# 给排水科学与工程

# Water Science and Engineering

**专业代码：**081003　　**学制：**4 年

**Program Code:** 081003　　**Duration：**4 years

## 培养目标

培养坚持社会主义道路、德智体美全面发展，适应创新型国家建设和社会发展需要，具备扎实的自然科学与人文科学基础，掌握给排水科学与工程专业理论和知识，具备终身学习能力和国际视野，获得工程实践与基本科研训练，富有探索创新精神、团队合作精神，具有自我提升能力、解决复杂工程问题的能力以及较强创新实践能力，能在给排水工程领域从事规划、设计、施工、运行、管理、研究开发等的工作的复合型高级工程人才。学生毕业五年后，预期可成为给排水科学与工程相关领域的骨干。

## Educational Objectives:

Cultivate and adhere to the socialist road, moral and physical development in an all-round way, adapt to the needs of innovation-oriented country construction and social development, have a solid foundation of natural science and humanities, master the water supply science and engineering theory and knowledge, with lifelong learning ability and international Vision, access to engineering practice and basic scientific research training, rich exploration of the spirit of innovation, team spirit, with self-improvement ability to solve complex engineering problems and strong ability to innovate and practice, in the field of water supply and drainage engineering planning, Operation, management, research and development work of the composite senior engineering talent.After five years of graduation, students are expected to become the backbone of drainage and science and engineering related fields.

## 毕业要求：

№1.工程知识：能够将数学、自然科学知识以及相关的工程基础理论和专业知识用于解决复杂给排水工程问题。

№2.问题分析：能够应用数学、自然科学和环境科学的基本原理，识别、表达并通过文献研究分析复杂给排水工程问题，以获得有效的结论。

№3.设计/开发解决方案：能够设计针对复杂给排水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、文化及环境等因素。

№4.研究：能够基于给排水工程领域的科学原理并采用科学方法对复杂给排水工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

№5.使用现代工具：能够针对复杂给排水工程问题，开发、选择与使用适当的技术、资源、现

代工程工具和信息技术工具，包括对复杂给排水工程问题的预测与模拟，并能够理解其局限性。

№6.工程与社会：能够基于工程相关背景知识进行合理分析，评价给排水工程实践和复杂给排水工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№7.环境和可持续发展：能够理解和评价针对复杂给排水工程问题的专业工程实践对环境、社会可持续发展的影响。

№8.职业规范：具有人文社会科学素养、社会责任感，能够在给排水工程实践中理解并遵守工程职业道德和规范，履行责任。

№9.个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

№10.沟通：能够就复杂给排水工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

№11.项目管理：理解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。

№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。

## Student Outcomes:

№1.Engineering Knowledge: Ability to use mathematical, natural science knowledge and related engineering basic theory and expertise to solve complex water supply and drainage engineering problems.

№2.Problem Analysis: The basic principles of mathematics, natural sciences and environmental science can be used to identify, express and analyze complex water supply and drainage engineering problems through literature research to obtain effective conclusions.

№3.Design / Development Solution: Design a solution for complex water supply and drainage engineering problems, design systems, units or processes that meet specific needs and be able to embody innovation awareness in the design process, taking into account social, health and safety , Legal, cultural and environmental factors.

№4.Research: The research on complex water supply and drainage engineering problems can be carried out based on the scientific principles of water supply and drainage engineering and scientific methods, including design experiments, analysis and interpretation of data, and reasonable and effective conclusions through information synthesis.

№5.Use of modern tools: to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for complex water supply and drainage engineering issues, including predictions and simulations of complex water supply and drainage engineering issues and the ability to understand Its limitations.

№6.Engineering and Society: Ability to conduct rational analysis based on engineering-related background knowledge, evaluate the impact of water supply and drainage engineering practices and complex water supply and drainage engineering solutions on society, health, safety, law and culture, and understand the responsibilities that should be borne The

№7.Environment and Sustainability: Ability to understand and evaluate the impact of professional engineering practices on complex environmental issues such as environmental and social sustainable development.

№8.professional norms: a humanities and social science literacy, social responsibility, in the water supply and drainage engineering practice to understand and comply with engineering ethics and norms, to fulfill their responsibilities.

