

# 轻化工程

## Light Chemical Engineering

专业代码: 081701

学 制: 4 年

Program Code:081701

Duration: 4 years

### 培养目标:

培养德、智、体全面发展, 具备数学、化学、化工、高分子材料及计算机等学科基础理论, 掌握轻化工程特别是制浆造纸工程和包装印刷工程基本原理及工程设计方法等专门知识, 具有从事轻化工程及相关领域工程技术、生产管理、质量控制、研究开发等能力, 兼具创新意识、环保理念和团队精神的行业精英人才。

### Educational Objectives:

After training, the students would be expected to have all-round development in morality, intelligence and physique; to master the basic theories of mathematics, chemistry, chemical engineering, polymer materials and computer science; to master professional knowledges and engineering design methods of Light Chemical Engineering, especially Pulp and Paper Engineering, and Packaging and Printing Engineering; to have the abilities engaging in engineering technologies, production managements, quality controls, research and development of Light Chemical Engineering and related fields; to also have innovative consciousness, the concept of environmental protection and group cooperative spirit.

### 毕业要求:

№1.工程知识: 能够将数学、自然科学、工程基础和轻化工专业知识用于解决轻化及其相关专业复杂工程问题。

1.1 掌握数学及其相关领域的基础理论知识, 并为解决复杂工程问题奠定扎实的理论基础。

1.2 掌握基础化学、化工和物理及其相关领域的基础理论知识, 并为解决复杂工程问题奠定扎实的理论基础。

1.3 掌握机械、电子和信息等工程基础及其相关领域的基础理论知识, 并为解决复杂工程问题奠定扎实的理论基础。

1.4 掌握轻化工程专业及相关专业基础课程及其相关领域的基础理论知识, 并为解决复杂工程问题奠定扎实的理论基础。

№2.问题分析: 能够应用数学、自然科学和工程科学的基本原理, 识别、表达、并通过文献研究分析复杂工程问题, 以获得有效结论。

2.1 能够应用数学基础知识进行轻化及相关专业复杂工程问题分析、识别、表达的能力。

2.2 能够应用化学、化工和物理等基础知识进行轻化及相关专业复杂工程问题分析、识别、表达的能力。

2.3 能够应用机械、电子、电工基础知识进行轻化及相关专业复杂工程问题分析、识别、表达的能力。

2.4 了解轻化工程领域前沿发展现状和趋势, 结合文献资料、专业知识和工程实例分析、识别复杂工程问题并获

得有效结论。

**№3.设计/开发解决方案：**能够设计针对复杂工程问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

3.1 具备将轻化及相关专业所必须的基础知识、核心知识、工程基本技能、工程实践技能和综合研究技能用以设计针对复杂工程问题解决方案的能力。

3.2 了解轻化专业及相关专业的现状，发展前沿及趋势，将创新意识体现在工程设计中，同时考虑社会、健康、安全、法律、文化以及环境等综合因素的影响。

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

4.1 掌握基于科学原理并采用科学方法对轻化及相关专业复杂工程问题进行研究的基本方法、基本理论（数据整理和分析），以及物理及材料结构表征及分析测试、化学分析测试表征的基本方法和技能。

4.2 培养基于科学原理并采用科学方法对复杂工程问题进行研究所需的实验设计、实验结果整理、分析和归纳，并获得结论的能力。

**№5.使用现代工具：**能够针对复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。

5.1 掌握运用网络、数据库等现代信息手段检索科技文献、查询专业资料的能力。

5.2 掌握运用各类专业绘图和图形处理软件进行工程设计和工程实践的技能。

5.3 掌握运用化学、化工分析方法和手段进行相应的实践的技能。

5.4 具备运用计算机语言、专业软件解决轻化及相关专业较复杂工程技术问题的技能。

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

6.1 具有运用轻化工程专业知识分析工程技术问题及制定解决方案的能力。

6.2 具备工程技术人员所必需的工程实验设计能力，以及对工程技术问题和实验结果进行整理、归纳和分析的能力。

6.3 培养评价轻化及相关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的基本能力，树立对社会、健康、安全、法律以及文化相应责任感。

**№7.环境和可持续发展：**能够理解和评价针对轻化工程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 正确评价轻化工程及其相关行业的产业、环境和社会可持续发展的关系。

7.2 正确的分析、认识和评价轻化及相关工程专业在复杂工程实践中对环境和可持续发展的影响。

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

8.1 培养正确的世界观、人生观，正确认识个人在历史以及社会、自然环境中的地位；

8.2 理解中国可持续发展的科学发展道路，具有人文素质修养和社会责任感；

8.3 培养并在实践中践行科研技术人员职业道德和规范。

№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 培养多学科团队中人际交往能力和团队协作能力。

9.2 培养多学科团队中的组织管理能力和统筹协调技能。

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

10.1 培养轻化工程及相关专业的报告撰写、文档设计、清晰表达和回应指令的能力。

10.2 具有轻化工程专业及相关专业领域知识，以及国际化视野。

10.3 培养多学科、不同文化背景下的人际交往和沟通交流技能，以及团队合作精神。

№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 掌握轻化及相关专业工程管理、经济决策的基本原理和方法。

11.2 具有将所学的工程管理与经济决策方法应用在轻化及相关专业教育和实践中的能力。

№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 掌握提高自身素养和专业素质的学习技能。

12.2 具有不断学习实践和自我评价提高的能力。

## **Student Outcomes:**

№1. Engineering Knowledge: Be able to utilize the knowledge of mathematics, natural science, engineering fundamentals and light chemical industry to solve the complex problems of light engineering and related fields.

