is designed to cultivate engineering professionals who meet the needs of economic and social development of the country, region or ethnic minority, have good moral education, humanistic quality, professional ethics and professionalism, solid basic knowledge and innovative spirit. After graduation, students can be engaged in surveying, evaluating, planning, designing, predicting and forecasting, managing and researching in the fields of hydrology, water resources, water environment and hydroecology in the departments of water conservancy (water affairs), land, energy, transportation, urban construction, agriculture and forestry, environmental protection, geology and mineral. This undergraduate program adapts a four-year curriculum system. Enrollment is based on the major categories of environmental science and engineering for science oriented students. If they meet the degree-granting conditions upon graduation, they will be awarded a bachelor's degree in science.

专业大类构成表

Major specialization

大类名称 **Name**	**专业名称** **Major**	**所属专业门类** **Major Categories**	**大类培养时间** **Semester**
环境科学与工程	环境工程	工学-环境科学与工程	第 1 学期至 第 2 学期 Semester 1 to 2
	资源循环科学与工程	工学-化工与制药类	
	环境科学	理学-环境科学与工程	
	水文与水资源工程	工学-水利类	

环境工程专业本科培养方案

Undergraduate Program for Environmental Engineering

一、培养规格

□ Education Standards

I）学制

Length of Schooling

修业年限：4 年

Duration: four-year

II）学位

Degree

授予学位：工学士学位

Degree conferred: Bachelor of Engineering

二、培养目标

□ Education Objectives

本专业培养符合国家、区域经济和社会发展需要，具备良好的思想品德、人文素养、职业道德和敬业精神，系统掌握环境工程专业基础知识和污染控制工程、资源利用及环境修复等方面的理论与实践技能，具备创新意识和持续学习能力，不断适应行业科学与技术进步，能够**从事环境污染控制工程的设计及运营、环境管理、环境监测和水土环境保护及修复技术研发等**环境保护事业的高级专门人才，**成长为扎根地方尤其是民族地区从事环境保护的骨干人才。**

具体培养目标可以归纳为以下四方面内容：

目标1（知识能力）：能够掌握环境工程专业相关技术在民族资源与环境保护中的应用与发展现状，融会贯通工程数理基础知识和环境工程专业知识，针对复杂环境工程项目提供整体解决方案。

目标2（实践能力）：具备系统思维和可持续发展理念，能将知识有效运用到环境污染控制工程的设计及运营、环境管理、环境监测和民族地区水土环境保护及修复技术研发的实践中，并具备一定的创新能力。

目标3（职业素养）：身心健康，具有社会责任感和职业道德修养，拥有团队精神、有效的沟通、表达能力和工程项目管理能力。

目标4（发展潜能）：具备较强的获取知识和综合运用知识的能力，能及时了解环境工程专

业最新理论、技术及国际前沿动态，有效地持续自主学习以适应社会和行业的多样性发展。

This specialty aims to train the talents with complex engineering skills who are in accordance with national, regional or ethnic minority economic and social development needs, who have the good ideology and morality, humanistic quality, professional ethics and professional dedication, who master the basic knowledge and practical skills of environmental engineering systematically, who have the ability to innovate and continue learning, who adapt to the industry science and technology progress constantly, who can bear the environmental engineering projects and environmental protection management and who can solve the problem of complex environmental projects. Graduates can be engaged in the work of environmental management, design, research and development for environmental pollution prevention and control projects in government departments, environmental protection companies, industrial and mining enterprises, scientific research institutes and other units. Meanwhile, the graduates can grow into the backbone talents rooted in local, especially in ethnic areas for environmental protection and achieve the following goals:

Goal 1 (knowledge capability): Able to grasp the development status of technologies in environmental engineering, master the basic knowledge of engineering, mathematics and professional knowledge of environmental engineering and provide integrated solutions for complex environmental engineering projects.

Goal 2 (practical ability): Have the systematic thinking and idea of sustainable development, can effectively apply knowledge to the practice of design, construction and operation management, environmental planning and management as well as the environmental monitoring and assessment and have the innovation ability.

Goal 3 (professional quality): Have correct environmental ethics, noble sense of social responsibility and professional ethics, be able to communicate effectively with team members, industry peers and publics under the context of globalization and be able to coordinate the teams and manage engineering projects.

Goal 4 (potential for development): Have the consciousness of lifelong learning and ability to criticize and reflect, be able to keep abreast of the latest theories, technologies and international cutting-edge developments in environmental engineering and can study independently, effectively and continuously to adapt to the diverse development of society and industry.

三、毕业要求

 Basic Requirements for Graduation

根据我校环境工程专业培养目标的要求，通过人文社会科学课程、工程基础课、专业基础课、专业课的课堂教学、讲座、社会活动、文化活动、各种竞赛、实践、辅导、座谈等教学环

节，使环境工程专业毕业生能力达到如下基本要求：

1.工程知识：能够利用数学、物理、化学等自然科学和工程科学的基本原理及环境工程专业知识来解决环境污染治理工程的设计、运行和管理等复杂环境工程问题。

1.1 能将数学、工程数学的基本知识运用到工程问题的恰当表述之中。

1.2 理解物理、化学等自然科学知识的原理及在识别环境污染问题基本应用。

1.3 能够将工程制图、工程力学、流体力学、环境工程微生物、化工原理等环境工程基础知识应用环境污染治理单元的设计、运行和管理。

1.4 能将水、气、固及物理性污染控制等环境工程专业知识用于环境污染防治工艺的设计、系统的控制和改进中。

2.问题分析：能够利用数学、自然科学和环境工程相关的基础理论和知识以及文献资料对环境污染问题进行识别、表达和分析，以获得有效结论。

2.1 能够运用数学、自然科学和环境工程的基本原理和专业知识，识别和判断复杂环境工程问题的关键点和参数。

2.2 能通过数学、自然科学和环境工程专业的概念、原理、方法，分析环境污染防治工程的关键环节和参数，并给予表述。

2.3 能够运用环境工程相关的基础理论和知识结合文献分析环境污染防治过程的影响因素及采用相关技术，并获得有效结论。

3.设计/开发解决方案：能够应用水污染控制、大气污染控制及固体废物处理处置与资源化、土壤及地下水修复的基本原理和方法开发、设计满足环境防治要求的污染治理工艺流程与处理单元，并能够在设计中体现创新意识，综合考虑社会、健康、安全、法律文化及环境等因素。

3.1 能够根据环境污染的特征和防治要求提出复杂环境工程问题的解决方案。

3.2 能够对所提技术方案及工艺流程的可行性进行初步分析与论证。

3.3 能够进行污染治理工艺系统及处理单元的设计，并在设计中综合考虑社会、健康、安全、法律、文化等因素，且体现创新意识，进而优化设计方案。

4.研究：能够基于科学原理并采用科学方法，开展试验研究，预测、分析环境污染防治技术和工程中的问题，为解决环境污染防治实践中的复杂工程问题提供合理有效的结论；

4.1 掌握现代分析方法，能够识别复杂工程问题中的各种制约条件，分析研究对象的基本特征；

4.2 能够基于环境工程专业理论，根据环境污染对象特征，选择合适的研究路线、设计可行的研究方案；

4.3 能正确采集、整理研究数据，对研究结果进行关联、分析处理，获取合理有效的结论。

5.现代工具的使用：能够针对复杂环境工程问题，开发、选择与使用恰当的环境工程专业领域相关的计算机辅助设计、计算机模拟仿真等技术、资源和工具，熟练使用现代分析检测仪器，具备预测、模拟及优化环境污染防治实践中的复杂工程问题的能力，并能够理解其局限性；

5.1 能够基于复杂环境工程问题的技术背景，选择、使用和开发恰当的计算机语言程序、

计算机辅助设计软件等现代工具；

5.2 能够运用环境工程仿真软件和现代分析检测仪器，预测、模拟和评价复杂环境工程问题，明确各种方法的局限性。

5.3 掌握专业工具，能够进行环境污染防治实践中复杂环境工程问题的工程设计和实施，能理解其局限性。

6.工程与社会：能基于环境工程相关背景知识，在解决复杂工程问题的同时，分析和评价设计方案对社会、健康、安全、法律及文化的影响，并理解其承担的责任；

6.1 熟悉环境工程领域相关的技术规范、法律法规和民族区域政策，能客观评价环境污染防治过程对社会、健康、安全、法律以及文化的影响，能理解环境污染防治过程中应承担的责任；

6.2 具有环境工程实习和实践经历，有较强的工程和社会意识。

7.环境和可持续发展：能够理解和评价环境污染防治工程实践对环境、社会可持续发展的影响；

7.1 理解环境保护和社会可持续发展的内涵和意义，熟悉环境保护的相关政策和法律法规；

7.2 能针对实际的环境污染防治工程项目中的生产、运行和维护相关环节中正确理解并评价工程实践对环境、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，能够在环境工程实践中理解并遵守工程职业道德和规范，履行责任；

8.1 具有科学的世界观、正确的人生观、价值观和爱国精神，具有人文社会科学素养和社会责任感；

8.2 理解工程伦理的核心理念，熟悉环保工程师的职业性质和责任，在工程实践中能自觉遵守职业道德和规范，履行责任。

9.个人和团队：具有在科学研究、工程设计与实践的多学科背景团队中团结互助的合作精神、一定的组织管理协调能力及在工作中对不同角色的适应能力；

9.1 能在多学科背景下的团队合作中承担自己的角色，听取不同意见，具有一定组织管理能力，能够综合团队成员的建议，并进行合理决策；

9.2 具有较强的团队协作和人际交往能力，能同其他成员进行有效交流，并妥善处理组织内外关系。

10.沟通：具备良好的文字及语言表达能力、辩论能力、倾听能力、外语应用能力，并能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。注重与民众的沟通，尤其是在民族地区民汉之间的顺畅沟通与交流，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；

10.1 具备良好的文字及语言表达能力、辩论能力、倾听能力；

10.2 能够通过口头或者图纸、报告等书面形式表达自己的想法和见解，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；

10.3 能够运用外语了解环境工程专业及相关领域的国际发展动态，能够在跨文化背景下进行沟通和交流。

11.项目管理：能够理解和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；

11.1 理解和掌握环境工程实践活动中涉及的工程管理原理与经济决策方法；

11.2 能够在多学科环境中应用工程管理的原理和经济决策的方法。

12.终身学习：具有自主学习和终身学习的意识，有不断学习、自我提高和适应发展的能力；

12.1 能认识不断探索和学习的必要性，具有自主学习和终身学习的意识；

12.2 掌握自主学习的方法和拓展知识、提高能力的途径，具备为适应发展而自我提高的能力。

According to the requirements in the education of environmental engineering specialty at our university, graduates reach the basic requirements through the study of humanistic and social science, basic engineering, professional basic and professional courses as well as through lectures, social activities, culture activities, competitions, practices, lessons and discussions. Requirement breakdowns are listed as follow:

1) Engineering Knowledge: Be able to use the rationales of natural science and engineering science such as mathematics, physics and chemistry as well as professional knowledge of environmental engineering to solve the complex problems of environmental engineering such as the design, operation and management of treatment for environmental pollutions;

1.1 Be able to use the fundamental knowledge of mathematics and engineering mathematics in the expression of engineering problems;

1.2 Understand the rationales of natural science such as physics and chemistry as well as its fundamental applications to recognize problems of environmental pollution;

1.3 Be able to apply the fundamental knowledge of lessons in environmental engineering specialty such as the engineering drawing, engineering mechanics, fluid mechanics, environmental engineering microbiology and principles of chemical engineering into the design of environmental pollution control units;

1.4 Be able to use the professional knowledge of water, air, solid and physical contamination control in design, systematic control and improvement.

2) Problem Analysis: Be able to apply the rationales, knowledge and references of mathematics, natural science and environmental engineering to recognize, explain and analyze for requiring effective conclusions;

2.1 Be able to use the rationales and professional knowledge of mathematics, natural science and environmental engineering to recognize complex problems of environmental engineering;

2.2 Be able to use the concepts, rationales and methods of mathematics, natural science and

environmental engineering to analyze and explain the key links and parameters of environmental pollution prevention and control projects;

2.3 Be able to use the basic theory and knowledge of environmental engineering as well as references to analyze the factors and related technologies in the process of environmental pollution prevention and make effective conclusions.

3) Designing/developing solutions: Be able to use the rationales and methods of water pollution control, air pollution control as well as treatment, disposal and recycling of solid waste to develop and design the technological process and treatment units;

3.1 Be able to put forward solutions of complex problems of environmental engineering according to characterizations and prevention requirements of environmental pollution;

3.2 Familiarize and grasp the technical standards, intellectual properties as well as policies and regulations of industry and can do feasibility studies to designing schemes through techno-economic appraisal under the constraint condition of reality;

3.3 Be able to design the technology system of pollution control and treatment units, take the factors of society, health, security, law and culture into the design, reflect the sense of innovation and then optimize the design scheme.

4) Research: Be able to use the scientific methods and treatments based on principles of environmental engineering to forecast and analyze the problems in technologies of environmental pollution treatments and engineering and provide proper conclusion for solving the complex engineering problems in the practices of environmental pollution treatments;

4.1 Grasp modern analytical method, can recognize the constraint conditions in the complex engineering problems and analyze the basic characterizations of research objects;

4.2 Be able to choose proper research routes and design feasible research projects based on professional theories of environmental engineering as well as the characterizations of polluted objects;

4.3 Be able to collect and clear up the research data correctly, analyze and deal with the research results and obtain the proper conclusions.

5) Usage of modern tools: Be able to develop, choose and use correct technologies and tools of computer aided design in the area of environmental engineering, expertly use modern analytical instruments and able to forecast, simulate and optimize complex engineering problems in the practices of environmental pollution prevention;

5.1 Be able to choose, use and develop correct modern tools such as the computer language programs and software of computer aided design;

5.2 Be able to use modern analytical instruments, forecast, simulate and evaluate complex engineering problems, and make clear the boundedness of methods.

6) Engineering and society: Be able to solve complex engineering problems based on background

knowledge of environmental engineering while simultaneously analyze and evaluate the influences of designing project to society, health, safety, law and culture and understand the responsibility;

6.1 Have practice experiences of environmental engineering and senses of engineering and society;

6.2 Be familiar with the relevant technical regulations, laws and ethnic regional policies in the area of environmental engineering, be able to evaluate the influences to society, health, security, law and culture in the process of prevention for environmental pollutions, and understand the responsibilities in the process of prevention for environmental pollutions.

7) Environment and sustainable development: Be able to understand and evaluate the influences of engineering practices of environmental pollutions prevention to the sustainable progress of environment and society;

7.1 Understand the connotation and meaning of environmental protection and sustainable development of society and know the relevant policies and laws of environmental protection well;

7.2 Be able to correctly understand and evaluate the impacts of engineering practices on sustainable development of environment and society in the process of production, operation and maintenance for environmental pollution prevention and control project.

8) Professional norms: have the literacy of humanity and social science as well as responsibility for society, be able to understand and comply with the professional ethics and regulations in projects and fulfill the duty;

8.1 Have the scientific world outlook, correct view of life, values and patriotism and have the literacy of humanity and social science as well as responsibility for society;

8.2 understand the core idea of engineering ethics, be familiar with the profession and responsibility of environmental engineer, can comply with the professional ethics and regulations in projects and fulfill the duty.

9) Individuals and teams: have the team spirit in the multi-disciplinary teams of science research, engineering design and practices, ability for organization, management and coordination as well as the adaptive capacities for different roles in the work;

9.1 Be able to undertake the roles in the multi-disciplinary teams, Listen to different opinions, have certain ability of organization and management, able to sum up the conclusions of team members and make a proper decision;

9.2 Have strong team work and interpersonal skills, can communicate with other members effectively and properly deal with internal and external relationships of the organization.

10) Communication: have great writing and communicating skills, debate competences, listening skills, application ability for language, be able to effectively communicate with industry peers and publics for complex engineering problems, have a certain international vision and able to communicate in a cross-cultural context;

10.1 Have good abilities for writing, communicating and listening;

10.2 Be able to express ideas and opinions orally or in writing and effectively communicate with industry peers and publics for complex engineering problems;

10.3 Be able to study the international developments of environmental engineering and relevant areas and can have a communication in a cross-cultural context.

11) Project management: able to understand and grasp the principles of engineering management and methods of economic decision and apply the professional knowledge of environmental engineering into the design, operation and management of projects for prevention of environmental pollutions;

11.1 Understand and grasp the principles of engineering management and methods of economic decision in the practices of environmental projects;

11.2 Be able to apply the principles of engineering management and methods of economic decision to the design, operation and management of projects for prevention of environmental pollutions.

12) Lifelong learning: have the sense of independent study and lifelong learning as well as the ability for self-improvement and adaptive development;

12.1 Be able to realize the necessity of continuous discovery and study as well as the senses of independent study and lifelong learning;

12.2 Grasp the methods of independent study and pathway to expand knowledge and improve ability as well as the ability for self-improvement.