№9.Individuals and Teams: Ability to take on individual, team members, and responsible roles in a multidisciplinary team.

№10.Communication: Ability to communicate and communicate effectively with industry peers and the public on complex water supply and drainage issues, including writing reports and design manuscripts, making statements, clearly expressing or responding to directives. And have a certain international perspective, to cross-cultural background to communicate and exchange.

№11.Project Management: Understand and master engineering management principles and economic decision-making methods, and can be applied in a multidisciplinary environment.

№12.lifelong learning: a self-learning and lifelong learning awareness, have the ability to continue to learn and adapt to development.

## 专业简介

给排水科学与工程专业作为给水排水行业高级工程技术人才培养和科技发展的重要支撑，专业内涵逐步丰富，外延不断拓展，专业研究对象已从城市基础设施拓展为水的社会循环。专业面临的主要任务已从“以水量为主”转变为“水质水量并重，以水质为核心”。专业基础为化学、生物学和水力学，并大量融入现代生物工程、化学工程、材料工程等领域最新成果，不断向高新技术方向发展，形成了具有自身特点的学科专业理论体系和工程技术体系。

给排水科学与工程专业从 2004 年开始招收本科生。该专业培养从事给水排水工程规划、设计、施工、运行、管理、研究开发等工作的高级工程人才，服务于水资源利用与保护、城镇给水排水、建筑给水排水、工业给水排水和城市水系统等领域。专业实验室面积 1000$m^2$，设有水分析化学、水处理生物学、水质工程学、水力学等专业教学实验室。专业建有校外实习实践教学基地 13 个，主要包括广州开发区水质净化厂、广州市石井污水处理厂、黄陂水质净化厂、番禺沙湾水厂等。

## Program Profile：

Water Science and Engineering as a water supply and drainage industry advanced engineering and technical personnel training and scientific and technological development of the important support, professional content gradually rich, extension of continuous development, professional research object has been expanded from urban infrastructure for the social cycle of water. Professional main task has been from the "water-based" into "water quality and water quality, water quality as the core." Professional basis for the chemical, biological and hydraulics, and a large number of modern biological engineering, chemical

engineering, materials engineering and other areas of the latest achievements, and constantly to the direction of high-tech development, with its own characteristics of the disciplines of professional theoretical system and engineering technology system.

Water Science and Engineering from 2004 to recruit undergraduate students. The professional training in water supply and drainage engineering planning, design, construction, operation, management, research and development work of senior engineering talent, serving the use of water resources and protection, urban water supply and drainage, construction water supply and drainage, industrial water supply and drainage and urban water systems field.

Professional laboratory area of 1000$m^2$, with water analysis chemistry, water treatment biology, water quality engineering, hydraulics and other professional teaching laboratories. Professional construction of overseas practice practice teaching base 13, including the Guangzhou Development Zone water purification plant, Guangzhou Shijing sewage treatment plant, Huangpi water purification plant, Panyu Shawan water plant.

In recent years, the employment rate of professional graduates has remained at 100%, welcomed by the employing units.

## 专业特色：

注重学生面向应用的工程实践能力的培养，理论联系实际，依托专业教师科研课题和实际工程项目、专业设计院实际工程项目，培养学生的综合素质和能力；实施校企合作，聘请专业设计院资深设计人员讲授课程设计；擅长工业废水处理、给排水管网系统优化运行等领域。

## Program Features:

Focus on the application of students for the application of engineering practice ability, theory with practice, relying on professional teachers research projects and practical projects, professional design institute of practical projects to develop students' comprehensive quality and ability to implement school-enterprise cooperation, hired professional design institute senior Designers teach course design; good at industrial wastewater treatment, water supply and drainage network system to optimize the operation and other fields.

**授予学位：**工学学士学位

**Degree Conferred:** Bachelor of Engineering.

## 主干课程

工程力学Ⅱ、水力学、水分析化学、水处理生物学、水质工程学（Ⅰ、Ⅱ）、泵与泵站、给水排水管网系统、建筑给水排水工程。

## Core Courses:

Engineering MechanicsⅡ; Hydrology; Water Analysis Chemistry; Water Treatment Microbiology;

Engineering Science of Water Quality(Ⅰ、Ⅱ)；Pump and Pump Station；Water supply and drainage pipe network system； Building Water Supply and Sewage Engineering

## 特色课程

校企合作课程：给水厂课程设计、污水处理厂课程设计、给排水管网课程设计、建筑给水排水工程设计

创新实践课程：给排水科学与工程综合实验

创业教育课程：环保产业创业教育、技术经济学

## Featured Courses:

School-enterprise cooperation courses: water supply course design, sewage treatment plant curriculum design, water supply and drainage network course design, construction water supply and drainage engineering design

Innovative Practice Course: Comprehensive Experiment on Water Science and Engineering

## 一、教学计划总体安排表（Teaching Plan Schedule）

| 学年 | 学期 | 教学进度安排（周） | | | | | | | | | | | | | | | | | | | | 理论教学 | 考试 | 入学教育 | 军训 | 课程设计 | 大作业 | 工程训练 | 电子实习 | 综合实验 | 社会实践 | 生产实习 | 毕业实习 | 其它实习 | 中外合作项目 | 毕业设计 | 就业安排 | 机动 | 假期 | 小计 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | |
| 一 | 1 | | C | A | A | A | A | A | A | A | A | A | A | A | A | A | B | B | D | D | D | 13 | 2 | 1 | 3 | | | | | | | | | | | | | | | | |
| | 2 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Q | B | B | 17 | 2 | | | | | | | | | | | 1 | | | | | | |
| 二 | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Q | B | B | 17 | 2 | | | | | | | | | | | | | | | 1 | | |
| | 4 | A | A | A | A | A | A | G | G | A | A | A | A | A | A | A | A | A | Q | B | B | 15 | 2 | | | | | 2 | | | | | | 1 | | | | | | |
| 三 | 5 | A | A | A | A | A | A | A | A | A | A | A | A | A | K | K | E | E | H | B | B | 11 | 2 | | | 4 | | | 1 | | | 2 | | | | | | | | |
| | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | E | E | E | E | B | B | 14 | 2 | | | 4 | | | | | | | | | | | | | | |
| 四 | 7 | A | A | A | A | A | A | A | A | A | A | A | A | E | E | E | E | E | Q | B | B | 17 | 2 | | | | | | | | | | | | | | | 1 | | |
| | 8 | L | L | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | Q | Q | Q | | | | | | | | | | | | 2 | | | 15 | | 3 | | |
| 合计（周） | | | | | | | | | | | | | | | | | | | | | | 104 | 14 | 1 | 3 | 8 | | 2 | 1 | | | 2 | 2 | 2 | | 15 | | 5 | | 159 |

## 二、各类课程学分登记表（Registration Form of Curriculum Credits）

### 1. 学分统计表 (Credit statistics)

| 课程类别<br>Course Category | 课程要求<br>Requirement | 学分<br>Credits | 学时<br>Academic Hours | 备注<br>Remarks |
|---|---|---|---|---|
| 公共基础课<br>General Basic Courses | 必修<br>Compulsory | 60.0 | 924 | |
| | 通识<br>General Education | 10.0 | 160 | |
| 学科基础课<br>Disciplinary Basic Courses | 必修<br>Compulsory | 42.0 | 728 | |
| | 选修<br>Elective | 0 | 0 | |
| 专业领域课<br>Specialty- related Courses | 必修<br>Compulsory | 22.5 | 360 | |
| | 选修<br>Elective | 5.5 | 88 | |
| 合 计<br>Total | | 140.0 | 2260 | |
| 集中实践教学环节（周）<br>Practice Training (Weeks) | 必修<br>Compulsory | 37.0 | 37 周 | |
| 毕业学分要求<br>Credits Required for Graduation | 140.0+37.0=177.0 | | | |