四、毕业要求与培养目标对应矩阵

□ Matrices of Graduation Requirements and Education Objectives

本专业的毕业要求能够实现对本专业培养目标的完全支撑，具体的支撑关系矩阵如表 2 所示。

表 2 毕业要求对培养目标的支撑

毕业要求 培养目标	（1）工程知识	（2）问题分析	（3）设计/开发解决方案	（4）研究	（5）使用现代工具	（6）工程与社会	（7）环境和可持续发展	（8）职业规范	（9）个人和团队	（10）沟通	（11）项目管理	（12）终身学习	支撑关系分析说明
培养目标 1	√	√	√	√	√						√		**毕业要求 1** 关于能够将工程和专业基础知识运用到解决复杂环境工程问题；**毕业要求 2** 能够利用数学、自然科学和环境工程相关的基础理论和知识以及文献资料对环境污染问题进行识别、表达和分析，以获得有效结论；**毕业要求 3** 能够应用水污染控制、大气污染控制及固体废物处理处置与资源化的基本原理和方法开发、设计满足环境防治要求的污染治理工艺流程与处理单元，设计中要充分考虑社会、健康、安全、法律文化及环境等因素；**毕业要求 4** 能够基于环境工程原理并采用科学方法，开展试验研究，预测、分析环境污染防治技术和工程中的问题；**毕业要求 5** 能够针对复杂环境工程问题，开发、选择与使用恰当得环境工程领域相关的计算机辅助设计等技术和工具，熟练使用现代分析检测仪器；**毕业要求 11** 理解和掌握环境工程实践活动中涉及的工程管理原理与经济决策方法。
培养目标 2	√	√	√	√	√	√							**毕业要求 1** 具有利用自然科学和工程科学的基本原理及环境工程专业知识来解决环境污染治理工程的设计、运行和管理等复杂环境工程问题；**毕业要求 2** 能够利用数学、自然科学和环境工程相关的基础理论和知识以及文献资料对环境污染问题进行识别、表达和分析；**毕业要求 3** 能够进行污染治理工艺系统及处理单元的设计，并在设计中综合考虑社会、健康、安全、法律、文化等因素，且体现创新意识，进而优化设计方案；**毕业要求 4** 能够基于环境工程原理并采用科学方法，开展试验研究；**毕业要求 5** 能够使用现代分析检测仪器，预测、模拟和评价复杂环境工程问题；**毕业要求 6** 具有环境工程实习和实践经历，有较强的工程和社会意识。
培养目标 3						√	√	√	√	√	√		**毕业要求 6** 能客观评价环境污染防治过程对社会、健康、安全、法律以及文化的影响，能理解应承担的责任；**毕业要求 7** 能够理解和评价环境污染防治工程实践对环境、社会可持续发展的影响；**毕业要求 8** 能够在环境工程实践中理解并遵守工程职业道德和规范，履行责任；**毕业要求 9** 具有在科学研究、工程设计与实践的多学科背景团队中团结互助的合作精神、一定的组织管理协调能力及在工作中对不同角色的适应能力；**毕业要求 10** 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，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。**毕业要求 11** 能够将工程管理的原理和经济决策的方法用于环境污染防治工程项目的设计、施工及管理中。
培养目标 4												√	**毕业要求 12** 关于学生能够认识不断探索和学习的必要性，具有自主学习和终身学习的意识；掌握自主学习的方法，不断学习和适应社会发展。

五、毕业要求实现矩阵

□ Matrices of relations of courses and Graduation Requirements

表 3 课程体系与毕业要求关联度矩阵

毕业要求	一级	1)工程知识				2）问题分析			3）设计/开发解决方案			4）研究			5）现代工具使用			6）工程与社会		7）环境和可持续发展		8）职业规范		9）个人和团队		10）沟通			11）项目管理		12）终身学习	
	二级	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	10.3	11.1	11.2	12.1	12.2
思想道德与法治																						H										
中华民族共同体概论																			H									H				
其他通识类课程																						H									H	
就业指导																						M			H							
英语																												H				
语言程序设计															H																	
分析化学			H				H																									
分析化学实验												H																				
无机化学			M			H																										
无机化学实验												H																				
有机化学			M			H																										
有机化学实验												H																				
物理化学			H			H																										
物理化学实验												H																				

毕业要求	一级	1)工程知识				2）问题分析			3）设计/开发解决方案			4）研究			5）现代工具使用			6）工程与社会		7）环境和可持续发展		8）职业规范		9）个人和团队		10）沟通			11）项目管理		12）终身学习	
	二级	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	10.3	11.1	11.2	12.1	12.2
现代环境分析			H				H																									
现代环境分析实验												H				H															
大学物理			H																													
大学物理实验												H																				
高等数学	H																															
线性代数	M																															
概率论与数理统计	M																															
画法几何&工程制图			H												L																	
工程测量学			H		M																											
工程测量学实习					M																				H							
环境工程 CAD			M												H																	
环境工程微生物学			H		H																											
环境工程微生物学实验												H	L																			
流体力学			H				M																									

毕业要求	一级	1)工程知识				2）问题分析			3）设计/开发解决方案			4）研究			5）现代工具使用			6）工程与社会		7）环境和可持续发展		8）职业规范		9）个人和团队		10）沟通			11）项目管理		12）终身学习	
	二级	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	10.3	11.1	11.2	12.1	12.2
流体力学实验												H		L																		
工程力学				H			L																									
电子电工学				H																												
电子电工学实验				M																												
土建工程基础							H																M									
工程项目管理																								M					H	H		
环境保护法规											H									H												
环境监测						H	M						M																			
环境监测实验												H				H																
环境工程原理				H			H																									
大气污染控制工程					H			H	H																							
物理性污染控制工程					H			M	M																							
水污染控制工程（A1）					H																								H	H		
水污染控制工程（A2）					H			H	H																							
环境工程概预算																			L											H		

毕业要求	一级	1)工程知识				2）问题分析			3）设计/开发解决方案			4）研究			5）现代工具使用			6）工程与社会		7）环境和可持续发展		8）职业规范		9）个人和团队		10）沟通			11）项目管理		12）终身学习	
	二级	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	10.3	11.1	11.2	12.1	12.2
固体废物处理与处置					H			H	H																							
大气污染控制工程实验													M	H																		
水污染控制工程实验													H	H																		
固体废物处理与处置实验													M	H																		
环境工程原理实验												H				H																
环境工程综合实验																								H							M	H
大气污染控制工程课程设计										H																H						
水污染控制工程课程设计										H																H				H		
环境工程原理课程设计										H																H						
固体废物处理与处置课程设计										H																H			M			

毕业要求	一级	1)工程知识				2）问题分析			3）设计/开发解决方案			4）研究			5）现代工具使用			6）工程与社会		7）环境和可持续发展		8）职业规范		9）个人和团队		10）沟通			11）项目管理		12）终身学习	
	二级	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	10.3	11.1	11.2	12.1	12.2
环境规划与管理										H									H	H												
环境工程专业英语																												H				M
土壤及地下水污染修复					H			L	L																							
环境工程设备											H																					
废水处理工程设计											H																H					
环境影响评价																			H		H											
军事理论与训练																									H							
工程训练																	H															
认识实习																		H									M					
生产实习																		H			H		H				H					
毕业实习																					H		H				H					H
毕业设计（论文）											H		H	H										H		H		H				H
	说明：1）课程与毕业要求的关联度的高低分别用“H(强)”、“M(中)”、“L(弱)”表示。																															

六、核心课程

□ Core Courses

环境工程微生物学 Microbiology of Environmental Engineering、环境监测（B）Environmental Monitoring（B）、环境工程原理 Environmental Engineering Principle、物理性污染控制工程 Physical Pollution Control Engineering、大气污染控制工程 Air Pollution Control Engineering、水污染控制工程（A1）Water Pollution Control Project (A1)、环境规划与管理 Environmental Planning and Management、水污染控制工程（A2）Water Pollution Control Project (A2)、固体废物处理与处置 Solid Waste Treatment and Disposal、环境影响评价 Environmental Impact Assessment、土壤及地下水污染修复 Remediation of Soil and Groundwater Pollution.

七、主要实践性教学环节

□ Main Internship and Practical Training

环境工程原理实验 Principle Experiments of Environmental Engineering、环境监测实验 Experiments of Environmental Monitoring、环境工程微生物学实验 Experiments of Environmental Engineering Microbiology、水污染控制工程实验 Experiments of Water Pollution Control Engineering、固体废物处理与处置实验 Experiments of Solid Waste Treatment and Disposal、环境工程综合实验 Comprehensive Experiments of Environmental Engineering、环境工程原理课程设计 Course Design of Environmental Engineering Principles、大气污染控制工程课程设计 Course Design of Air Pollution Control Engineering、水污染控制工程课程设计 Course Design of Water Pollution Control Engineering、固体废物处理与处置课程设计 Course Design of Treatment and Disposal of Solid Wastes、工程测量学实习 Engineering Surveying Practice、工程训练 Metalworking Practice、认识实习 Cognition Practice、生产实习 Production Practice、毕业实习 Graduation Practice、毕业设计（论文）Graduation Design (Thesis).

八、学时与学分

□ Hours/Credits

学时学分构成表

Table of Hours and Credits

<table>
<tr><th colspan="3" rowspan="2">课程类别
Courses Classified</th><th rowspan="2">学时/周数
Period/Weeks</th><th colspan="2">学分
Credits</th><th rowspan="2">学分比例
Proportion of Credits</th></tr>
<tr><th>理论
Theory</th><th>实践（双创）
Practice
（I&E Crs.）</th></tr>
<tr><td colspan="2" rowspan="2">通识课程平台
General Courses Platform</td><td>必修
Compulsory</td><td>578</td><td>28</td><td>3</td><td>18.24%</td></tr>
<tr><td>选修
Elective</td><td>144</td><td>9</td><td>/</td><td>5.29%</td></tr>
<tr><td colspan="2">学科基础课程平台 Basic Courses Platform</td><td>必修
Compulsory</td><td>1080</td><td>47</td><td>10</td><td>33.53%</td></tr>
<tr><td colspan="2" rowspan="2">专业课程平台
Major Courses Platform</td><td>必修
Compulsory</td><td>616</td><td>26.5</td><td>6</td><td>19.12%</td></tr>
<tr><td>选修
Elective</td><td>96</td><td>6</td><td></td><td>3.53%</td></tr>
<tr><td colspan="2" rowspan="2">集中性实践课程平台
Practical Teaching Platform</td><td>必修
Compulsory</td><td></td><td></td><td>24.5</td><td rowspan="2">14.41%</td></tr>
<tr><td>选修
Elective</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">素质拓展平台
Quality Development Platform</td><td>双创学分
Innovation & Entrepreneurship Credits</td><td rowspan="2">必修
Compulsory</td><td></td><td></td><td>5</td><td>2.94%</td></tr>
<tr><td>其他学分
Other Credits</td><td>92</td><td>4</td><td>1</td><td>2.94%</td></tr>
<tr><td rowspan="2">小计
Amount</td><td colspan="2">必修学分总数
Compulsory Credits</td><td>155</td><td>选修学分总数
Elective Credits</td><td>15</td><td>选修学分比例
Proportion of Elective Credits</td><td>8.8%</td></tr>
<tr><td colspan="2">理论学分总数
Theory Credits</td><td>120.5</td><td>实践学分总数
Practice Credits</td><td>44.5</td><td>实践教学环节比例
Proportion of Internship and Practical Training</td><td>26.17%</td></tr>
<tr><td colspan="3">最低毕业学分
The Lowest Graduate Credits</td><td colspan="5">170</td></tr>
</table>

注：

①学分比例：各教学平台或教学环节占最低毕业学分的比例。

□实践教学环节，包括集中性实践教学环节和实验教学（不含体育）。集中性实践教学环节，包括培养方案内集中实施的实践、实习、课程设计、毕业设计、毕业论文、社会调查等；实验教学，包括课内实验和独立开设实验。

□必修学分总数=通必学分+学科基础学分+专必学分+实践必修学分+素质拓展学分；

选修学分总数=通选学分+专选学分+实践（选修）学分；

理论学分总数=所有平台理论学分之和（不包括双创学分）；

实践学分总数=所有平台实践学分之和（不包括双创学分）；

最低毕业学分=必修学分+选修学分=理论学分+实践学分+双创学分。

九、教学进程计划表 /□ Teaching Schedule Form

表一：通识课程平台 / Form □: General Course Platform

表一（A）：通识必修课程/Form I (A):General Compulsory Courses (General Required)

课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
20W100000613	英语 1 English 1	2	32	32				1
218110000313	体育 1 Physical Education 1	0/1	26			26		1
217100014918	思想道德与法治 Moral Education and Rule of Law	2.5/0.5	52	40		12		2
217100015218	形势与政策 Situation and Policy	2	32	32				2
225100000118	中华民族共同体概论 Education of Chinese Minzu Community Consciousness	1.5/ 0.5	36	24		12		2
20W100000713	英语 2 English 2	2	32	32				2
218110000213	体育 2 Physical Education 2	0/1	32			32		2
2171000122	中国近现代史纲要 Essentials of China Modern and Contemporary History	2.5/ 0.5	52	40		12		3
20W100000813	英语 3 English 3	2	32	32				3
218110015018	体育 3 Physical Education 3	0/0.5	16			16		3
217100012318	马克思主义基本原理 The Basic Principles of Maxism	2.5/0.5	52	40		12		4
217100015818	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 Socialist Theoretical System with Chinese Characteristics	2.5/0.5	52	40		12		5
217100015918	习近平新时代中国特色社会主义思想概论 Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	2.5/0.5	52	40		12		5
20W100000913	英语 4 English 4	2	32	32				4
218110014718	体育 4 Physical Education 4	0/0.5	16			16		4
218110014018	体育 5 Physical Education 3	0/0.5	16			16		5

218110015318	体育 6 Physical Education 3	0/0.5	16			16		6
学分要求：必修学分 31 Demand of Credits: Required 31								

注：大学英语扩展课程包括□20W100000813 英语 3□20W100000913 英语 4□20W100001018 学术英语阅读与写作□20W100001318 高级媒体英语视听说□20W100001518 英语国家社会与文化□20W100001618 中华文化导论（英文），要求在第 3、4 学期完成 4 学分即可。

表一（B）：通识选修课程（通选课）/Form I (B): General Elective Courses

模块 Module	**学分 Crs.**
心理健康与安全 Psychological Health and Safety	2
人文素养与写作 Humanistic Accomplishment and Writing	2
科学技术与科普 Science and Technology & Science Popularization	2
艺术体验与审美 Art Appreciation and Aesthetics	1
国际视野与世界 Contemporary China and the World	1
中华文化与文明 Chinese Culture and Civilization	1
学分要求：选修学分 9 Demand of Credits: Elective 9	

表二：学科基础课程平台

Form II. Basic Course Platform

课程类别 Course Classi-fied	课程编号 Courses Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
学科基础必修 Basic Courses Required	213100035618	无机化学（B）Z Inorganic Chemistry	3	48	48				1	
	213110035818	无机化学实验（C） Inorganic Chemistry Experiments	/0.5	16		16			1	
	2101000113	高等数学 A(1) Higher Mathematics A (1)	4	80	64			16	1	
	2101000118	线性代数 Linear Algebra	2	48	32			16	1	
	213103005213	分析化学(B) Analytical Chemistry (B)	2	32	32				1	
	213110036418	分析化学实验（B） Analytical Chemistry Experiments	1	32		32			1	
	210102000413	高等数学 A(2) Higher Mathematics A (2)	5	96	80			16	2	
	211100011118	大学物理 B(1) College Physics B (1)	3	56	48			8	2	
	211110021318	大学物理实验(1) University Physics (1) Experiments	0.5	16		16			2	
	2241000067	工程测量学 Engineering Surveying	2	32	32				2	
	2101000112	概率论与数理统计 Probability Theory and Mathematical Statistics	2.5	56	40			16	3	
	211100011218	大学物理 B（2）	2.0	40	32			8	3	
	211110022818	大学物理实验（2）	0.5	16		16			3	
	213100047518	有机化学(D) Organic Chemistry(D)	2	32	32				3	
	213110036118	有机化学实验(B) Organic Chemistry Experiments (B)	1	32		32			3	
	213100047118	物理化学(C) Physical chemistry (C)	2.5	40	40				3	

课程类别 Course Classi-fied	课程编号 Courses Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	213110034618	物理化学实验 Physical Chemistry Experiments	1	32		32			3	
	224100000913	画法几何&工程制图 Descriptive Geometry & Engineering Drawing	2	32	32				3	
	212100018318	电子电工学 Electronic Engineering	2.0	32	32				3	
	2241100071	电子电工学实验 Electronics and Electrotechnics Experiments	0.5	16		16			3	
	209100030818	程序设计语言（Python）□ Python Language Programming □	1/1	48	16		32		3	
	2241000073	现代环境分析 Modern Environmental analysis	2	32	32				4	
	2241100074	现代环境分析实验 Modern Environmental Analysis Experiments	1	32		32			4	
	213103016813	流体力学 Fluid Mechanics	3.0	48	48				4	
	213113016913	流体力学实验 Experiments of Fluid Mechanics	0.5	16		16			4	
	2241000133	环境工程微生物学 Microbiology of Environmental Engineering	2	32	32				4	
	2241100132	环境工程微生物学实验 Environmental Engineering Microbiology Experiments	0.5	16		16			4	
	224100021518	工程力学 Engineering Mechanics	2.0	32	32				4	
	224100025218	土建工程基础 Foundation of Civil Engineering	1.5	24	24				4	

课程类别 Course Classi-fied	课程编号 Courses Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	224110023218	环境工程 CAD 实验 Environmental Engineering CAD	2.0	64		64			5	
	213103012113	工程项目管理 Project Management	1.5	24	24				5	
学分要求：必修学分 57 Demand of Credits:Required 57										

表三：专业课程平台

Form III: Major Courses Platform

课程类别 Course Classi-fied	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业必修 Required Courses	213103017113	环境工程原理 Environmental Engineering Principle	4	64	64				5	
	213113016213	环境工程原理实验 Principle Experiments of Environmental Engineering	1	32		32			5	
	213103011313	大气污染控制工程 Air Pollution Control Engineering	3	48	48				5	
	2241100127	大气污染控制工程实验 Experiments of Air Pollution Control Engineering	0.5	16		16			5	
	213103021513	环境监测（B） Environmental Monitoring (B)	2	32	32				5	
	213113023813	环境监测实验（B） Environmental Monitoring Experiments (B)	1	32		32			5	
	2241000124	物理性污染控制工程 Physical Pollution Control Engineering	2	32	32				5	
	224100023018	环境规划与管理 Environmental Planning and Management	1.5	24	24				5	
	224100021618	水污染控制工程（A1） Water Pollution Control Project (A1)	1.5	24	24				5	
	213103018613	水污染控制工程（A2） Water Pollution Control Project (A2)	3.5	56	56				6	
	214113019613	水污染控制工程实验 Water Pollution Control Engineering Experiments	1	32		32			6	
	224100021818	废水处理工程设计 Wastewater Treatment Engineering Design	1.5	24	24				6	
	224100021918	环境工程设备 Environmental Engineering Equipment	1.5	24	24				6	