备注：学生在取得专业教学计划规定学分的同时，还必须取得第二课堂 2 个人文素质教育学分和 4 个创新能力培养学分。

**2.类别统计表 (Category statistics)**

| 学时 Academic Hours | | | | | 学分 Credits | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 总学时数 Total | 其中 Include | | 其中 Include | | 总学分数 Total | 其中 Include | | 其中 Include | | | 其中 Include |
| | 必修学时 Compulsory | 选修学时 Elective | 理论教学学时 Theory Course | 实验教学学时 Lab | | 必修学分 Compulsory | 选修学分 Elective | 集中实践教学环节学分 Practice-concentrated Training | 理论教学学分 Theory Course Credits | 实验教学学分 Lab | 创新创业教育学分 Innovation and Entrepreneurship Education |
| 2260 | 2012 | 248 | 1904 | 384 | 177 | 161.5 | 15.5 | 37 | 127.5 | 12.5 | 12 |

## 三、专业教学计划表（Teaching Schedule）

| 类别 Course Category | 课程代码 Course No. | 课程名称 Course Title | 是否必修 C/E | 学时数 Total Curriculum Hours | | | | 学分数 Credits | 开课学期 Semester | 毕业要求 Student Outcomes |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 总学时 Class Hours | 上机 Computer-aided Class Hours | 实验 Lab Hours | 实践 Practice Hours | | | |
| 公共基础课 General Basic Courses | 143091 | 中国近现代史纲要<br>Skeleton of Chinese Modern History | 必修课C | (32)<br>24 | | | | 2.0 | 1 | №8 |
| | 143093 | 思想道德修养与法律基础<br>Cultivation of Thought and Morals & Fundamental of Law | | (40)<br>(36) | | | | 2.5 | 2 | №8,12 |
| | 143090 | 马克思主义基本原理<br>Fundamentals of Marxism Principle | | (40)<br>36 | | | | 2.5 | 3 | №8,12 |
| | 143106 | 毛泽东思想和中国特色社会主义理论体系概论<br>Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics | | (80)<br>48 | | | | 5.0 | 4 | №8 |
| | 143094 | 形势与政策<br>Analysis of the Situation & Policy | | (128) | | | | 2.0 | 1-8 | №8,12 |
| | 144001 | 大学英语（一）<br>College English(1) | | 64 | | | | 4.0 | 1 | №10 |
| | 144002 | 大学英语（二）<br>College English(2) | | 64 | | | | 4.0 | 2 | №10 |
| | 145223 | 大学计算机基础<br>College Computer Basis | | 32 | | | | 2.0 | 1 | №5 |
| | 145269 | VB 语言程序设计<br>VB Language Program Designing | | 48 | | | | 3.0 | 2 | №5 |
| | 152001 | 体育（一）<br>Physical Education (1) | | 32 | | | 32 | 1.0 | 1 | №9 |
| | 152002 | 体育（二）<br>Physical Education (2) | | 32 | | | 32 | 1.0 | 2 | №9 |
| | 152003 | 体育（三）<br>Physical Education (3) | | 32 | | | 32 | 1.0 | 3 | №9 |
| | 152004 | 体育（四）<br>Physical Education (4) | | 32 | | | 32 | 1.0 | 4 | №9 |
| | 106001 | 军事理论<br>Military Principle | | (16) | | | | 1.0 | 2 | №8 |
| | 141001 | 大学物理Ⅰ（一）<br>General Physics (1) | | 48 | | | | 3.0 | 2 | №1 |
| | 141002 | 大学物理Ⅰ（二）<br>General Physics (2) | | 48 | | | | 3.0 | 3 | №1 |
| | 141007 | 大学物理实验（一）<br>Physics Experiment(1) | | 32 | | 32 | | 1.0 | 2 | №4 |
| | 141008 | 大学物理实验（二）<br>Physics Experiment(2) | | 32 | | 32 | | 1.0 | 3 | №4 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 140189 | 微积分Ⅰ（一）<br>Calculus(1) | | 80 | | | | 5.0 | 1 | №1 |