课程类别 Course Classi-fied	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	224100022318	环境影响评价 Environmental Impact Assessment	1.5	24	24				6	
	2241000137	固体废物处理与处置 Solid Waste Treatment and Disposal	2.5	40	40				6	
	2241100136	固体废物处理与处置实验 Solid Waste Treatment and Disposal Experiments	0.5	16		16			6	
	213113018513	环境工程综合实验 Comprehensive Experiments of Environmental Engineering	2	64		64			6	
	2241000077	土壤及地下水污染修复 Remediation of Soil and Groundwater Pollution	2	32	32				6	
专业选修 Elective courses	2241000075	环境工程专业英语 English for Environmental Engineering	1.5	24	24				6（限选）	至少修读 6.0 学分，第 4 学期修 1.5 学分
	224100024718	土壤学 pedology	1.5	24	24				3	
	224100022718	环境保护法规 Environmental Protection Regulations	1.5	24	24				4（限选）	
	2241000131	环境工程概预算 Budget Estimates For Environmental Engineering	1.5	24	24				6（限选）	
	224100024218	清洁生产 Cleaner Production	1.5	24	24				6	
	213103018913	污染控制微生物工程 Microbial Engineering for Pollution Control	1.5	24	24				6	
	213103023613	高级氧化技术 Advanced oxidation technology	1.5	24	24				6	
	213103020613	给排水与环境工程施工 Water Supply and Drainage and Environmental Engineering Construction	1.5	24	24				7	
	213103021013	给水处理 Treatment of Water Supply	1.5	24	24				7	
	213103014513	水化学（B） Hydrochemistry	1.5	24	24				7	

课程类别 Course Classi-fied	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	213103021413	生态水文学 Ecohydrology	1.5	24	24				7	
	224100017418	环境生态学（B） Environmental Ecology (B)	1.5	24	24				7	
	213103008413	GIS 与环境模型 GIS and Environmental Modelling	1.5	24	24				7	
	224100022118	文献检索及科技论文写作 Document Retrieval and Scientific Paper Writing	0.5/0.5	24	8	16			7	
学分要求：学分: 38.5 其中必修 32.5 学分，选修 6.0 学分 Demand of Credits:Credits: 38.5 Required: 32.5 Elective: 6.0										

表四：集中性实践课程平台

Form IV: Practical Teaching Platform

课程类别 CourseClassified			课程编号 CourseCode	实践教学名称 Course Names	学分 Crs.	周数/学时数 Total Period/Hrs.	学时类型 PeriodClassified		开课学期 Semester
							实践 Exp.	实习 Pra.	
实践 Practice	实践 Teaching Practice	必修 Compulsory Courses	112110010718	劳动教育 Labor Education	1	32	√		1
			109110000318	军事技能训练 Military Skill Training	2	36	√		1
	课程设计 Project Design	必修 Compulsory Course	224110018718	环境工程原理课程设计 Course Design of Environmental Engineering Principles	1	1W	√		5
			224110018618	大气污染控制工程课程设计 Course Design of Air Pollution Control Engineering	1	1W	√		5
			224110019018	固体废物处理与处置课程设计 Course Design of Treatment and Disposal of Solid Wastes	1	1W	√		6
			224110019318	水污染控制工程课程设计 Course Design of Water Pollution Control Engineering	1	1W	√		6
	小计 Amount		7						
实习 internship	专业实习 Course internship	必修 Compulsory Course	2241100080	工程测量学实习 Engineering Surveying Practice	0.5	0.5W		√	2
			701110000418	工程训练 D Engineering Training	2	2W		√	5
			224110006213	认识实习 Cognition Practice	1	1W		√	4
			224110019218	生产实习 Production Practice	2	2W			7
		选修 Elective Courses							
	毕业实习 Graduation Practice		2241100134	毕业实习 Graduation Practice	2	2W			8

课程类别 CourseClassified			课程编号 CourseCode	实践教学名称 Course Names	学分 Crs.	周数/学时数 Total Period/Hrs.	学时类型 PeriodClassified		开课学期 Semester
							实践 Exp.	实习 Pra.	
	毕业论文（设计） Graduation Thesis (Project)	必修 Compulsory Course	224110000113	毕业论文（设计） Graduation Project（Thesis）	10	10W			8
	小计 Amount								
学分要求: 24.5，其中必修学分 24.5，选修学分 0 Demand of Credits: 24.5, Required24.5, Elective 0									

表五：素质拓展平台

Form V: Quality Development Platform

课程编号 Course Code	课程/模块名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
109100000418	军事理论 Military Theory	2	36	36				1
109100000818	国家安全教育 National Security Education	1	16	16				2
	艺术实践	0/1	24			24		1-7
115100000113	就业指导 Employment Guidance	1	16	16				6
/	创新教育 Innovation Education	3	/					
/	创业教育 Entrepreneurship Education	2	/					
学分要求：必修学分 10 **Demand of Credits: Required 10**								

资源循环科学与工程专业本科培养方案

Undergraduate Program for Resources Circulation Science and Engineering

一、培养规格

□ Education Standards

I）学制

Length of Schooling

修业年限：四年

Duration: 4 years

II）学位

Degree

授予学位：工学学士学位

Degrees conferred: Bachelor of Engineering

二、培养目标

II Cultivation Objectives

本专业旨在培养具有扎实的资源循环科学与工程的理论和实践基础，具备“资源-产品-再生资源-产品”的多向式资源开发和循环可持续利用理念，掌握一次资源开发、二次资源综合利用、清洁生产与循环经济、资源循环规划与管理等专业基础知识体系，具有解决资源综合利用和环境保护的科学与工程的能力，能在资源循环科学与工程领域从事科学研究、工程技术开发、工艺设计、产业经营和管理规划等工作的跨学科高级工程技术及管理人才。毕业生能在政府部门、规划管理部门、环保部门、设计单位、化工企业、冶金企业、环保企业、工矿企业、科研院所和学校等，从事资源循环科学与工程领域管理、规划、设计、工程建设、产业经营、制造、研发和教育等工作，也可以选择国内外相近学科的科研机构或高校继续深造。具体需达到以下目标：

目标 1（知识能力）：能够掌握资源循环科学与工程专业相关技术发展现状，融会贯通工程数理基础知识和资源循环科学与工程专业知识，具备独立发现、研究与解决复杂工程问题的能力。

目标 2（实践能力）：具备系统思维和可持续发展理念，能将知识有效运用到一次资源开发、二次资源综合利用、清洁生产与循环经济、资源循环规划与管理等相关工程实践中，并具备一定的创新能力。

目标 3（职业素养）：具备家国情怀、高尚的职业道德、社会责任感和良好的人文科学素养，具有与主管部门、业界同行、相关专业的配合和协调能力，具有一定的国际视野和文化交流能力。

目标 4（发展潜能）：具有终身学习的能力，具有一定的批判性思维能力，能及时了解资源循环科学与工程专业最新理论、技术及国际前沿动态，有效地持续自主学习以适应社会和行业的多样性发展。

The program is designed to educate cross-disciplined senior engineers for engineering technology and engineering management who will have firmer theories and practice foundation of Resources Circulation Science and Engineering, fulfil the concept of the multi-directional resource development, cycling and sustainable utilization of "resources-products-renewable resources-products", master the professional knowledge system of development of natural primary resources, comprehensive utilization of secondary resources, cleaner production and circular economy, and resource recycling planning and management, acquire the ability to solve the science and engineering problems of comprehensive utilization of resources and environmental protection, can accomplish the work in the field of resource recycling science and engineering, such as scientific research, engineering technology development, process design, industrial management and management planning, et al. Graduates can be engaged in the work of management, planning, design, engineering construction, manufacturing, scientific research and education in the field of the Resources Circulation Science and Engineering in government departments, management planning departments, environmental protection departments, design departments, Chemical enterprises, metallurgical enterprises, environmental protection enterprises, industrial and mining enterprises, scientific research institutes, and universities and so on. Also, the graduates can go further study in domestic and foreign scientific research institutions or universities of similar disciplines. Specifically, the following objectives need to be achieved.

Cultivation Objective □ (knowledge capability): Able to grasp the development status of technologies in Resources Circulation Science and Engineering, master the basic knowledge of engineering, mathematics and professional knowledge, and have the ability to discover, research and solve complex engineering problems independently.

Cultivation Objective II (practical ability): Have the systematic thinking and idea of sustainable development, can effectively apply knowledge to the engineering practice of development of natural primary resources, comprehensive utilization of secondary resources, cleaner production and circular economy, and resource recycling planning and management, and have the innovation ability.

Cultivation Objective III (professional quality): Posses family and country feelings, noble professional ethics, social responsibility and good humanities literacy, have the ability to cooperate and coordinate with competent authorities, industry peers, and related majors, and have certain international vision and cultural exchange ability.

Cultivation Objective IV (potential for development): Have the ability of lifelong learning and certain critical thinking skills, able to keep abreast of the latest theories, technologies and international cutting-edge developments in Resources Circulation Science and Engineering, and can study independently, effectively and continuously to adapt to the diverse development of society and industry.

三、毕业要求

□ Basic Requirements for Graduation

本专业学生学习数学、自然科学和资源加工、资源再生循环、化工、冶金等方面的基本理论和专业知识，进行应用基础研究和技术开发方面的科学思维和科学实验训练，掌握工程

测量、科学运算、设计、实验和测试等方面的实践技能，能够运用数学、自然科学和资源加工、资源再生循环、化工、冶金等相关基础理论和基本技能，分析解决本专业及相关领域实际问题，具有从事本专业及相关领域科学研究和规划管理的基本能力。

毕业生应获得以下几方面的知识、能力和素养：

1. 工程知识：能够将数学、自然科学、工程基础知识，资源加工、资源再生循环、化工、冶金等专业知识用于解决复杂工程问题。

1.1 掌握数学、自然科学、工程基础知识与基本方法，并能应用于表述复杂工程问题。

1.2 能够针对资源加工、资源再生循环、化工、冶金相关复杂工程问题，构建恰当的数学模型，并进行求解。

1.3 能够将相关知识和数学方法用于资源加工、资源再生循环、化工、冶金等专业相关复杂工程问题解决方案的比较和综合。

2. 问题分析：能够应用数学、自然科学、工程科学的基本原理，识别、表达、并通过文献研究分析资源加工、资源再生循环、化工、冶金有关的复杂工程问题，以获得有效结论。

2.1 能够应用数学、自然科学和工程科学的基本原理，识别和表达资源加工、资源再生循环、化工、冶金相关的复杂工程问题。

2.2 能够通过文献研究，对资源加工、资源再生循环、化工、冶金相关的复杂工程问题进行分析，获得有效结论。

3. 设计/开发解决方案：能够设计针对资源加工、资源再生循环、化工、冶金有关的复杂工程问题的解决方案，设计满足特定需求的系统、单元或工艺流程，并能够在设计环节中体现创新意识，考虑社会、经济、安全、法律、环境以及文化等因素。

3.1 能够针对资源加工、资源再生循环、化工、冶金有关的复杂工程问题，掌握设计方法和技术。

3.2 能够针对资源加工、资源再生循环、化工、冶金有关的复杂工程问题，进行具体的工程设计，并能够在设计环节中体现创新意识。

3.3 能够针对资源加工、资源再生循环、化工、冶金有关的复杂工程问题，在具体的工程设计中，考虑社会、经济、安全、法律、环境、生态以及文化等因素。

4. 研究：能够基于科学原理并采用科学方法，对资源加工、资源再生循环、化工、冶金有关的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

4.1 能够基于科学原理，通过调研和分析，确定资源加工、资源再生循环、化工、冶金相关复杂工程问题的研究路线和实验方案。

4.2 能够根据设计的实验方案，安全地开展实验研究，正确采集、收集和测量数据。

4.3 能够对实验结果进行分析和解释，通过信息综合分析得到合理有效的结论。

5. 使用现代工具：能够针对资源加工、资源再生循环、化工、冶金有关的复杂工程问题，

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的模拟，并能够理解其局限性。

5.1 了解和掌握资源加工、资源再生循环、化工、冶金等方面常用的现代仪器、信息技术工具和相关软件的原理和使用方法。

5.2 能够选择与使用恰当的技术、资源和工具，用于资源加工、资源再生循环、化工、冶金相关复杂工程问题的分析、计算和设计，并理解其局限性。

5.3 能够开发、选择和使用现代工具，用于资源加工、资源再生循环、化工、冶金相关复杂工程问题的模拟，并理解其局限性。

6. 工程与社会：熟悉资源加工、资源再生循环、化工、冶金相关政策、法律法规、技术标准体系，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、经济、安全、法律、环境以及文化的影响，并理解应承担的责任。

6.1 熟悉相关政策、法规法规、技术标准体系，理解地域文化对资源加工、资源再生循环、化工、冶金等相关工程的影响。

6.2 能够客观评价资源加工、资源再生循环、化工、冶金等相关工程方案对社会、经济、安全、法律、环境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：针对复杂工程问题，能够理解和评价本专业工程实践对资源、环境、社会可持续发展的影响。

7.1 能够正确理解针对资源加工、资源再生循环、化工、冶金等复杂工程问题的工程实践对环境、社会可持续发展的影响，建立环境和可持续发展意识。

7.2 能够合理评价资源加工、资源再生循环、化工、冶金等相关工程实践对环境、社会可持续发展的影响。

8. 职业规范：具有深厚的爱国精神、人文社会科学素养、社会责任感和历史使命感，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。

8.1 树立和践行社会主义核心价值观，理解个人与社会的关系，了解中国国情，明确个人作为社会主义事业建设者和接班人所肩负的责任和使命。

8.2 理解诚实公正、诚信守则的工程职业道德和规范，并能在资源循环科学与工程实践中自觉遵守。

8.3 理解工程师对公众的安全、健康和福祉，以及环境保护的社会责任，能够在工程实践中自觉履行。

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。

9.1 具有良好的人际交往能力，具有一定执行能力，能够在多学科背景下的团队中承担个体角色，并发挥个体优势。

9.2 具有一定的组织能力，能够在团队中承担成员及负责人的角色，并发挥管理、协调作用。

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

10.1 针对资源加工、资源再生循环、化工、冶金等复杂工程问题，具备口头和书面等多种形式的表达能力。

10.2 能够理解和尊重文化的差异，能够就资源加工、资源再生循环、化工、冶金等相关的复杂工程问题与业界同行与社会公众进行有效沟通和交流。

10.3 具备宽广的国际视野和外语交流能力，能在跨文化背景下交流资源加工、资源再生循环、化工、冶金等相关问题。

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。

11.1 理解并掌握工程管理原理与经济决策方法。

11.2 理解资源加工、资源再生循环、化工、冶金等相关复杂工程问题中的工程管理与经济决策问题。

11.3 能在多学科环境下，掌握和运用工程项目管理及成本控制原理方法，具备较强的项目管理能力。

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。

12.1 具有自主学习和终身学习的意识。

12.2 具备不断学习和适应发展的能力。

Students in this major learn the basic theories and professional knowledge of mathematics, natural science, resource processing, resource recycling, chemical industry, metallurgy, etc., conduct scientific thinking and scientific experimental training in applied basic research and technology development, master the practical skills of engineering measurement, scientific arithmetic, design, experiments and tests, etc., and be able to apply the basic theories and skills in mathematics, natural science, resource processing, resource recycling, chemical industry and metallurgy to analyze and solve the practical problems in this profession and related fields, and have the basic ability to engage in scientific research and planning management in this profession and related fields.

Graduates should acquire the following knowledge, abilities and qualities:

1. Engineering knowledge: Be able to apply basic knowledge of mathematics, natural science and engineering, and professional knowledge of resource processing, resource recycling, chemical industry and metallurgy to solve complex engineering problems.

1.1 Master basic knowledge and basic methods of mathematics, natural sciences, and engineering, and be able to apply them to formulate complex engineering problems.

1.2 Be able to construct appropriate mathematical models for complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy, and to solve them.

1.3 Be able to apply relevant knowledge and mathematical methods to the comparison and synthesis of solutions to complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy.

2. Problem Analysis: Be able to apply the basic principles of mathematics, natural sciences, and engineering sciences to identify, express, and analyze complex engineering problems related to resource processing, resource recycling, chemical industry, and metallurgy through literature research, and to obtain valid conclusions.

2.1 Be able to apply basic principles of mathematics, natural sciences, and engineering sciences to identify and express complex engineering problems related to resource processing, resource recycling, chemical industry, and metallurgy.

2.2 Be able to analyze complex engineering problems related to resource processing, resource recycling, chemical industry, and metallurgy through literature research to obtain valid conclusions.

3. Design / develop solutions: Be able to design solutions to complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy, design systems, units or processes that meet specific needs, and be able to demonstrate a sense of innovation in the design process, taking into account social, health, safety, legal, cultural and environmental factors.

3.1 Be able to master design methods and techniques for complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy.

3.2 Be able to carry out specific engineering designs for complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy, and be able to demonstrate a sense of innovation in the design process.

3.3 Be able to consider social, economic, safety, legal, environmental, ecological, and cultural factors in specific engineering designs for complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy.

4. Research: Be able to apply scientific principles and methods to research complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy, including designing experiments, analyzing and interpreting data, and synthesizing information to reach reasonable and valid conclusions.

4.1 Be able to determine the research route and experimental protocol for complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy through research and analysis based on scientific principles.

4.2 Be able to safely conduct experimental research and properly collect, gather and measure data according to the designed experimental protocol.

4.3 Be able to analyze and interpret experimental results and obtain reasonable and valid

conclusions through comprehensive analysis of information.

5. Use modern tools: Be able to develop, select and use appropriate techniques, resources, modern engineering tools and information technology tools for complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy, including simulation of complex engineering problems, and be able to understand their limitations.

5.1 Understand and master the principles and usage of modern instrumentation, information technology tools and related software commonly used in resource processing, resource recycling, chemical industry and metallurgy.

5.2 Be able to select and use appropriate techniques, resources and tools for the analysis, calculation and design of complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy, and understand their limitations.

5.3 Be able to develop, select and use modern tools for the simulation of complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy, and understand their limitations.

6. Engineering and Society: Be familiar with policies, laws and regulations, technical standard systems related to resource processing and resource recycling, etc., and be able to perform reasonable analysis based on engineering-related background knowledge, evaluate the impacts of professional engineering practices and solutions to complex engineering problems on the society, economic, safety, legal, environment and culture, and understand the responsibilities to be assumed.

6.1 Be familiar with relevant policies, laws and regulations, technical standard systems, and understand the impact of local cultures on the projects related to resource processing, resource recycling, chemical industry and metallurgy.

6.2 Be able to objectively evaluate the impacts of engineering solutions related with resource processing, resource recycling, chemical industry and metallurgy on the society, economic, safety, legal, environment and culture, and understand the responsibilities that should be assumed.

7. Environment and Sustainable Development: Understand and evaluate the impact of engineering practices for complex engineering problems on the sustainable development of resource, environment and society.

7.1 Be able to understand the impacts of engineering practices for complex engineering, which related to resource processing, resource recycling, chemical industry and metallurgy on environment and social sustainability, and develop an awareness of environment and sustainable development.

7.2 Be able to reasonably evaluate the impact of engineering practices related to resource processing, resource recycling, chemical industry and metallurgy on the environment and sustainable development of society.

8. Professional norms: Have a deep patriotic spirit, humanistic, social and scientific quality, a

sense of social responsibility and a sense of historical mission, and be able to understand and abide by engineering professional ethics and norms and fulfill responsibilities in engineering practice.

8.1 Establish and practice socialist core values, understand the relationship between individuals and society, understand the national conditions of China, and clarify the responsibilities and missions of individuals as builders and successors of the socialist cause.

8.2 Understand the engineering professional ethics and norms of honesty, fairness and integrity, and be able to consciously comply with them in the engineering practice of resource recycling science and engineering.

8.3 Understand the social responsibility of engineer for the safety, health and welfare of the public, and environmental protection, and be able to consciously fulfill them in engineering practice.

9. Individual and team: Be able to assume the role of individual, team member, and leader in a multidisciplinary team.

9.1 Have good interpersonal skills and certain perform ability, be able to take on individual role in a multidisciplinary team and to take advantage of individual advantages.

9.2 Have certain organizational skills, be able to assume the role of member and leader in a team and play a managerial and coordinating role.

10. Communication: Be able to communicate effectively and interact with people of the same profession and the public on complex engineering problems related to the specialty of resource recycling science and engineering, including writing reports and design briefs, presenting statements, and articulating or responding to instructions. Have a certain international perspective, and be able to communicate and interact in a cross-cultural context.

10.1 Be able to articulate in a variety of forms, both oral and written, for complex engineering problems in resource processing, resource recycling, chemical industry and metallurgy.

10.2 Be able to understand and respect cultural differences and communicate effectively with people of the same profession and the public on complex engineering problems related to resource processing, resource recycling, chemical industry and metallurgy.

10.3 Have a broad international perspective and foreign language communication skills to communicate in a cross-cultural context on problems related to resource processing, resource recycling, chemical industry and metallurgy.

11. Project management: Understand and master the principles of engineering management and economic decision-making methods and be able to apply them in a multidisciplinary environment.

11.1 Understand and master the principles of engineering management and economic decision-making methods.

11.2 Understand engineering management and economic decision-making methods in complex

engineering problems related to resource processing, resource recycling, chemical industry and metallurgy.

11.3 Be able to master and apply the principles and methods of engineering project management and cost control in a multidisciplinary environment, and have strong project management skills.

12. Lifelong learning: Have the awareness of independent and lifelong learning, and the ability to continuously learn and adapt to development.

12.1 Have the consciousness of self-directed learning and lifelong learning

12.2 Be able to continuously learn and adapt to development.

四、毕业要求与培养目标对应矩阵

□ Matrices of Graduation Requirements and Education Objectives

培养目标及毕业要求 Cultivation Objectives & Graduation Requirements	培养目标 1 Cultivation Objective □	培养目标 2 Cultivation Objective II	培养目标 3 Cultivation Objective III	培养目标 4 Cultivation Objective □
毕业要求 1 Graduation Requirement □	√			
毕业要求 2 Graduation Requirement II		√		
毕业要求 3 Graduation Requirement III		√		
毕业要求 4 Graduation Requirement IV		√		
毕业要求 5 Graduation Requirement V		√		
毕业要求 6 Graduation Requirement VI			√	
毕业要求 7 Graduation Requirement VII			√	
毕业要求 8 Graduation Requirement VIII			√	
毕业要求 9 Graduation Requirement □			√	√
毕业要求 10 Graduation Requirement □			√	√
毕业要求 11 Graduation Requirement □			√	
毕业要求 12 Graduation Requirement □II				√

五、毕业要求实现矩阵

V Matrices of relations of courses and Graduation Requirements

毕业要求	1）工程知识	2）问题分析	3）设计/开发解决方案	4）研究	5）现代工具使用	6）工程与社会	7）环境和可持续发展	8）职业规范	9）个人和团队	10）沟通	11）项目管理	12）终身学习
英语										H		M
体育												M
思想道德与法治								H				H
形式与政策							M					
中华民族共同体概论										H		
中国近现代史纲要						M						
马克思主义基本原理		M										H
毛泽东思想和中国特色社会主义理论体系概论						M						H
习近平新时代中国特色社会主义思想概论							H					
心理健康与安全										L		H
人文素养与写作										H		M
科学技术与科普						H				M		
艺术体验与审美										M		M
国际视野与世界										M		
中华文化与文明						L				M		L
分析化学		M		H								
分析化学实验		H			H							
无机化学		M										

毕业要求	1）工程知识	2）问题分析	3）设计/开发解决方案	4）研究	5）现代工具使用	6）工程与社会	7）环境和可持续发展	8）职业规范	9）个人和团队	10）沟通	11）项目管理	12）终身学习
无机化学实验		H			H							
有机化学				H								
有机化学实验		H		M								
物理化学	H			M								
物理化学实验		H		H								
现代环境分析		H										
现代环境分析实验		H			H				M			
大学物理	H											
大学物理实验		H							M			
高等数学	H											
线性代数	M											
概率论与数理统计	M											
画法几何&工程制图	H		H		H							
工程测量学	H		M									
工程测量学实习			M		M							
资源与环境导论						H	M					
电子电工学	M											
电子电工学实验		M										
程序设计语言			H		H							
化工原理	H											
化工原理实验		M	H									

毕业要求	1）工程知识	2）问题分析	3）设计/开发解决方案	4）研究	5）现代工具使用	6）工程与社会	7）环境和可持续发展	8）职业规范	9）个人和团队	10）沟通	11）项目管理	12）终身学习
化学反应工程	H											
矿石学	H											
CAD 制图	H		M									
CAD 制图实验			H		H							
资源加工过程与装备	H											
资源加工过程与装备实验		M			H							
化工热力学	H											
冶金原理	H											
固体废物处置与资源化	H						H					
固体废物处置与资源化实验		M	M									
环境工程学	H						M					
环境工程学实验		M		H								
分离工程	H											
清洁生产						M	H					
资源微生物学	H											
资源微生物学实验		M		H								
劳动教育								H	M			H
军事技能训练									H			
化工原理课程设计	M		H			M						
资源加工过程与装备课程设计	M		H			M						

毕业要求	1）工程知识	2）问题分析	3）设计/开发解决方案	4）研究	5）现代工具使用	6）工程与社会	7）环境和可持续发展	8）职业规范	9）个人和团队	10）沟通	11）项目管理	12）终身学习
工程测量学实习	M					H						
认识实习	M					H						
金工实习	M				M	M						
生产（或毕业）实习	H					H		L				
毕业设计（论文）			H	H								
创新训练		H	H									M
创业训练			H						H		H	
军事理论												M
国家安全教育								H		M		H
艺术实践										M		L
就业指导								H				H

注①不同学期的同一门课程只需填写一次；

□所有的课程和教学活动都要列入表格，包括集中实践性环节；

□表格要清晰展示每门课程与“毕业要求”中每项具体要求达成的关联度情况，关联度强的用“H”表示，关联度中等的用“M”表示，关联度弱的用“L”表示。

六、核心课程

VI Core Courses

无机化学、分析化学、有机化学、物理化学、资源加工过程与装备、化工原理、冶金原理、分离工程、固体废物处置与资源化、清洁生产、环境工程学、工程测量学、画法几何&工程制图、CAD 制图、资源微生物学、化学反应工程。

Inorganic Chemistry, Analytical Chemistry, Organic Chemistry, Physical Chemistry, Resource Processing and Equipment, Chemical Engineering, Metallurgical Engineering, Separation Engineering, Disposal and Reuse of Solid Waste, Clean Production, Environmental Engineering, Engineering Surveying, Descriptive Geometry & Engineering Drawing, Computer Aided Design, Resource Microbiology, Chemical Reaction Engineering.

七、主要实践性教学环节

VII Main Internship and Practical Training

化工原理实验、化工原理课程设计、资源加工过程与装备实验、资源加工过程与装备课程设计、固体废物处置与资源化实验、认识学习、工程训练、生产实习、毕业（设计）论文和创新创业训练。

Experiments of Chemical Engineering, Chemical Engineering Principle Design, Experiments of Resource Processing Process and Equipment, Resource Processing Process and Equipment Design, Experiments of Disposal and Reuse of Solid Waste, Knowledge Acquirement, Engineering Training, Producing Practice, Graduation Project, Innovation & Entrepreneurship.

八、学时与学分

VIII Hours/Credits

学时学分构成表

Table of Hours and Credits

课程类别 Courses Classified			学时/周数 Period/ Weeks	学分 Credits		学分比例 Proportion of Credits
				理论 Theory	实践（双创） Practice（I&E Crs.)	
通识课程平台 General Courses Platform		必修 Compulsory	578	28	3	18.2%
		选修 Elective	144	9	/	5.29%
学科基础课程平台 Basic Courses Platform		必修 Compulsory	992	40	8.5	28.53%
专业课程平台 Major Courses Platform		必修 Compulsory	640	26.5	7.5	20.00%
		选修 Elective	632	11.5	0.5	7.35%
集中性实践课程平台 Practical Teaching Platform		必修 Compulsory	72+22.5W	/	25.5	15.00%
素质拓展平台 Quality Development Platform	双创学分 Innovation & Entrepreneurship Credits	必修 Compulsory	/	/	5	2.94%
	其他学分 Other Credits		92	4	1	2.94%
小计 Amount	必修学分总数 Compulsory Credits	149	选修学分总数 Elective Credits	21	选修学分比例 Proportion of Elective Credits	12.65%
	理论学分总数 Theory Credits	119	实践学分总数 Practice Credits	46	实践教学环节比例 Proportion of Internship and Practical Training	27.05 %
最低毕业学分 The Lowest Graduate Credits			**170**			

注：□ 学分比例：各教学平台或教学环节占最低毕业学分的比例。

□ 实践教学环节，包括集中性实践教学环节和实验教学（不含体育）。集中性实践教学环节，包括培养方案内集中实施的实践、实习、课程设计、毕业设计、毕业论文、社会调查等；实验教学，包括课内实验和独立开设实验。

□ 必修学分总数=通必学分+学科基础学分+专必学分+实践必修学分+素质拓展学分；

选修学分总数=通选学分+专选学分+实践（选修）学分；

理论学分总数=所有平台理论学分之和（不包括双创学分）；

实践学分总数=所有平台实践学分之和（不包括双创学分）；

最低毕业学分=必修学分+选修学分=理论学分+实践学分+双创学分。

九、教学进程计划表 / IX Teaching Schedule Form

表一：通识课程平台 / Form I: General Course Platform

表一（A）：通识必修课程（通必课）/Form I (A): General Compulsory Courses (General Required)

课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
20W100000613	英语 1 English 1	2	32	32				1
218110000313	体育 1 Physical Education 1	0/1	26			26		1
217100014918	思想道德与法治 Moral Education and Rule of Law	2.5/0.5	52	40		12		2
217100015218	形势与政策 Situation and Policy	2	32	32				2
225100000118	中华民族共同体概论 Education of Chinese Minzu Community Consciousness	1.5/ 0.5	36	24		12		2
20W100000713	英语 2 English 2	2	32	32				2
218110000213	体育 2 Physical Education 2	0/1	32			32		2
2171000122	中国近现代史纲要 Essentials of China Modern and Contemporary History	2.5/ 0.5	52	40		12		3
20W100000813	英语 3 English 3	2	32	32				3
218110015018	体育 3 Physical Education 3	0/0.5	16			16		3
217100012318	马克思主义基本原理 The Basic Principles of Marxism	2.5/0.5	52	40		12		4
217100015818	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 Socialist Theoretical System with Chinese Characteristics	2.5/0.5	52	40		12		5
217100015918	习近平新时代中国特色社会主义思想概论 Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	2.5/0.5	52	40		12		5
20W100000913	英语 4 English 4	2	32	32				4

课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
218110014718	体育 4 Physical Education 4	0/0.5	16			16		4
218110014018	体育 5 Physical Education 3	0/0.5	16			16		5
218110015318	体育 6 Physical Education 3	0/0.5	16			16		6
学分要求：必修学分 31 **Demand of Credits: Required 31**								

注：大学英语扩展课程包括□20W100000813 英语 3 □20W100000913 英语 4 □20W100001018 学术英语阅读与写作 □20W100001318 高级媒体英语视听说 □20W100001518 英语国家社会与文化 □20W100001618 中华文化导论（英文），要求在第 3、4 学期完成 4 学分即可。

表一（B）：通识选修课程（通选课）/ Form I (B): General Elective Courses

模块 Module	学分 Crs.
心理健康与安全 Psychological Health and Safety	2
人文素养与写作 Humanistic Accomplishment and Writing	2
科学技术与科普 Science and Technology & Science Popularization	2
艺术体验与审美 Art Appreciation and Aesthetics	1
国际视野与世界 Contemporary China and the World	1
中华文化与文明 Chinese Culture and Civilization	1
学分要求：选修学分 9 **Demand of Credits: Elective 9**	

表二：学科基础课程平台

Form II. Basic Course Platform

课程类别 Course Classified	课程编号 Courses Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
学科基础必修 Basic Courses Require	213100035618	无机化学（B）Z Inorganic Chemistry (B) Z	3	48	48				1	
	213110035818	无机化学实验（C） Inorganic Chemistry Experiments (C)	0/0.5	16		16			1	
	2101000113	高等数学 A(1) Higher Mathematics A (1)	4	80	64			16	1	
	2101000118	线性代数 Linear Algebra	2	48	32			16	1	
	213103005213	分析化学（B） Analytical Chemistry (B)	2	32	32				1	
	213110036418	分析化学实验（B） Analytical Chemistry Experiments (B)	0/1	32		32			1	
	210102000413	高等数学 A(2) Higher Mathematics A (2)	5	96	80			16	2	
	211100011118	大学物理 B（1） College Physics B（1）	3	56	48			8	2	
	211110021318	大学物理实验（1） University Physics Experiments （1）	0/0.5	16		16			2	
	2241000067	工程测量学 Engineering Surveying	2	32	32				2	
	224100000913	画法几何&工程制图 Descriptive Geometry & Engineering Drawing	2	32	32				3	
	2101000112	概率论与数理统计 Probability Theory and Mathematical Statistics	2.5	56	40			16	3	
	211100011218	大学物理 B（2） College Physics B（2）	2	40	32			8	3	
学科基础必修 Require	211110022818	大学物理实验（2） University Physics Experiments （2）	0/0.5	16		16			3	

课程类别 Course Classified	课程编号 Courses Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	213100035218	有机化学（C） Organic Chemistry (C)	3	48	48				3	
	213110036118	有机化学实验（B） Organic Chemistry Experiments (B)	0/1	32		32			3	
	213100034518	物理化学（B） Physical chemistry (B)	3.5	56	56				3	
	213110034618	物理化学实验 Physical Chemistry Experiments	0/1	32		32			3	
	212100018318	电子电工学 Electronic Engineering	2	32	32				3	
	2241100071	电子电工学实验 Electronics and Electrotechnics Experiments	0/0.5	16		16			3	
	209100030818	程序设计语言（Python）□ Programming Language（Python）□	1/1	48	16		32		3	
	224100024518	CAD 制图 Computer Aided Design	1/1.5	64	16	48			4	
	2241000073	现代环境分析 Modern Environmental Analysis	2	32	32				4	
	2241100074	现代环境分析实验 Experiments of Modern Environmental Analysis	0/1	32		32			4	
学分要求：必修学分 48.5 **Demand of Credits: Required: 48.5**										