| | 140190 | 微积分Ⅰ（二）<br>Calculus(2) | | 64 | | | | 4.0 | 2 | №1 |
| | 130199 | 画法几何及建筑制图（一）<br>Descriptive Geometry & Architecture Drawing (1) | | 48 | | | | 3.0 | 3 | №1 |
| | 130200 | 画法几何及建筑制图（二）<br>Descriptive Geometry & Architecture Drawing (2) | | 32 | | | | 2.0 | 4 | №1 |
| | 140197 | 线性代数与解析几何<br>Linear Algebra & Analytic Geometry | | 48 | | | | 3.0 | 1 | №1 |
| | 140019 | 概率论与数理统计<br>Probability & Mathematical Statistics | | 48 | | | | 3.0 | 2 | №1 |
| | | 人文科学领域<br>Humanities Field | 通识课E | 96 | | | | 6.0 | | №8,9,11 |
| | | 社会科学领域<br>Social Science Field | | 64 | | | | 4.0 | | №8,9,11 |
| | 合　计 | | | 1084 | | 64 | 128 | 70.0 | | |
| 学科基础课 Disciplinary Basic Courses | 147001 | 无机化学Ⅰ<br>Inorganic Chemistry | 必C | 32 | | | | 2.0 | 1 | №1 |
| | 147034 | 无机化学实验（工科）（一）<br>inorganic Chemistry Experiment | 必C | 16 | | 16 | | 0.5 | 1 | №4 |
| | 147020 | 有机化学Ⅰ<br>Organic Chemistry | 必C | 48 | | | | 3.0 | 2 | №1 |
| | 147007 | 有机化学实验<br>Organic Chemistry Experiment | 必C | 32 | | 32 | | 1.0 | 2 | №4 |
| | 169094 | 水分析化学<br>Water Analysis Chemistry | 必C | 40 | | | | 2.5 | 3 | №1 |
| | 169207 | 水分析化学实验<br>Water Analysis Chemistry Experiment | 必C | 16 | | 16 | | 0.5 | 3 | №4 |
| | 147058 | 物理化学Ⅰ<br>Physical Chemistry | 必C | 48 | | | | 3.0 | 4 | №1 |
| | 169153 | 水处理生物学<br>Biological Water Treatment | 必C | 32 | | | | 2.0 | 3 | №1,2,3 |
| | 169208 | 水处理生物学实验<br>Biological Water Treatment Experiment | 必C | 16 | | 16 | | 0.5 | 3 | №4 |
| | 133092 | 工程力学Ⅱ<br>Engineering Mechanics | 必C | 64 | | | | 4.0 | 3 | №1 |
| | 169095 | 水力学<br>Hydrology | 必C | 56 | | | | 3.5 | 4 | №1,2,3 |
| | 169209 | 水力学实验<br>Hydrology Experiment | 必C | 16 | | 16 | | 0.5 | 5 | №4 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 169210 | 给排水科学与工程概论<br>Urban Water Engineering | 必<br>C | 32 | | | | 2.0 | 1 | №1,4,7,10 |
| | 169155 | 水资源利用与保护<br>Urban Water Engineering | 必<br>C | 32 | | | | 2.0 | 3 | №6 |
| | 169168 | 水文学与水文地质学<br>Hydrology and hydrogeology | 必<br>C | 32 | | | | 2.0 | 3 | №1 |
| | 133040 | 测量学<br>Surveying | 必<br>C | 32 | | 6 | | 2.0 | 4 | №2,3,5 |
| | 135092 | 电工与电子技术Ⅱ<br>Electrical Engineering and Electrontechnics | 必<br>C | 64 | | | | 4.0 | 4 | №1 |
| | 169151 | 土建工程基础<br>Fundamental Civil Engineering | 必<br>C | 32 | | | | 2.0 | 4 | №2 |
| | 169154 | 水工艺设备基础<br>Water Procedure Equipment Foundation | 必<br>C | 32 | | | | 2.0 | 5 | №2 |
| | 135081 | 电工与电子技术实验<br>Experiment of Electrical Engineering and Electrontechnics | 必<br>C | 24 | | 24 | | 1.0 | 5 | №4 |
| | 169164 | 泵与泵站<br>Pump and Pump Station | 必<br>C | 32 | | 2 | | 2.0 | 5 | №1,2 |
| | 合 计 | | 必<br>C | 728 | | 128 | | 42.0 | | |
| 专业领域课 Specialty- related Courses | 169211 | 水质工程学 I<br>Engineering Science of Water Quality(Ⅰ) | 必<br>C | 48 | | | | 3.0 | 5 | №1,2,3,6 |
| | 169212 | 水质工程学实验I<br>Experiment of Engineering Science of Water Quality(Ⅰ) | 必<br>C | 16 | | 16 | | 0.5 | 5 | №4 |
| | 169159 | 给水排水管网系统<br>Water supply and drainage pipe network system | 必<br>C | 40 | | | | 2.5 | 5 | №1,2 |
| | 169213 | 水质工程学 II<br>Engineering Science of Water Quality(Ⅱ) | 必<br>C | 48 | | | | 3.0 | 6 | №1,2,3,6 |
| | 169214 | 水质工程学实验II<br>Experiment of Engineering Science of Water Quality(Ⅱ) | 必<br>C | 16 | | 16 | | 0.5 | 6 | №4 |
| | 169215 | 给排水科学与工程综合实验<br>Comprehensive Experiment on Water Science and Engineering | 必<br>C | 32 | | 32 | | 1.0 | 6 | №2,4,9 |
| | 169149 | 建筑给水排水工程<br>Building Water Supply and Sewage Engineering | 必<br>C | 48 | | | | 3.0 | 6 | №1,2 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 169157 | 城市水工程仪表与控制<br>Urban Water Equipment and Control | 必<br>C | 32 | | | | 2.0 | 6 | №1,2 |
| | 169163 | 水工程施工<br>Water Engineering Construction | 必<br>C | 32 | | | | 2.0 | 6 | №1,3,11 |
| | 169200 | 计算机数据与图形应用<br>Computer Data and Graphics Applications | 必<br>C | 64 | 32 | | | 3 | 6 | №4,5 |
| | 169216 | 技术经济学<br>Technical Economics | 必<br>C | 32 | | | | 2.0 | 7 | №1,3,6,11 |
| | 169019 | 科技文献检索<br>Environmental Documents Retrieval | 选<br>E | 16 | | | | 1.0 | 3 | №4,5 |
| | 169013 | 环境生态学<br>Environmental ecology | 选<br>E | 32 | | | | 2.0 | 3 | №6,7 |
| | 169098 | 环境卫生学<br>Environmental Hygiene | 选<br>E | 24 | | | | 1.5 | 4 | №6,7 |
| | 169037 | 环境毒理学<br>Environmental Toxicology | 选<br>E | 24 | | | | 1.5 | 5 | №6,7,10 |
| | 169016 | 环境监测<br>Environmental Monitoring | 选<br>E | 32 | | | | 2.0 | 4 | №1,6 |
| | 169017 | 环境质量评价<br>Environmental Quality Assessment | 选<br>E | 32 | | | | 2.0 | 5 | №5,6,7 |
| | 169192 | 固体废物处理与处置<br>Solid Waste Treatment and Disposal | 选<br>E | 32 | | | | 2.0 | 5 | №1,2,3 |
| | 170013 | 传质与分离工程III<br>Mass Transfer and Separation Engineering | 选<br>E | 48 | | | | 3.0 | 6 | №1,2,3 |
| | 169186 | 工业废水处理工艺与设计<br>Industrial Water Treatment: Craft and Design | 选<br>E | 32 | | | | 2.0 | 7 | №2,3,5,6,10,11,12 |
| | 169184 | 环保产业创业教育<br>Environmental Entrepreneurship Education | 选<br>E | 16 | | | | 1.0 | 7 | №12 |
| | 120003 | 创新研究训练<br>Innovative Research Training | 选<br>E | 32 | | | | 2.0 | 7 | №4,12 |
| | 120004 | 创新研究实践 I<br>Innovative Research Practice I | 选<br>E | 32 | | | | 2.0 | 7 | №4,12 |
| | 120005 | 创新研究实践 II<br>Innovative Research Practice II | 选<br>E | 32 | | | | 2.0 | 7 | №4,12 |
| | 120006 | 创业实践<br>Entrepreneurial Practice | 选<br>E | 32 | | | | 2.0 | 7 | №4,12 |
| | **合 计**<br>**Total** | | 必<br>C | 408 | 32 | 64 | | 22.5 | | |
| | | | 选<br>E | 选修课选修最低要求 5.5 学分<br>minimum elective course credits required:5.5credits | | | | | | |