表三：专业课程平台

Form III: Major Courses Platform

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业必修 Required Courses	224100013818	化工原理（A1）Chemical Engineering（A1）	3	48	48				4	
	224110014018	化工原理实验（A1）Experiments of Chemical Engineering（A1）	0/1	32		32			4	
	224100019818	化学反应工程 Chemical Reaction Engineering	2	32	32				4	
	224100019918	矿石学 Ore Science	1.5	24	24				4	
	224100020818	资源微生物学 Resource Microbiology	2	32	32				4	
	224110015318	资源微生物学实验 Experiments of Resource Microbiology	0/1	32		32			4	
	224100013918	化工原理（A2）Chemical Engineering（A2）	3	48	48				5	
	224110014118	化工原理实验（A2）Experiments of Chemical Engineering（A2）	0/1	32		32			5	
	224100014518	资源加工过程与装备 Resource Processing Process and Equipment	3	48	48				5	
	224110014618	资源加工过程与装备实验 Experiments of Resource Processing Process and Equipment	0/1	32		32			5	
	224100014718	化工热力学 Chemical Engineering Thermodynamics	3	48	48				5	
	224100014818	冶金原理 Metallurgical Principle	3	48	48				5	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业必修 Required Courses	224100014918	固体废物处置与资源化 Disposal and Reuse of Solid Waste	2	32	32				6	
	224110015018	固体废物处置与资源化实验 Experiments of Disposal and Reuse of Solid Waste	0/1	32		32			6	
	224100015118	环境工程学（B） Environmental Engineering	2	32	32				6	
	213113019613	环境工程学实验 Experiments of Environmental Engineering	0/1	32		32			6	
	224100015418	分离工程 Separation Engineering	2	32	32				6	
	224100024218	清洁生产 Clean Production	1.5	24	24				6	
专业选修 Elective courses	213103021513	环境监测（B） Environmental Monitoring (B)	2	32	32				5	共选修12个学分，其中实验学分不少于0.5学分。第5学期最少选修6个学分，6学期总计最少选修3个学分，第7学期最少选修3个学分
	213103029713	环境规划与管理 Environmental Plans and Management	2	32	32				5	
	224100001713	地理信息系统 Geographic Information System	2	32	32				5	
	213103024513	环境生态学（B） Environmental Ecology （B）	2	32	32				5	
	224100018318	生物化学 Biochemistry	2	32	32				5	
	224100016218	化工工艺学 Chemical technology	2	32	32				6	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业选修 Elective courses	224100019518	资源循环科学与工程专业英语 Professional English for Resource Recycling Science and Engineering	1.5	24	24				6	
	224100025018	计算机在资源循环科学与工程中的应用 Application of Computer in Resource Circulation Science and Engineering	1/0.5	32	16	16			6	
	224100015818	化工设备机械基础 Fundamental Chemical Process Equipment	2	32	32				6	
	224100021018	遥感技术与应用 Remote Sensing Technology and Application	2	32	32				6	
	224100015918	结晶学与工业结晶 Crystallography and Industrial Crystallization	2	32	32				6	
	224100015718	固废处理与生态材料 Solid Waste Disposal and Ecological Materials	1.5	24	24				6	
	224100022118	文献检索及科技论文写作 Literature Retrieval and Scientific Paper Writing	0.5/0.5	24	8	16			7	
	224100023618	碳中和与清洁能源技术 Carbon Neutrality and Clean Energy Technology	2	32	32				7	
	224100016118	资源循环加工工厂设计 Resource Recycling Processing Plant Design	1.5	24	24				7	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classification				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业选修 Elective courses	224100015518	化工安全与环保 Chemical Safety and Environmental Protection	2	32	32				7	
	224100016318	生化分离工程 Biochemical Separation Engineering	1.5	24	24				7	
	2241000098	废弃机电电子电器资源化利用技术 Recycling Technology of Waste Electrical and Electronic Equipment	2	32	32				7	
	2241000105	生物质转化与利用 Biomass Conversion and Utilization	2	32	32				7	
	224100016518	生物冶金原理与技术 Principle and Technology of Biological Metallurgy	2	32	32				7	
	224100016618	再生金属冶金学 Regenerated Metal Metallurgy	2	32	32				7	
学分要求：46，其中必修 34，选修 12 **Demand of Credits 46, Required 34, Elective 12**										

表四：集中性实践教学平台

Form IV: Practical Teaching Platform

课程类别 Course Classified			课程编号 Course Code	课程名称 Course Name	学分 Crs.	周数/学时数 Total Period/Hrs	学时类型 Period Classified		开课学期 Semester
							实验 Exp.	实习 Pra.	
教学实践 Teaching Practice	实践 Teaching Practice	必修 Compulsory Courses	112110010718	劳动教育 Labor Education	1	32	√		1-7
			109110000318	军事技能训练 Military Skill Training	2	36	√		1
	课程设计 Project Design	必修 Compulsory Courses	224110024918	化工原理课程设计 Chemical Engineering Principle Design	1	1W			5
			22410024618	资源加工过程与装备课程设计 Resource Processing Process and Equipment Design	1	1W			6
	小计 Amount				5	72+2W			
实习 Exercitation	教学实习 Teaching Exercitation	必修 Compulsory Courses	2241100080	工程测量学实习 Engineering Surveying Practice	0.5	0.5W			2
			224110006213	认识实习 Cognition Practice	1	1W		√	3
			701110000418	工程训练 D Engineering Training D	2	2W		√	5
	小计 Amount				3.5	3.5W			
	毕业实习 Graduation Practice	必修 Compulsory Courses	224110000313	生产（或毕业）实习 Production (or Graduation) Practice	3	3W		√	7
	毕业论文（设计） Graduation Project（Thesis）	必修 Compulsory Courses	224110017718	毕业设计（论文） Graduation Project（Thesis）	14	14W			8
	小计 Amount				17	17W			

学分要求: 必修学分 25.5
Demand of Credits: Required 25.5

表五：素质拓展平台

Form V: Quality Development Platform

课程编号 Course Code	课程/模块名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
109100000418	军事理论 Military Theory	2	36	36				1
109100000818	国家安全教育 National Security Education	1	16	16				2
/	艺术实践	0/1	24			24		1-7
115100000113	就业指导 Employment Guidance	1	16	16				6
/	创新教育 Innovation Education	3	/					
/	创业教育 Entrepreneurship Education	2	/					
学分要求：必修学分 10 **Demand of Credits: Required 10**								

环境科学专业本科人才培养方案

Undergraduate Program for Environmental Science

一、培养规格

□ Cultivation Standards

I）学制

Length of Schooling

修业年限：4 年

Duration: 4 years

II）学位

Degree

授予学位：理学学士学位

Degrees conferred: Bachelor of Science

二、培养目标

□ Education Objectives

本专业培养德智体美劳全面发展，具有扎实的基础知识，系统掌握环境科学的基本理论与基本技能，熟悉污染物在环境介质中的迁移转化与控制治理，具备从事环境监测、环境影响评价、环境咨询与管理以及科学研究的能力，能在政府、企业与教学科研单位从事环境保护相关工作的创新型高级技术骨干和管理人才。

具体培养目标可以归纳为以下四个方面：

目标 1（知识能力）：能够掌握环境科学专业相关知识在环境监测和管理中的应用和发展现状，融会贯通数理基础知识和环境科学专业知识，针对复杂环境问题提供整体解决方案。

目标 2（实践能力）：具备系统思维和可持续发展理念，能将知识有效运用到环境的监测、评价、治理和管理实践中，并具备一定的创新能力。

目标 3（职业素养）：具备家国情怀、高尚的职业道德、社会责任感和良好的人文科学素养，具有与主管部门、业界同行、相关专业的配合和协调能力，具有一定的国际视野和文化交流能力。

目标 4（发展潜能）：具备较强的获取知识和综合应用知识的能力，能及时了解环境科学专业最新理论、技术以及国际前沿动态，有效地持续自主学习以适应社会和行业的发展变化。

The students will be educated adapting “all-around” idea through moral, intellectual, physical, aesthetics and labor education, have a solid foundation of basic knowledge, master basic theories and knowledge relevant to environmental science, be familiar with the migration and transformation as well as control and management of pollutants in various ambient medium, and be skilled in

monitoring, assessing, consulting and managing of environmental pollution as well as scientific research. They are qualified to take jobs related to environmental protection in governments, enterprises, colleges and scientific institutes, and grow up to be innovative senior talents in technology and management.

Cultivation Objective □ (knowledge capability): Able to grasp the development status of environmental science in ecological monitoring and management, and master the basic knowledge of natural science and professional knowledge of environmental science so as to provide solutions for complex environmental problems.

Cultivation Objective □ (practical ability): Have the systematic thinking and idea of sustainable development, can effectively apply knowledge to monitoring, assessment and management of environment as well as have the innovation ability.

Cultivation Objective □ (professional quality): Posses family and country feelings, noble professional ethics, social responsibility and good humanities literacy, have the ability to cooperate and coordinate with competent authorities, industry peers, and related majors, and have certain international vision and cultural exchange ability.

Cultivation Objective □ (potential for development): Have the consciousness of lifelong learning and ability to apply associated knowledge comprehensively, able to keep abreast of the latest theories, technologies and international cutting-edge developments in environmental science so as to adapt to the development of society and industry.

三、毕业要求

□ Basic Requirements for Graduation

本专业学生主要学习自然科学和环境科学的基本理论和基础知识，接受环境科学专业技能的基本训练，培养系统地识别、分析与解决环境问题的素质和能力，具有从事本专业及相关领域科学研究和管理工作的基本能力。

1. 具有宽厚的自然科学基础知识、良好的思想品德与人文素养；

2. 掌握全面扎实的环境科学专业的基本理论与基础知识；

3. 掌握环境科学专业的基本实验方法和操作技能，初步具备环境监测、环境影响评价以及环境咨询与管理的能力；

4. 熟悉国家环境保护、资源利用、可持续发展等方面的相关政策、法律法规、标准和规范；

5. 具备较强的获取知识和综合运用知识的能力，初步具备创新性开展科学研究的能力。

6. 能够基于环境科学相关背景知识进行合理分析，评价工程建设对资源、环境、社会可持续发展的影响，并理解应承担的责任。

7. 有较好的人文科学素养，较强的社会责任感，能够在本专业相关实践中理解并遵守职业道德和规范，履行相应责任。

8. 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。

9. 能够就本专业复杂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。

10. 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。

The students of this major will learn basic theories and knowledge of natural science and environmental science, and take part in basic professional skill training. They are qualified to be skilled in recognizing, analyzing and resolving environmental problems, and have basic ability to engage in scientific research and management in this field and related fields.

1. Possess generous knowledge of basic natural science, have a good quality of thought and morality as well as humanity.

2. Master basic theories and knowledge of environmental science comprehensively and solidly.

3. Master basic skills of experiments and operation in environmental science, have the primary ability in monitoring, assessing, consulting and managing of environmental pollution.

4. Be familiar with the policy, laws and regulations, standards and norms in relation to environmental protection, resource utilization, sustainable development, and etc.

5. Possess a strong ability in knowledge acquisition and comprehensive application, and have the primary innovation ability in scientific research.

6. Has the ability to conduct a reasonable analysis based on the background knowledge of environmental science, evaluate the impact of engineering practice on the sustainable development of resource, environment and society, and understand the bearing responsibilities.

7. Has good humanities literacy, strong sense of social responsibility, understand and abide the engineering professional ethics and norms in the relevant engineering practice, and fulfill the corresponding responsibilities.

8. Act as individuals, team members and leaders in a multidisciplinary team.

9. Has the ability to effectively communicate with colleagues and the public on complex environmental issues, including writing and designing reports, presenting speeches, clearly expressing or responding to instructions. Communicate with different persons who have cross-cultural background in an international perspective.

10. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

四、毕业要求与培养目标对应矩阵

□ Matrices of Graduation Requirements and Education Objectives

培养目标及毕业要求 Cultivation Objectives & Graduation Requirements	培养目标 1 Cultivation Objective □	培养目标 2 Cultivation Objective II	培养目标 3 Cultivation Objective III	培养目标 4 Cultivation Objective □
毕业要求 1 Graduation Requirement □	√		√	√
毕业要求 2 Graduation Requirement II	√			√
毕业要求 3 Graduation Requirement III	√	√		
毕业要求 4 Graduation Requirement □	√			√
毕业要求 5 Graduation Requirement □		√		√
毕业要求 6 Graduation Requirement □		√	√	
毕业要求 7 Graduation Requirement □			√	
毕业要求 8 Graduation Requirement □			√	
毕业要求 9 Graduation Requirement □		√	√	
毕业要求 10 Graduation Requirement □				√

五、毕业要求实现矩阵

□ Matrices of relations of courses and Graduation Requirements

课程及毕业要求 Course & Graduation Requirements	毕业要求 1 Graduation Requirement □	毕业要求 2 Graduation Requirement II	毕业要求 3 Graduation Requirement III	毕业要求 4 Graduation Requirement □	毕业要求 5 Graduation Requirement □	毕业要求 6 Graduation Requirement □	毕业要求 7 Graduation Requirement □	毕业要求 8 Graduation Requirement □	毕业要求 9 Graduation Requirement □	毕业要求 10 Graduation Requirement □
英语 1	H				M				M	M
体育 1	H									L
思想道德与法治	H						M			
形势与政策	H			M		M				
中华民族共同体概论	H						H			
英语 2	H				M				M	M
体育 2	H									L
中国近现代史纲要	H						H			
英语 3	H				M				M	M
体育 3	H									L
马克思主义基本原理	H	M					M			
毛泽东思想和中国特色社会主义理论体系概论	H						H			
习近平新时代中国特色社会主义思想概论	H						H			

英语 4	H				M				M	M
体育 4	H									L
体育 5	H									L
体育 6	H									L
无机化学（B）Z	H	M			M					M
无机化学实验（C）			H		M					M
分析化学（B）	H		M		M					M
分析化学实验（B）			H		M					M
高等数学 A(1)	H				M	M				M
线性代数	H				M	M				M
高等数学 A(2)	H				M	M				M
大学物理 B(1)	H									
大学物理实验(1)			H							
工程测量学	H		M							
画法几何&工程制图		H	H							M
概率论与数理统计	H				M					M
大学物理 B(2)	H									
大学物理实验(2)			H							
有机化学（C）	H		M		M	L				
有机化学实验（B）			H		M	L				
物理化学（B）	H				M	L				

物理化学实验			H		M	L				
环境学	M	H				M	L			
CAD 制图		M			M	M	M			
环境微生物学	M	H			M					M
环境微生物学实验			H		M					M
现代环境分析	M	H			H					
现代环境分析实验			H		H					
环境化学	M	H			M					
环境化学实验			H		M					
环境监测（A）		H		M		M	M			
环境监测实验（A）			H		H	M	M			
环境土壤学	M	H			M	M				
环境土壤学实验			H		M	M				
环境工程学（A）		H		M		M			M	
环境工程学实验			H						M	
环境生态学（A）	M	H			M	M				
环境影响评价		H	H	H		H			H	
环境规划与管理	M	H		H			M			
环境科学综合实验			H		H					
环境数据分析方法	M		H		H					M
物理性污染控制工程	M	H	M							

固体废物处置与资源化		H	M	L			M			
环境毒理学	M	H	M		M	L				
环境样品前处理技术		M	H		M					L
清洁生产		H	M	H		M				
环境科学专业英语	M	H			M					L
环境纳米材料	M	M			M					L
地理信息系统	M	H	L	L						M
水环境保护		H	M							M
污染控制微生物工程	M		M							
环境信息系统		M								
环境经济学	M	H		M			L			
环境法学	M		M	H			L			
生态监测与评价			H		M				L	
环境监测设备及应用			M							
水土保持		H	M							
文献检索及科技论文写作		H			H					M
高级氧化技术		M			M					L
生态水文学		M			L					
膜处理技术			M							
给水处理			L							
给排水与环境工程施工			M							

劳动教育	H									
军事技能训练	H									
环境影响评价课程设计		H	H		M				M	
工程训练	M									
工程测量学实习		H			M					
环境监测实习			H		M					
认识实习	M	M								
生产（或毕业）实习			M	M				M		
毕业设计（论文）		M	H		H					M
军事理论	H									
国家安全教育	H									
艺术实践	H						L			
就业指导	M									
创新教育					M					M
创业教育								M		

注①不同学期的同一门课程只需填写一次；

□所有的课程和教学活动都要列入表格，包括集中实践性环节；

□表格要清晰展示每门课程与“毕业要求”中每项具体要求达成的关联度情况，关联度强的用“H” 表示，关联度中等的用“M” 表示，关联度弱的用“L” 表示。

六、核心课程

□ Core Courses

环境学 Environmental Science、环境化学 Environmental Chemistry、现代环境分析 Modern Environmental Analysis、环境监测 Environmental Monitoring、环境影响评价 Environmental Impact and Assessment、环境生态学 Environmental Ecology、环境微生物学 Environmental Microbiology、环境土壤学 Environmental Soil Science、环境工程学 Environmental Engineering

七、主要实践性教学环节

□ Main Internship and Practical Training

认识实习 Knowledge Acquirement、环境监测实习 Environmental Monitoring Practice、环境影响评价课程设计 Environmental Impact and Assessment: Course Design、生产（或毕业）实习 Factory （or Graduation） Practice、毕业设计（论文）Graduation Project (Thesis)

现代环境分析实验 Experiments of Modern Environmental Analysis、环境化学实验 Experiments of Environmental Chemistry、环境微生物学实验 Experiments of Environmental Microbiology、环境监测实验 Experiments of Environmental Monitoring、环境土壤学实验 Experiments of Environmental Soil Science、环境工程学实验 Experiments of Environmental Engineering、环境科学综合实验 Comprehensive Experiments

八、学时与学分

□ Hours/Credits

学时学分构成表

Table of Hours and Credits

<table>
<tr><th colspan="3" rowspan="2">课程类别
Course Classified</th><th rowspan="2">学时/周数
Period/Weeks</th><th colspan="2">学分
Credits</th><th rowspan="2">学分比例
Proportion of Credits</th></tr>
<tr><th>理论
Theory</th><th>实践（双创）
Practice (I&E Crs.)</th></tr>
<tr><td colspan="2" rowspan="2">通识课程平台
General Course Platform</td><td>必修
Compulsory</td><td>578</td><td>28</td><td>3</td><td>18.2%</td></tr>
<tr><td>选修
Elective</td><td>144</td><td>9</td><td>/</td><td>5.3%</td></tr>
<tr><td colspan="2">学科基础课程平台
Basic Course Platform</td><td>必修
Compulsory</td><td>912</td><td>39</td><td>6.5</td><td>26.8%</td></tr>
<tr><td colspan="2" rowspan="2">专业课程平台
Major Course Platform</td><td>必修
Compulsory</td><td>600</td><td>19.5</td><td>9</td><td>16.8%</td></tr>
<tr><td>选修
Elective</td><td>400</td><td>23</td><td>1</td><td>14.1%</td></tr>
<tr><td colspan="2" rowspan="2">集中性实践课程平台
Practical Teaching Platform</td><td>必修
Compulsory</td><td>22w</td><td></td><td>22</td><td rowspan="2">12.9%</td></tr>
<tr><td>选修
Elective</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">素质拓展平台
Quality Development Platform</td><td>双创学分
Innovation & Entrepreneurship Credits</td><td rowspan="2">必修
Compulsory</td><td>/</td><td>/</td><td>5</td><td>2.9%</td></tr>
<tr><td>其他学分
Other Credits</td><td>92</td><td>4</td><td>1</td><td>2.9%</td></tr>
<tr><td rowspan="2">小计
Amount</td><td colspan="2">必修学分总数
Compulsory Credits</td><td>137</td><td>选修学分总数
Elective Credits</td><td>33</td><td>选修学分比例
Proportion of Elective Credits</td><td>19.4%</td></tr>
<tr><td colspan="2">理论学分总数
Theory Credits</td><td>122.5</td><td>实践学分总数
Practice Credits</td><td>42.5</td><td>实践教学环节比例
Proportion of Internship and Practical Training</td><td>25.0%</td></tr>
<tr><td colspan="3">最低毕业学分
The Lowest Graduate Credits</td><td colspan="4">170</td></tr>
</table>