备注：学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践 I、创新研究实践 II、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过 4 个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分。

## 四、集中实践教学环节(Practice-concentrated Training)

| 课程代码 Course No | 课程名称 Course Title | 是否必修 C/E | 学时数 Total Curriculum Hours | | 学分数 Credits | 开课学期 Semester | 毕业要求 Student Outcomes |
|---|---|---|---|---|---|---|---|
| | | | 实践 Practice weeks | 授课 Lecture Hours | | | |
| 106002 | 军训<br>Military Training | 必<br>C | 3 周 | | 3.0 | 1 | №8,9 |
| 143197 | 马克思主义理论与实践<br>Marxist Theory and Practice | 必<br>C | 2 周 | | 2.0 | 假期 | №8 |
| 130356 | 工程训练 I<br>Metalworking Practice I | 必<br>C | 2 周 | | 2.0 | 4 | №6,9 |
| 169180 | 认识实习<br>Cognition Practice | 必<br>C | 1 周 | | 1.0 | 2 | №6,8 |
| 169087 | 生产实习<br>Production Practice | 必<br>C | 2 周 | | 2.0 | 5 | №2,6,8 |
| 141075 | 电子工艺实习 I<br>Practice of Electronic | 必<br>C | 1 周 | | 1.0 | 5 | №6,9 |
| 169217 | 测量实习<br>Measurement Practice | 必<br>C | 1 周 | | 1.0 | 4 | №6 |
| 169162 | 给水厂课程设计<br>Water Supply Plant Design | 必<br>C | 2 周 | | 2.0 | 5 | №2,3,5,6,10,11,12 |
| 169160 | 给排水管网课程设计<br>Water Supply and Drainage Pipe Network System Design | 必<br>C | 2 周 | | 2.0 | 5 | №2,3,5,6,10,11,12 |
| 169161 | 污水处理厂课程设计<br>Sewage Plant Design | 必<br>C | 2 周 | | 2.0 | 6 | №2,3,5,6,10,11,12 |
| 169167 | 建筑给水排水工程设计<br>Building Water Supply and Sewage Engineering Design | 必<br>C | 2 周 | | 2.0 | 6 | №2,3,5,6,10,11,12 |
| 169061 | 毕业实习<br>Graduation practice | 必<br>C | 2 周 | | 2.0 | 8 | №6,7,8,9 |
| 169092 | 毕业设计<br>Graduation Design | 必<br>C | 15 周 | | 15.0 | 8 | №2,3,4,5,6,10,11,12 |
| **合 计<br>Total** | | 必<br>C | 37 周 | | 37.0 | | |

## 五、第二课堂

第二课堂由人文素质教育和创新能力培养两部分组成。

**1.人文素质教育基本要求**

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活

动，参加活动的学分累计不少于 2 个学分。

**2.创新能力培养基本要求**

学生在取得本专业教学计划规定学分的同时，还必须参加国家创新创业训练计划或广东省创新创业训练计划或 SRP（学生研究计划）或百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于 4 个学分。

## 5. “Second Classroom” Activities

The second classroom consists of two aspects: humanistic quality education and innovation ability.

1. Humanistic quality education basic requirements

Students in the professional teaching plan to obtain credits at the same time, should also be combined with their own interest to participate in extracurricular cultural quality education activities, participate in the activities of the accumulated no less than 2 credits.

2. Innovative ability to cultivate the basic requirements

Students must also participate in the National Innovation and Entrepreneurship Training Program or the Guangdong Provincial Innovation and Entrepreneurship Training Program or the SRP (Student Research Program) or the 100-step climbing program or a certain amount of extracurricular innovation ability in the course of obtaining the professional teaching plan. Activities (such as subject competitions, academic lectures, etc.), participate in activities accumulated credits of not less than 4 credits.