注：

Φ学分比例：各教学平台或教学环节占最低毕业学分的比例。

□实践教学环节，包括集中性实践教学环节和实验教学（不含体育）。集中性实践教学环节，包括培养方案内集中实施的实践、实习、课程设计、毕业设计、毕业论文、社会调查等；实验教学，包括课内实验和独立开设实验。

□必修学分总数=通必学分+学科基础学分+专必学分+实践必修学分+素质拓展学分；

选修学分总数=通选学分+专选学分+实践（选修）学分；

理论学分总数=所有平台理论学分之和（不包括双创学分）；

实践学分总数=所有平台实践学分之和（不包括双创学分）；

最低毕业学分=必修学分+选修学分=理论学分+实践学分+双创学分。

九、教学进程计划表 /□ **Teaching Schedule Form**

表一：通识课程平台 / Form □: General Course Platform

表一（A）：通识必修课程/Form I (A):General Compulsory Courses (General Required)

课程编号 Course Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
20W100000613	英语 1 English 1	2	32	32				1
218110000313	体育 1 Physical Education 1	0/1	26			26		1
217100014918	思想道德与法治 Moral Education and Rule of Law	2.5/0.5	52	40		12		2
217100015218	形势与政策 Situation and Policy	2	32	32				2
225100000118	中华民族共同体概论 Education of Chinese Minzu Community Consciousness	1.5/ 0.5	36	24		12		2
20W100000713	英语 2 English 2	2	32	32				2
218110000213	体育 2 Physical Education 2	0/1	32			32		2
2171000122	中国近现代史纲要 Essentials of China Modern and Contemporary History	2.5/ 0.5	52	40		12		3
20W100000813	英语 3 English 3	2	32	32				3
218110015018	体育 3 Physical Education 3	0/0.5	16			16		3
217100012318	马克思主义基本原理 The Basis Principles of Marxism	2.5/0.5	52	40		12		4
217100015818	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 Socialist Theoretical System with Chinese Characteristics	2.5/0.5	52	40		12		5
217100015918	习近平新时代中国特色社会主义思想概论 Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	2.5/0.5	52	40		12		5
20W100000913	英语 4 English 4	2	32	32				4
218110014718	体育 4 Physical Education 4	0/0.5	16			16		4
218110014018	体育 5 Physical Education 3	0/0.5	16			16		5

218110015318	体育 6 Physical Education 3	0/0.5	16			16		6
学分要求：必修学分 31 Demand of Credits: Required 31								

注：大学英语扩展课程包括□20W100000813 英语 3□20W100000913 英语 4□20W100001018 学术英语阅读与写作□20W100001318 高级媒体英语视听说□20W100001518 英语国家社会与文化□20W100001618 中华文化导论（英文），要求在第 3、4 学期完成 4 学分即可。

表一（B）：通识选修课程（通选课）/Form I (B): General Elective Courses

模块 Module	**学分 Crs.**
心理健康与安全 Psychological Health and Safety	2
人文素养与写作 Humanistic Accomplishment and Writing	2
科学技术与科普 Science and Technology & Science Popularization	2
艺术体验与审美 Art Appreciation and Aesthetics	1
国际视野与世界 Contemporary China and the World	1
中华文化与文明 Chinese Culture and Civilization	1
学分要求：选修学分 9 Demand of Credits: Elective 9	

表二：学科基础课程平台

Form II. Basic Course Platform

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
学科基础必修 Basic Courses Required	213100035618	无机化学（B）Z Inorganic Chemistry (B) Z	3	48	48				1	
	213110035818	无机化学实验（C） Inorganic Chemistry Experiments (C)	0.5	16		16			1	
	2101000113	高等数学 A(1) Higher Mathematics A (1)	4	80	64			16	1	
	2101000118	线性代数 Linear Algebra	2	48	32			16	1	
	213103005213	分析化学（B） Analytical Chemistry (B)	2	32	32				1	
	213110036418	分析化学实验（B） Analytical Chemistry Experiments (B)	1	32		32			1	
	210102000413	高等数学 A(2) Higher Mathematics A (2)	5	96	80			16	2	
	211100011118	大学物理 B(1) College Physics B (1)	3	56	48			8	2	
	211112000113	大学物理实验(1) University Physics Experiments (1)	0.5	16		16			2	
	2241000067	工程测量学 Engineering Surveying	2	32	32				2	
	224100000913	画法几何&工程制图 Descriptive Geometry & Engineering Drawing	2	32	32				3	
	2101000112	概率论与数理统计 Probability Theory and Mathematical Statistics	2.5	56	40			16	3	
	211100011218	大学物理 B(2) College Physics B (2)	2	40	32			8	3	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	211112000213	大学物理实验(2) University Physics Experiments (2)	0.5	16		16			3	
	213100035218	有机化学（C） Organic Chemistry (C)	3	48	48				3	
	213110036118	有机化学实验（B） Organic Chemistry Experiments (B)	1	32		32			3	
	213100034518	物理化学（B） Physical chemistry (B)	3.5	56	56				3	
	213110034618	物理化学实验 Physical Chemistry Experiments	1	32		32			3	
	224100017818	环境学 Environmental Science	2	32	32				3	
	224100024518	CAD 制图 Computer Aided Design	1/1.5	64	16	48			4	
	214103026713	环境微生物学 Environmental Microbiology	2	32	32				4	
	214113026613	环境微生物学实验 Experiments of Environmental Microbiology	0.5	16	0	16			4	
学分要求：必修学分 45.5 **Demand of Credits: Required 45.5**										

表三：专业课程平台

Form III: Major Course Platform

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业必修 Required Courses	224100024418	现代环境分析 Modern Environmental Analysis	2.5	40	40				4	
	2241100074	现代环境分析实验 Experiments of Modern Environmental Analysis	1	32	0	32			4	
	224100017918	环境化学 Environmental Chemistry	3	48	48				4	
	213113018813	环境化学实验 Experiments of Environmental Chemistry	1.5	48		48			4	
	213103022413	环境监测（A） Environmental Monitoring (A)	3	48	48				5	
	213113023713	环境监测实验（A） Experiments of Environmental Monitoring (A)	1.5	48		48			5	
	213103016013	环境土壤学 Environmental Soil Science	2	32	32				5	
	213113031313	环境土壤学实验 Experiments of Environmental Soil Science	1	32		32			5	
	224100018018	环境工程学（A） Environmental Engineering (A)	4	64	64				5	
	224110022518	环境工程学实验 Experiments of Environmental Engineering	2	64		64			5	
	224100018118	环境生态学（A） Environmental Ecology (A)	3	48	48				5	
	224100003213	环境影响评价 Environmental Impact and Assessment	2	32	32				6	
	224110004113	环境科学综合实验 Comprehensive Experiments	2	64		64			6	
专业选修 Elective courses	224100022818	环境数据分析方法 Methods of Environmental Data Analysis	1.5/0.5	40	24	16			4	专业选修总学分 24 分，其中：实践学分不低于 1 学分。第四学期至少选修 4 学分；第五学期
	2241000124	物理性污染控制工程 Physical Pollution Control	2	32	32				4	
	213103029713	环境规划与管理 Environmental Plans and Management	2	32	32				6	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	224100014918	固体废物处置与资源化 Disposal and Reuse of Solid Waste	2	32	32				6	至少选修 2 学分；第六学期至少选修 15 学分；第七学期至少选修 3 学分。
	213103022013	环境毒理学 Environmental Toxicology	2	32	32				6	
	213103020913	环境样品前处理技术 Pre-treating Methods for Environmental Samples	1.5	24	24				6	
	224100024218	清洁生产 Cleaner Production	1.5	24	24				6	
	224100024118	环境科学专业英语 Specialized English	2	32	32				6	
	224100022618	环境纳米材料 Environmental nanomaterials	2	32	32				6	
	224100001713	地理信息系统 Geographic Information System	2	32	32				5	
	213103017313	水环境保护 Protection of Water Environment	2	32	32				6	
	213103018913	污染控制微生物工程 Pollution Control Microbiology Engineering	1.5	24	24				6	
	213103019313	环境信息系统 Environmental Information Systems	1.5	24	24				6	
	224100025118	环境经济学 Environmental Economy	2	32	32				6	
	224100022418	环境法学 Environmental Laws	2	32	32				6	
	224100023818	生态监测与评价 Ecological Monitoring and Assessment	1.5	24	24				7	
	224100019618	环境监测设备及应用 Environmental Monitoring Instruments and Application	1.5	24	24				7	
	213103014813	水土保持 Water and Soil Conservation	1.5	24	24				7	
	224100022118	文献检索及科技论文写作 Document Retrieval and Scientific Paper Writing	0.5/0.5	24	8	16			7	
	224100024018	高级氧化技术 Advanced Oxidizing Technology	2	32	32				7	
	213103021413	生态水文学 Ecological Hydrology	1.5	24	24				7	
	213103024313	膜处理技术 Membrane Treatment Technology	1.5	24	24				7	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
	213103021013	给水处理 Treatment of Water Supply	1.5	24	24				7	
	213103020613	给排水与环境工程施工 Water/Wastewater & Environmental Construction	1.5	24	24				7	
学分要求: 52.5 (其中必修学分 28.5，选修学分 24) Demand of Credits: 52.5 (Required 28.5, Elective 24)										

表四：集中性实践课程平台

Form IV: Practical Course Platform

课程类别 Course Classified			课程编号 Course Code	课程名称 Course Name	学分 Crs.	周数/学时数 Total Period/Hrs.	学时类型 Period Classified		开课学期 Semester
							实践 Exp.	实习 Pra.	
实践 Practice	实践 Course Practice	必修 Compulsory Courses	112110010718	劳动教育 Labor Education	1	32	√		1
			109110000318	军事技能训练 Military Skill Training	2	36	√		1
	课程设计 Project Design	必修 Compulsory Course	224110024818	环境影响评价课程设计 Environmental Impact and Assessment: Course Design	2.5	2.5			6
	小计 Amount		5.5						
实习 internship	专业实习 Course internship	必修 Compulsory Course	701110000118	工程训练 A Engineering Practice A	1	1			5
			2241100080	工程测量学实习 Engineering Surveying Practice	0.5	0.5			2
			224110018818	环境监测实习 Environmental Monitoring Practice	1	1			5
			224110006213	认识实习 Knowledge Acquirement	1	1			5
	毕业实习 Graduation internship	必修 Compulsory Course	224110000313	生产（或毕业）实习 Production (or Graduation) Practice	3	3			7
	毕业论文（设计） Graduation Thesis (Project)	必修 Compulsory Course	224110000113	毕业设计（论文） Graduation Project（Thesis）	10	10			8
	小计 Amount		16.5						
学分要求: 22（必修学分 22，选修学分 0） Demand of Credits: 22 (Required 22, Elective 0)									

表五：素质拓展平台

Form V: Quality Development Platform

课程编号 Course Code	课程/模块名称 Course Name	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
109100000418	军事理论 Military Theory	2	36	36				1
109100000818	国家安全教育 National Security Education	1	16	16				2
/	艺术实践	0/1	24			24		1-7
115100000113	就业指导 Employment Guidance	1	16	16				6
/	创新教育 Innovation Education	3	/					
/	创业教育 Entrepreneurship Education	2	/					
小计 Amount		10						
学分要求：必修学分 10 **Demand of Credits: Required 10**								

水文与水资源工程专业本科人才培养方案

Undergraduate Program for Hydrology and Water Resources Engineering

一、培养规格

□ Education Standards

I）学制

Length of Schooling

修业年限：4 年

Duration: 4 years

II）学位

Degree

授予学位：工学学士学位

Degrees conferred: Bachelor of Engineering

二、培养目标

□ Cultivation Objectives

以立德树人为根本任务，以铸牢中华民族共同体意识为主线，以服务地方经济社会发展为导向，培养德智体美劳全面发展，具有良好的思想品德、人文素养、职业道德和敬业精神，具备扎实的基础知识，富有创新精神的水文与水资源工程专业高级专门人才。学生毕业后 5 年左右，能够在水利（水务）、国土、能源、交通、城建、农林、环保、地矿等部门从事水文、水资源及水环境领域的勘测、评价、规划、设计、预测预报、管理和科学研究等方面的工作，并达到以下目标：

目标 1（知识能力）：能够掌握水文与水资源工程专业相关技术发展现状，融会贯通工程数理基础知识和水文与水资源工程专业知识，具备独立发现、研究与解决复杂工程问题的能力。

目标 2（实践能力）：具备系统思维和可持续发展理念，能将知识有效运用到水文、水资源及水环境相关的勘测评价、规划设计、预测预报的实践中，并具备一定的创新能力。

目标 3（职业素养）：具备家国情怀、高尚的职业道德、社会责任感和良好的人文科学素养，具有与主管部门、业界同行、相关专业的配合和协调能力，具有一定的国际视野和文化交流能力。

目标 4（发展潜能）：具有终身学习的能力，具有一定的批判性思维能力，能及时了解水文与水资源工程专业最新理论、技术及国际前沿动态，有效地持续自主学习以适应社会和行业的多样性发展。

To promote moral education as the fundamental task, to strengthen the sense of community of the Chinese nation as the main task, to serve local economic and social development as the guide, this major aims at cultivating senior engineering professionals who meet the needs of economic and social development of the country, region or ethnic minority, have good moral education, humanistic quality, professional ethics and professionalism, solid basic knowledge and innovative spirit. After graduating 5 years, students can be engaged in surveying, evaluating, planning, designing, predicting and forecasting, managing and researching in the field of hydrology, water resources, water environment and hydroecology in the departments of water conservancy, water affairs, land, energy, transportation, urban construction, agriculture and forestry, environmental protection, geology and mineral and achieve the following goals:

Cultivation Objective □ (knowledge capability): Be able to grasp the development status of technologies in hydrology and water resources engineering, master the basic knowledge of engineering, mathematics and professional knowledge, and have the ability to discover, research and solve complex engineering problems independently.

Cultivation Objective II (practical ability): Have the systematic thinking and idea of sustainable development, can effectively apply knowledge to the practice of surveying and evaluating, planning and designing, predicting and forecasting, and have the innovation ability.

Cultivation Objective III (professional quality): Patriotic, noble professional ethics, social responsibility and good humanities literacy, have the ability to cooperate and coordinate with competent authorities, industry peers, and related majors, and have certain international vision and cultural exchange ability.

Cultivation Objective IV (potential for development): Have the ability of lifelong learning and certain critical thinking skills, able to keep abreast of the latest theories, technologies and international cutting-edge developments in hydrology and water resources engineering, and can study independently, effectively and continuously to adapt to the diverse development of society and industry.

三、毕业要求

□ Basic Requirements for Graduation

本专业学生学习数学、自然科学和水文水资源、水环境等方面的基本理论和专业知识，进行应用基础研究和技术开发方面的科学思维和科学实验训练，掌握工程测量、科学运算、实验和测试等方面的实践技能，能够运用数学、自然科学和水文水资源、水环境方面的基础理论和基本技能，分析解决本专业及相关领域实际问题，具有从事本专业及相关领域科学研究和组织管理的基本能力。

毕业生应获得以下几方面的知识、能力和素养：

1. 工程知识：能够将数学、自然科学、工程基础知识，水文、水资源、水环境专业知识用于解决复杂工程问题。

1.1 掌握数学、自然科学、工程基础知识与基本方法，并能应用于表述复杂工程问题。

1.2 能够针对水文、水资源及水环境相关复杂工程问题，构建恰当的数学模型，并进行推演和求解。

1.3 能够将相关知识和数学模型方法用于水文、水资源及水环境等专业相关复杂工程问题解决方案的比较和综合。

2. 问题分析：能够应用数学、自然科学、工程科学的基本原理，识别、表达、并通过文献研究分析水文、水资源及水环境有关的复杂工程问题，以获得有效结论。

2.1 能够应用数学、自然科学和工程科学的基本原理，识别和表达水文、水资源及水环境相关的复杂工程问题。

2.2 能够通过文献研究，对水文、水资源及水环境相关的复杂工程问题进行分析，获得有效结论。

3. 设计/开发解决方案：能够设计针对水文、水资源及水环境有关的复杂工程问题的解决方案，设计满足特定需求的系统、单元或工艺流程，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。

3.1 能够针对水文、水资源及水环境有关的复杂工程问题，掌握设计方法和技术。

3.2 能够针对水文、水资源及水环境有关的复杂工程问题，进行具体的工程设计，并能够在设计环节中体现创新意识。

3.3 能够针对水文、水资源及水环境有关的复杂工程问题，在具体的工程设计中，考虑社会、经济、健康、安全、生态、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，对水文、水资源及水环境有关的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

4.1 能够基于科学原理，通过调研和分析，确定水文、水资源及水环境相关复杂工程问题的研究路线和实验方案。

4.2 能够根据设计的实验方案，安全地开展实验研究，正确采集、收集和测量数据。

4.3 能够对实验结果进行分析和解释，通过信息综合分析得到合理有效的结论。

5. 使用现代工具：能够针对水文、水资源及水环境有关的复杂工程问题，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的预测与模拟，并能够理解其局限性。

5.1 了解和掌握水文、水资源及水环境等方面常用的现代仪器、信息技术工具和相关软件的原理和使用方法。

5.2 能够选择与使用恰当的技术、资源和工具，用于水文、水资源及水环境相关复杂工程问题的分析、计算和设计，并理解其局限性。

5.3 能够开发、选择和使用现代工具，用于水文、水资源及水环境相关复杂工程问题的模拟与预测，并理解其局限性。

6. 工程与社会：熟悉国家和地方涉水的政策和法律法规，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。

6.1 了解国家和地方涉水的政策和法律法规，熟悉相关的技术标准体系，理解民族、风俗、宗教等文化对涉水工程的影响。

6.2 能够客观评价水文、水资源及水环境相关的工程方案对社会、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水文水资源复杂工程问题的工程实践对环境、社会可持续发展的影响。

7.1 能够正确理解针对涉水复杂工程问题的工程实践对环境、社会可持续发展的影响，建立环境和可持续发展意识。

7.2 能够合理评价水文、水资源及水环境相关工程实践对环境、社会可持续发展的影响。

8. 职业规范：具有深厚的爱国精神、人文社会科学素养、社会责任感和历史使命感，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。

8.1 树立和践行社会主义核心价值观，理解个人与社会的关系，了解中国国情，明确个人作为社会主义事业建设者和接班人所肩负的责任和使命。

8.2 理解诚实公正、诚信守则的工程职业道德和规范，并能在水文水资源工程实践中自觉遵守。

8.3 理解工程师对公众的安全、健康和福祉，以及环境保护的社会责任，能够在工程实践中自觉履行。

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。

9.1 具有良好的人际交往能力，具有一定执行能力，能够在多学科背景下的团队中承担个体角色，并发挥个体优势。

9.2 具有一定的组织能力，能够在团队中承担成员及负责人的角色，并发挥管理、协调作用。

10. 沟通：能够就水文、水资源及水环境有关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。

10.1 针对水文、水资源及水环境的复杂工程问题，具备口头和书面等多种形式的表达能力。

10.2 能够理解和尊重文化的差异，能够就水文、水资源及水环境相关的复杂工程问题与业界同行与社会公众进行有效沟通和交流。

10.3 具备宽广的国际视野和外语交流能力，能在跨文化背景下交流水文、水资源及水环境相关问题。

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。

11.1 理解并掌握工程管理原理与经济决策方法。

11.2 理解水文、水资源及水环境相关复杂工程问题中的工程管理与经济决策问题。

11.3 能在多学科环境下，掌握和运用工程项目管理及成本控制原理方法，具备较强的项目管理能力。

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。

12.1 具有自主学习和终身学习的意识。

12.2 具备不断学习和适应发展的能力。

Students in this major learn the basic theories and professional knowledge of mathematics, natural science, hydrology and water resources, water environment, etc., conduct scientific thinking and scientific experimental training in applied basic research and technology development, master the practical skills of engineering measurement, scientific arithmetic, experiments and tests, etc., and be able to apply the basic theories and skills in mathematics, natural science, hydrology and water resources, water environment to analyze and solve the practical problems in this profession and related fields, and have the basic ability to engage in scientific research and organization management in this profession and related fields.

Graduates should acquire the following knowledge, abilities and qualities:

1. Engineering knowledge: Be able to apply basic knowledge of mathematics, natural science and engineering, and professional knowledge of hydrology, water resources and water environment to solve complex engineering problems.

1.1 Master basic knowledge and basic methods of mathematics, natural sciences, and engineering, and be able to apply them to formulate complex engineering problems.

1.2 Be able to construct appropriate mathematical models for complex engineering problems related to hydrology, water resources and water environment, and to derive and solve them.

1.3 Be able to apply relevant knowledge and mathematical modeling methods to the comparison and synthesis of solutions to complex engineering problems related to hydrology, water resources and the environment.

2. Problem Analysis: Be able to apply the basic principles of mathematics, natural sciences, and engineering sciences to identify, express, and analyze complex engineering problems related to hydrology, water resources, and water environment through literature research, and to obtain valid conclusions.

2.1 Be able to apply basic principles of mathematics, natural sciences, and engineering sciences

to identify and express complex engineering problems related to hydrology, water resources, and water environment.

2.2 Be able to analyze complex engineering problems related to hydrology, water resources, and water environment through literature research to obtain valid conclusions.

3. Design / develop solutions: Be able to design solutions to complex engineering problems related to hydrology, water resources and water environment, design systems, units or processes that meet specific needs, and be able to demonstrate a sense of innovation in the design process, taking into account social, health, safety, legal, cultural and environmental factors.

3.1 Be able to master design methods and techniques for complex engineering problems related to hydrology, water resources and water environment.

3.2 Be able to carry out specific engineering designs for complex engineering problems related to hydrology, water resources and water environment, and be able to demonstrate a sense of innovation in the design process.

3.3 Be able to consider social, economic, health, safety, ecological, legal, cultural, and environmental factors in specific engineering designs for complex engineering problems related to hydrology, water resources, and water environment.

4. Research: Be able to apply scientific principles and methods to research complex engineering problems related to hydrology, water resources, and water environment, including designing experiments, analyzing and interpreting data, and synthesizing information to reach reasonable and valid conclusions.

4.1 Be able to determine the research route and experimental protocol for complex engineering problems related to hydrology, water resources and water environment through research and analysis based on scientific principles.

4.2 Be able to safely conduct experimental research and properly collect, gather and measure data according to the designed experimental protocol.

4.3 Be able to analyze and interpret experimental results and obtain reasonable and valid conclusions through comprehensive analysis of information.

5. Use modern tools: Be able to develop, select and use appropriate techniques, resources, modern engineering tools and information technology tools for complex engineering problems related to hydrology, water resources and water environment, including prediction and simulation of complex engineering problems, and be able to understand their limitations.

5.1 Understand and master the principles and usage of modern instrumentation, information technology tools and related software commonly used in hydrology, water resources and water environment.

5.2 Be able to select and use appropriate techniques, resources and tools for the analysis, calculation and design of complex engineering problems related to hydrology, water resources and water environment, and understand their limitations.

5.3 Be able to develop, select and use modern tools for the simulation and prediction of complex engineering problems related to hydrology, water resources and water environment, and understand their limitations.

6. Engineering and Society: Be familiar with national and local water-related policies and laws and regulations, and be able to perform reasonablely analysis based on engineering-related background knowledge, evaluate the impacts of professional engineering practices and solutions to complex engineering problems on the society, health, safety, legal, and culture, and understand the responsibilities to be assumed.

6.1 Understand national and local water-related policies and laws and regulations, be familiar with relevant technical standard systems, and understand the impact of ethnicity, customs, religion and other cultures on water-related projects.

6.2 Be able to objectively evaluate the impacts of engineering solutions related with hydrology, water resources, and water environment on the society, health, safety, legal, and culture, and understand the responsibilities that should be assumed.

7. Environment and Sustainable Development: Be able to understand and evaluate the impacts of engineering practices for complex engineering problems related to hydrology and water resources on the environment and sustainable development of society.

7.1 Be able to understand the impacts of engineering practices for complex water-related engineering problems on environment and social sustainability, and develop an awareness of environment and sustainable development.

7.2 Be able to reasonably evaluate the impact of engineering practices related to hydrology, water resources and water environment on the environment and sustainable development of society.

8. Professional norms: Have a deep patriotic spirit, humanistic, social and scientific quality, a sense of social responsibility and a sense of historical mission, and be able to understand and abide by engineering professional ethics and norms and fulfill responsibilities in engineering practice.

8.1 Establish and practice socialist core values, understand the relationship between individuals and society, understand the national conditions of China, and clarify the responsibilities and missions of individuals as builders and successors of the socialist cause.

8.2 Understand the engineering professional ethics and norms of honesty, fairness and integrity, and be able to consciously comply with them in the engineering practice of hydrology and water resources.

8.3 Understand the social responsibility of engineer for the safety, health and welfare of the public, and environmental protection, and be able to consciously fulfill them in engineering practice.

9. Individual and team: Be able to assume the role of individual, team member, and leader in a multidisciplinary team.

9.1 Have good interpersonal skills and certain perform ability, be able to take on individual role in a multidisciplinary team and to take advantage of individual advantages.

9.2 Have certain organizational skills, be able to assume the role of member and leader in a team and play a managerial and coordinating role.

10. Communication and presentation: Be able to communicate effectively and interact with people of the same professionin and the public on complex engineering problems related to hydrology, water resources, and water environment, including writing reports and design briefs, presenting statements, and articulating or responding to instructions. Have a broad international perspective, and be able to communicate and interact in a cross-cultural context.

10.1 Be able to articulate in a variety of forms, both oral and written, for complex engineering problems in hydrology, water resources, and water environment.

10.2 Be able to understand and respect cultural differences and communicate effectively with people of the same professionin and the public on complex engineering problems related to hydrology, water resources, and water environment.

10.3 Have a broad international perspective and foreign language communication skills to communicate in a cross-cultural context on problems related to hydrology, water resources and water environment.

11. Project management: Understand and master the principles of engineering management and economic decision making methods and be able to apply them in a multidisciplinary environment.

11.1 Understand and master the principles of engineering management and economic decision making methods.

11.2 Understand engineering management and economic decision making methods in complex engineering problems related to hydrology, water resources and water environment.

11.3 Be able to master and apply the principles and methods of engineering project management and cost control in a multidisciplinary environment, and have strong project management skills.

12. Lifelong learning: Have the awareness of independent and lifelong learning, and the ability to continuously learn and adapt to development.

12.1 Have the consciousness of self-directed learning and lifelong learning

12.2 Be able to continuously learn and adapt to development.

四、毕业要求与培养目标对应矩阵

□ Matrices of Graduation Requirements and Education Objectives

培养目标及毕业要求 Cultivation Objectives & Graduation Requirements	培养目标 1 Cultivation Objective □	培养目标 2 Cultivation Objective II	培养目标 3 Cultivation Objective III	培养目标 4 Cultivation Objective □
毕业要求 1 Graduation Requirement □	√			
毕业要求 2 Graduation Requirement II		√		
毕业要求 3 Graduation Requirement III		√		
毕业要求 4 Graduation Requirement IV		√		
毕业要求 5 Graduation Requirement V		√		
毕业要求 6 Graduation Requirement VI			√	
毕业要求 7 Graduation Requirement VII			√	
毕业要求 8 Graduation Requirement VIII			√	
毕业要求 9 Graduation Requirement □			√	√
毕业要求 10 Graduation Requirement □			√	√
毕业要求 11 Graduation Requirement □			√	
毕业要求 12 Graduation Requirement □II				√

五、毕业要求实现矩阵

□ Matrices of relations of courses and Graduation Requirements

课程及毕业要求	1. 工程知识			2. 问题分析		3. 设计/开发解决方案			4. 研究			5. 使用现代工具			6. 工程与社会		7. 环境和可持续发展		8. 职业规范			9. 个人和团队		10. 沟通和表达			11. 项目管理			12. 终身学习	
	1.1	1.2	1.3	2.1	2.2	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	8.3	9.1	9.2	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2
英语																							M			H	M				
体育																			M			M								M
思想道德与法治															M					H					M					M	
形势与政策															M				H		H				M					H	
中华民族共同体概论															H										H						
中国近现代史纲要																M					H				M					H	
马克思主义基本原理															M				H				M								
毛泽东思想和中国特色社会主义理论体系概论															M						H	M			M						
习近平新时代中国特色社会主义思想概论															M						H	M			M					H	
无机化学			H						M								M														
无机化学实验									M			H								M			M								
分析化学			H						M								M														
分析化学实验									M			H								M			M								
高等数学	H				H				M			M																		M	
线性代数	H				H				M			M																		M	
大学物理	M				H						M																				

课程及毕业要求	1. 工程知识			2. 问题分析		3. 设计/开发解决方案			4. 研究			5. 使用现代工具			6. 工程与社会		7. 环境和可持续发展		8. 职业规范			9. 个人和团队		10. 沟通和表达			11. 项目管理			12. 终身学习	
	1.1	1.2	1.3	2.1	2.2	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	8.3	9.1	9.2	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2
大学物理实验					M						H	M								M			M							
工程测量学										M		H							M										M	
概率论与数理统计	H				H				M			M																	M	
程序设计语言（Python）		M			M			L						H																M
程序设计语言（Matlab）		M			M			L						H																M
水利工程制图		M										H			L															
自然地理学		M		M				M							M															
气象学			M	M														L												
水利工程概论	M															M														
水力学	H		M						M																					
水力学实验						M					H	M											M							
工程力学	H		M						M																					
水文学原理	M			H					M			L																		
水文学原理实验									M			M																		
水文统计						M					L		L																	
水文测验				L						H		M																		
水文测验实验											M		H																	
水环境监测					M				M									M												
水环境监测实验						M							H				M											M		
水文预报					H			M					M																	
水文预报实验							M							H																
水文分析与计算	M			H		H																								
地下水水文学	H			H		M																								

课程及毕业要求	1. 工程知识			2. 问题分析		3. 设计/开发解决方案			4. 研究			5. 使用现代工具			6. 工程与社会		7. 环境和可持续发展		8. 职业规范			9. 个人和团队		10. 沟通和表达			11. 项目管理			12. 终身学习	
	1.1	1.2	1.3	2.1	2.2	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	8.3	9.1	9.2	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2
河流动力学			M			M			M																						
水动力学实验						M					M																				
水利经济			M																									H			
水环境化学	M			M				M									M														
水环境化学实验						M							M				M											M			
水利计算			M			M																									
水资源利用								H	H									M													
水环境保护			H							M							M														
地理信息系统与遥感应用		M				M			M																						
地理信息系统与遥感应用实验						M						H																			
地下水污染与防治			H					M				M																			
地下水污染与防治实验				H		M												M													
劳动教育																			M			H		M							
军事技能训练																						H								H	
水文测验课程设计				M		M							H																		
水文统计课程设计				M			M				L																				
水文预报课程设计					M			M					M																		
水文分析与计算课程设计						H					L											H									
地下水水文学课程设计				M		M					M																				
水利计算课程设计								H		L														H							

课程及毕业要求	1. 工程知识			2. 问题分析		3. 设计/开发解决方案			4. 研究			5. 使用现代工具			6. 工程与社会		7. 环境和可持续发展		8. 职业规范			9. 个人和团队		10. 沟通和表达			11. 项目管理			12. 终身学习	
	1.1	1.2	1.3	2.1	2.2	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	8.3	9.1	9.2	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2
水资源利用课程设计				M			H																								
水环境保护课程设计							L				H						M														
工程测量学实习									M			H									M			M							
认识实习																M		L								L					
工程训练							H															M									
生产（或毕业）实习			M	H			M											H					H					H			
毕业设计（论文）			M		M			H		H			M			M	M									H			M		H
军事理论																				H		M					M		M		
国家安全教育																				H		M							M		
艺术实践																									M					H	
就业指导		M																						M						M	

注：H、M、L 表示课程对毕业要求达成的关联度强、中等、弱。

六、核心课程

□ Core Courses

自然地理学 Physical Geography、气象学 Meteorology、水力学 Hydraulics、水文学原理 Principles of Hydrology、水文统计 Hydrological Statistics、水文测验 Hydrometry、水文预报 Hydrological Forecasting、水文分析与计算 Hydrological Analysis and Computation、水利计算 Water Conservancy Computation、水资源利用 Water Resources Utilization、水环境保护 Protection of Water Environment、地下水水文学 Groundwater Hydrology、水环境化学 Aqueous Environmental Chemistry、地理信息系统与遥感应用 Geographic Information System and Remote Sensing Applications

七、主要实践性教学环节

□ Main Internship and Practical Training

水力学实验 Hydraulics Experiments、水文测验实验 Hydrometry Experiments、水文学原理实验 Experiments for Principles of Hydrology、水文预报实验 Experiments of Hydrological Forecasting、水环境化学实验 Experiments of Aqueous Environmental Chemistry、水环境监测实验 Experiments of Water Environmental Monitoring、水动力学实验 Experiments of Water Dynamics、地理信息系统与遥感应用实验 Experiments of Geographic Information System and Remote Sensing Applications、地下水污染与防治实验 Experiments of Groundwater Contamination and Protection、水文测验课程设计 Project Design for Hydrometry、水文统计课程设计 Project Design for Hydrological Statistics、水文预报课程设计 Project Design for Hydrological Forecasting、地下水水文学课程设计 Project Design for Groundwater Hydrology、水文分析与计算课程设计 Project Design for Hydrological Analysis and Computation、水利计算课程设计 Project Design for Water Conservancy Computation、水资源利用课程设计 Project Design for Water Resources Utilization、水环境保护课程设计 Project Design for Protection of Water Environment、工程训练 Engineering Training、认识实习 Cognition Practice、生产（或毕业）实习 Production (or Graduation) Practice、毕业设计（论文）Graduation Project (Thesis)

八、学时与学分

□ Hours/Credits

学时学分构成表

Table of Hours and Credits

<table>
<tr><th colspan="3" rowspan="2">课程类别
Course Classified</th><th rowspan="2">学时/周数
Period/Weeks</th><th colspan="2">学分
Credits</th><th rowspan="2">学分比例
Proportion of Crs.</th></tr>
<tr><th>理论
Theory</th><th>实践（双创）
Practice（I&E Crs.)</th></tr>
<tr><td colspan="2" rowspan="2">通识课程平台
General Course Platform</td><td>必修
Compulsory</td><td>578</td><td>28</td><td>3</td><td>18.2%</td></tr>
<tr><td>选修
Elective</td><td>144</td><td>9</td><td>/</td><td>5.3%</td></tr>
<tr><td colspan="2">学科基础课程平台
Basic Course Platform</td><td>必修
Compulsory</td><td>944</td><td>41.5</td><td>6</td><td>27.9%</td></tr>
<tr><td colspan="2" rowspan="2">专业课程平台
Major Course Platform</td><td>必修
Compulsory</td><td>672</td><td>32</td><td>5</td><td>21.8%</td></tr>
<tr><td>选修
Elective</td><td>104</td><td>5.5</td><td>0.5</td><td>3.5%</td></tr>
<tr><td colspan="2" rowspan="2">集中性实践课程平台
Practical Teaching Platform</td><td>必修
Compulsory</td><td>68+8W</td><td>0</td><td>29.5</td><td rowspan="2">17.4%</td></tr>
<tr><td>选修
Elective</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td rowspan="2">素质拓展平台
Quality Developme nt Platform</td><td>双创学分
Innovation & Entrepreneursh ip Credits</td><td rowspan="2">必修
Compulsory</td><td>/</td><td>/</td><td>5</td><td>2.9%</td></tr>
<tr><td>其他学分
Other Credits</td><td>92</td><td>4</td><td>1</td><td>2.9%</td></tr>
<tr><td rowspan="2">小计
Amount</td><td colspan="2">必修学分总数
Compulsory Credits</td><td>155</td><td>选修学分总数
Elective Credits</td><td>15</td><td>选修学分比例
Proportion of Elective Credits</td><td>8.8%</td></tr>
<tr><td colspan="2">理论学分总数
Theory Credits</td><td>120</td><td>实践学分总数
Practice Credits</td><td>45</td><td>实践教学环节比例
Proportion of Internship and Practical Training</td><td>26.5%</td></tr>
<tr><td colspan="3">最低毕业学分
The Lowest Graduate Credits</td><td colspan="5">170</td></tr>
</table>

注：

ϕ学分比例：各教学平台或教学环节占最低毕业学分的比例。

□实践教学环节，包括集中性实践教学环节和实验教学（不含体育）。集中性实践教学环节，包括培养方案内集中实施的实践、实习、课程设计、毕业设计、毕业论文、社会调查等；实验教学，包括课内实验和独立开设实验。

□必修学分总数=通必学分+学科基础学分+专必学分+实践必修学分+素质拓展学分；

选修学分总数=通选学分+专选学分+实践（选修）学分；

理论学分总数=所有平台理论学分之和（不包括双创学分）；

实践学分总数=所有平台实践学分之和（不包括双创学分）；

最低毕业学分=必修学分+选修学分=理论学分+实践学分+双创学分。

九、教学进程计划表 /□ **Teaching Schedule Form**

表一：通识课程平台 / Form □: General Course Platform

表一（A）：通识必修课程/Form I (A):General Compulsory Courses (General Required)

课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
20W100000613	英语 1 English 1	2	32	32				1
218110000313	体育 1 Physical Education 1	0/1	26			26		1
217100014918	思想道德与法治 Moral Education and Rule of Law	2.5/0.5	52	40		12		2
217100015218	形势与政策 Situation and Policy	2	32	32				2
225100000118	中华民族共同体概论 Education of Chinese Minzu Community Consciousness	1.5/ 0.5	36	24		12		2
20W100000713	英语 2 English 2	2	32	32				2
218110000213	体育 2 Physical Education 2	0/1	32			32		2
2171000122	中国近现代史纲要 Essentials of China Modern and Contemporary History	2.5/ 0.5	52	40		12		3
20W100000813	英语 3 English 3	2	32	32				3
218110015018	体育 3 Physical Education 3	0/0.5	16			16		3
217100012318	马克思主义基本原理 The Basic Principles of Marxism	2.5/0.5	52	40		12		4
217100015818	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 Socialist Theoretical System with Chinese Characteristics	2.5/0.5	52	40		12		5
217100015918	习近平新时代中国特色社会主义思想概论 Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	2.5/0.5	52	40		12		5
20W100000913	英语 4 English 4	2	32	32				4
218110014718	体育 4 Physical Education 4	0/0.5	16			16		4
218110014018	体育 5	0/0.5	16			16		5

	Physical Education 3							
218110015318	体育 6 Physical Education 3	0/0.5	16			16		6
学分要求：必修学分 31 Demand of Credits: Required 31								

注：大学英语扩展课程包括□20W100000813 英语 3□20W100000913 英语 4□20W100001018 学术英语阅读与写作□20W100001318 高级媒体英语视听说□20W100001518 英语国家社会与文化□20W100001618 中华文化导论（英文），要求在第 3,4 学期完成 4 学分即可。

表一（B）：通识选修课程（通选课）/Form I (B): General Elective Courses

模块 Module	**学分 Crs.**
心理健康与安全 Psychological Health and Safety	2
人文素养与写作 Humanistic Accomplishment and Writing	2
科学技术与科普 Science and Technology & Science Popularization	2
艺术体验与审美 Art Appreciation and Aesthetics	1
国际视野与世界 Contemporary China and the World	1
中华文化与文明 Chinese Culture and Civilization	1
学分要求：选修学分 9 Demand of Credits: Elective 9	

表二：学科基础课程平台

Form II. Basic Course Platform

课程类别 Course Classified	课程编号 Courses Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
学科基础必修 Basic Courses Required	213100035618	无机化学（B）Z Inorganic Chemistry (B) Z	3	48	48				1	
	213110035818	无机化学实验（C） Inorganic Chemistry Experiments (C)	0.5	16		16			1	
	213103005213	分析化学（B） Analytical Chemistry (B)	2	32	32				1	
	213110036418	分析化学实验（B） Analytical Chemistry Experiments (B)	1	32		32			1	
	2101000113	高等数学 A(1) Higher Mathematics A (1)	4	80	64			16	1	
	2101000118	线性代数 Linear Algebra	2	48	32			16	1	
	210102000413	高等数学 A(2) Higher Mathematics A (2)	5	96	80			16	2	
	211100011118	大学物理 B(1) College Physics B (1)	3	56	48			8	2	
	211110021318	大学物理实验(1) University Physics Experiments(1)	0.5	16		16			2	
	2241000067	工程测量学 Engineering Surveying	2	32	32				2	
	2101000112	概率论与数理统计 Probability Theory and Mathematical Statistics	2.5	56	40			16	3	
	211100011218	大学物理 B(2) College Physics B (2)	2	40	32			8	3	
	211110022818	大学物理实验(2) University Physics Experiments (2)	0.5	16		16			3	
	209100030818	程序设计语言（Python）I Programming Language (Python) I	1/1	48	16	32			3	
	209100031518	程序设计语言（Matlab） Programming Language (Matlab)	1/0.5	32	16	16			4	

课程类别 Course Classified	课程编号 Courses Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
学科基础必修 Basic Courses Required	224100023918	水利工程制图 Hydraulic Engineering Drawing	2/1.5	80	32	48			3	
	224100003313	自然地理学 Physical Geography	2	36	32	4			3	
	224100016718	气象学 Meteorology	2	36	32	4			3	
	213103015513	水利工程概论 An Introduction to Water Conservancy Engineering	2	32	32				3	
	213103015913	水力学 Hydraulics	4	64	64				4	
	213113015113	水力学实验 Hydraulics Experiments	0.5	16		16			4	
	224100021518	工程力学 Engineering Mechanics	2	32	32				4	
学分要求：必修学分 47.5 Demand of Credits: Required 47.5										

表三：专业课程平台

Form III: Major Courses Platform

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业必修 Required Courses	213103014913	水文学原理 Principles of Hydrology	4	64	64				4	
	224110020518	水文学原理实验 Experiments for Principles of Hydrology	0.5	16		16			4	
	224100020118	水文统计 Hydrological Statistics	1.5	24	24				4	
	224100017018	水文测验 Hydrometry	2	32	32				4	
	224110017118	水文测验实验 Hydrometry Experiments	0.5	16		16			4	
	224100016818	水环境监测 Water Environmental Monitoring	1	16	16				5	
	224110016918	水环境监测实验 Experiments of Water Environmental Monitoring	0.5	16		16			5	
	2241000120	水文预报 Hydrological Forecasting	3	48	48				5	
	2241100121	水文预报实验 Experiments of Hydrological Forecasting	0.5	16		16			5	
	2241000113	水文分析与计算 Hydrological Analysis and Computation	2	32	32				5	
	224100017218	地下水水文学 Groundwater Hydrology	2.5	40	40				5	
	213103017013	河流动力学 River Dynamics	2	32	32				5	
	2241100118	水动力学实验 Experiments of Water Dynamics	0.5	16		16			5	
	213103015613	水利经济 Economics of Water Conservancy	2	32	32				6	
	213103016413	水环境化学 Aqueous Environmental Chemistry	2	32	32				6	
	213113019013	水环境化学实验 Experiments of Aqueous Environmental Chemistry	0.5	16		16			6	
	2241000114	水利计算 Water Conservancy Computation	2	32	32				6	
	213103032313	水资源利用 Water Resources Utilization	2	32	32				6	
	213103017313	水环境保护 Protection of Water Environment	2	32	32				6	

课程类别 Course Classified	课程编号 Course Code	课程名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester	备注 Notes
					理论 The.	实验 Exp.	实践 Pra.	习题 Ueb		
专业必修 Required Courses	224100023718	地理信息系统与遥感应用 Geographic Information System and Remote Sensing Application	2	32	32				6	
	224110024318	地理信息系统与遥感应用实验 Experiments of Geographic Information System and Remote Sensing Application	1	32		32			6	
	213103032213	地下水污染与防治 Groundwater Contamination and Protection	2	32	32				6	
	224110020618	地下水污染与防治实验 Experiments of Groundwater Contamination and Protection	1	32		32			6	
专业选修 Elective courses	2241000122	水文地球化学 Hydro-geochemistry	2	32	32				5	要求选修6学分，其中第5学期最少选修2学分，第6学期最少选修1.5学分，第7学期最少选修2.5学分，其中实验最少选修0.5学分
	213103024513	环境生态学（B） Environmental Ecology (B)	2	32	32				5	
	224100019718	水文地质勘察 Hydrogeological Survey	1.5	24	24				6	
	213103021413	生态水文学 Ecological Hydrology	1.5	24	24				6	
	213103029813	水文水资源专业英语 Professional English for Hydrology and Water Resources	1.5	24	24				7	
	213103017413	水灾害防治 Water-related Disaster Prevention and Control	1.5	24	24				7	
	224100022118	文献检索及科技论文写作 Literature Retrieval and Scientific Paper Writing	0.5/0.5	24	8	16			7	
	224100021718	流域水文模型 Hydrological Model of Watershed	0.5/0.5	24	8	16			7	
学分要求: 43，其中必修学分 37，选修学分 6 Demand of Credits: 43, Required 37, Elective 6										

表四：集中性实践课程平台

Form IV: Practical Teaching Platform

课程类别 CourseClassified			课程编号 CourseCode	实践教学名称 Course Names	学分 Crs.	周数/学时数 Total Period/Hrs.	学时类型 PeriodClassified		开课学期 Semester
							实践 Exp.	实习 Pra.	
实践 Teaching Practice	实践 Teaching Practice	必修 Compulsory Courses	112110010718	劳动教育 Labor Education	1	32	√		1
			109110000318	军事技能训练 Military Skill Training	2	36	√		1
	课程设计 Project Design	必修 Compulsory Course	213113031413	水文测验课程设计 Project Design for Hydrometry	1	1W	√		4
			224110023518	水文统计课程设计 Project Design for Hydrological Statistics	1	1W	√		4
			2241100129	水文预报课程设计 Project Design for Hydrological Forecasting	1	1W	√		5
			2241100115	水文分析与计算课程设计 Project Design for Hydrological Analysis and Computation	1	1W	√		5
			224110023118	地下水水文学课程设计 Project Design for Groundwater Hydrology	1	1W	√		5
			2241100116	水利计算课程设计 Project Design for Water Conservancy Computation	1	1W	√		6
			213113029513	水资源利用课程设计 Project Design for Water Resources Utilization	1	1W	√		6
			224110000813	水环境保护课程设计 Project Design for Protection of Water Environment	1	1W	√		6
	小计 Amount				11	68+8W			
实习 Teaching Exercitation	专业实习 Teaching Exercitation	必修 Compulsory Course	2241100080	工程测量学实习 Engineering Surveying Practice	0.5	0.5W		√	2
			224110006213	认识实习 Cognition Practice	1	1W		√	4
			701110000118	工程训练 A Engineering Training	2	2W		√	5

课程类别 CourseClassified			课程编号 CourseCode	实践教学名称 Course Names	学分 Crs.	周数/学时数 Total Period/Hrs.	学时类型 PeriodClassified		开课学期 Semester
							实践 Exp.	实习 Pra.	
实习 Teaching Exercitation	毕业实习 Graduation Practice	必修 Compulsory Course	224110000313	生产（或毕业）实习 Production (or Graduation) Practice	3	3W		√	7
	毕业论文（设计） Graduation Thesis (Project)	必修 Compulsory Course	224110017618	毕业设计（论文） Graduation Project (Thesis)	12	12W		√	8
	小计 Amount				18.5	18.5W			
学分要求: 29.5，其中必修学分 29.5，选修学分 0 **Demand of Credits: 29.5, Required 29.5, Elective 0**									

表五：素质拓展平台

Form V: Quality Development Platform

课程编号 Course Code	课程/模块名称 Course Names	学分数 Crs.	总学时 Hrs.	学时类型 Period Classified				开课学期 Semester
				理论 The.	实验 Exp.	实践 Pra.	习题 Ueb	
109100000418	军事理论 Military Theory	2	36	36				1
109100000818	国家安全教育 National Security Education	1	16	16				2
	艺术实践	0/1	24			24		1-7
115100000113	就业指导 Employment Guidance	1	16	16				6
/	创新教育 Innovation Education	3	/					
/	创业教育 Entrepreneurship Education	2	/					
学分要求：必修学分 10 **Demand of Credits: Required 10**								

环境科学专业（第二学士学位）本科培养方案

一、培养目标

培养系统掌握环境科学的基本理论与基本技能，熟悉污染物在环境介质中的迁移转化与控制治理，具备从事环境监测、环境影响评价、环境咨询与管理以及科学研究的能力，能在政府、企业与教学科研单位从事环境保护相关工作的创新型高级技术骨干和管理人才。

二、培养规格

本专业学生主要学习环境科学的基本理论和基础知识，接受环境科学专业技能的基本训练，培养系统地识别、分析与解决环境问题的素质和能力。

1、具有宽厚的自然科学基础知识、良好的思想品德与人文素养；

2、掌握全面扎实的环境科学专业的基本理论与基础知识；

3、掌握环境科学专业的基本实验方法和操作技能，初步具备环境监测、环境影响评价以及环境咨询与管理的能力；

4、熟悉国家环境保护、资源利用、可持续发展等方面的相关政策、法律法规、标准和规范；

5、 具备较强的获取知识和综合运用知识的能力，初步具备创新性开展科学研究的能力。

三、学制、学分及学位

修业年限：二年

毕业学分要求：60 学分

授予学位：理学学士学位

各学期学分分配 / 课程类别		学期			
		一	二	三	四
学科基础课	理论课	2	8.5	0	0
	实验课	0	5.5	0	0
专业必修课	理论课	8	4	4	0
	实验课	2.5	0	2	2
专业选修课	理论课	1	2	4	2
	实验课	0.5	0	0	0
实践环节	实践课	0	2	0	0
毕业环节	毕业论文	0	0	0	10
小计		14	22	10	14
最低毕业学分		60			

四、核心课程

环境学、环境工程 CAD、环境化学、现代环境分析、环境监测、环境影响评价、环境生态学、环境微生物学、环境土壤学、环境工程学、环境规划与管理、环境数据分析方法

五、主要实践性教学环节

环境监测实习、环境影响评价课程设计、毕业设计（论文）、现代环境分析实验、环境化学实验、环境微生物学实验、环境监测实验、环境土壤学实验、环境工程学实验、环境科学综合实验

六、教学进程计划表

课程类别	课程编号	课程名称	学分数	总学时	学时类型			开课学期
					理论	实验	实践	
学科基础课	224100017818	环境学	2	32	32			1
	224110022018	环境工程 CAD	0/2	64		64		2
	224100022818	环境数据分析方法	1.5/0.5	40	24	16		2
	214103026713	环境微生物学	2	32	32			2
	214113026613	环境微生物学实验	0.5	16	0	16		2
	2241000073	现代环境分析	2	32	32			2
	2241100074	现代环境分析实验	1	32	0	32		2
	224100017918	环境化学	3	48	48			2
	213113018813	环境化学实验	1.5	48		48		2
专业必修课	213103022413	环境监测（A）	3	48	48			1
	213113023713	环境监测实验（A）	1.5	48		48		1
	213103016013	环境土壤学	2	32	32			1
	213113031313	环境土壤学实验	1	32		32		1
	224100018118	环境生态学（A）	3	48	48			1
	224100003213	环境影响评价	2	32	32			2
	213103029713	环境规划与管理	2	32	32			2
	224110022518	环境工程学实验	2	64		64		3
	224100018018	环境工程学（A）	4	64	64			3
	224110004113	环境科学综合实验	2	64		64		4
专业选修课	224100022118	文献检索及科技论文写作	1/0.5	32	16	16		1
	2241000124	物理性污染控制工程	2	32	32			2
	213103018913	污染控制微生物工程	1.5	24	24			2
	213103022013	环境毒理学	2	32	32			3
	213103020913	环境样品前处理技术	1.5	24	24			3
	224100024218	清洁生产	1.5	24	24			3
	224100024118	环境科学专业英语	2	32	32			3
	224100022618	环境纳米材料	2	32	32			3
	213103015413	水化学(A)	2	32	32			3
	224100001713	地理信息系统	2	32	32			3
	224100024018	高级氧化技术	2	32	32			3

	213103017313	水环境保护	2	32	32			4
	224100014918	固体废物处置与资源化	2	32	32			4
实践环节	224100022118	环境影响评价课程设计	2	2W				2
毕业环节	224110000113	毕业设计（论文）	10	10W				4