1.1 To master the basic theoretical knowledge of mathematics and related fields, and to lay a solid theoretical foundation for solving complex engineering problems.

1.2 To master the basic knowledge of basic chemistry, chemical engineering and physics, and to lay a solid theoretical foundation for solving complex engineering problems.

1.3 To master the basic theory of mechanical, electronic and information engineering and related fields, and to lay a solid theoretical foundation for solving complex engineering problems.

1.4 To master the basic knowledge of the basic courses of light chemical engineering and related majors, and to lay a solid theoretical foundation for solving complex engineering problems.

№2. Problem Analysis: Be able to identify, formulate and analyze complex engineering problems, reaching to substantiated conclusions using basic principles of mathematics, natural science, and engineering science.

2.1 Be able to analyze, identify and express complex engineering problems of light chemical engineering and related majors by using basic knowledge of mathematics.

2.2 Be able to analyze, identify and express complex engineering problems of light chemical engineering and related majors by using basic knowledge of chemistry, chemical engineering and physics.

2.3 Be able to analyze, identify and express complex engineering problems of light chemical engineering and related majors

by using basic knowledge of mechanical, electronic and electronic engineering.

2.4 To understand the development status and trends in the field of light chemical engineering. And be able to analyze, identify and solve complex engineering problems by combination of literature, professional knowledge and engineering examples.

№3. Design / Develop Solutions: Be able to design solutions for complex engineering problems and innovatively design systems, components or process that meet specific needs with societal, public health, safety, legal, cultural and environmental considerations.

3.1. Be able to utilize the basic and core knowledge, engineering skills, engineering practice skills and comprehensive research skills in light chemical engineering and related majors to solve the complex engineering problems.

3.2 To understand the current research activities and future perspectives of light chemical engineering and related majors, to develop creative design in the engineering, considering the impact factors of society, health, safety, law, culture and environment.

№4. Research: Be able to investigate scientifically complex engineering problems based on scientific principles, including design of experiments, analysis of data and information to provide valid conclusions.

4.1 Be able to master and utilize the scientific principle to investigate complex engineering problems in light chemical engineering and related fields, such as basic methods, basic theory (the data collation and analysis), and basic methods and skills about physical and structural characterization of materials as well as chemical analysis.

4.2 To cultivate the capacity of experimental design, analysis of results, and summarization for complex engineering problems based on scientific principle.

№5. Utilization of Modern Tools: Be able to develop, choose and utilize appropriate techniques, resources, and tools of modern engineering and IT to solve complex engineering problems, including prediction and simulation for such issues, and to understand the limits of these tools.

5.1 Be able to retrieve the scientific and technical documents and query the professional data by using the modern information means such as network and database.

5.2 Be able to carry out engineering design and engineering practice by using various kinds of professional software about drawing and graphic processing.

5.3 Be able to work by using chemical and chemical analysis methods.

5.4 Be able to solve the complex engineering problems in light chemical engineering and related fields with the use of computer language and professional software.

№6. Engineering and Society: Be able to evaluate the impacts of professional engineering practice and complex engineering solutions on issues, such as societal, health, safety, legal and culture, based on the background of engineering, and to understand the related responsibilities.

6.1 Be able to analyze and solve the engineering technical problems by using the knowledge of light engineering.

6.2 To master the ability of engineering design. Be able to organize, summarize and analyze the technical problems and the experimental results.

6.3 Be able to evaluate the impacts of professional engineering practice and complex engineering solutions on issues on

social, health, safety, law and culture. To establish the corresponding responsibilities for social, health, safety, law and culture.

№7. Environment and Sustainable Development: Be able to understand and evaluate the impact of engineering practice, which aimed at complex issues about light chemical engineering, on environmental and sustainable development society.

7.1 Evaluate properly the relationships among industries, environments and social sustainable development of light chemistry engineering and its related professions.

7.2 Analyze, recognize and evaluate properly the impacts of light chemistry and its related engineering professions to the environment and sustainable development during complex engineering practice.

№8. Professional norms: To have humanities and social sciences as well as social responsibility, be able to understand and abide by professional ethics and standards responsibly in engineering practice.

8.1 Be able to have proper perspective about world and life; understand well about the roles of individual in history, society and nature environment.

8.2 To understand the scientific developing path of sustainable development in China, and have humanity self-cultivation and social responsibilities.

8.3 To develop and achieve professional ethics and norms of researchers in practice.

№9. Individual and Teams: Be able to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

9.1 To develop the abilities of interpersonal communication and team work in multi-disciplinary team.

9.2 To develop the ability of organization and management as well as overall coordination skills.

№10. Communication: Be able to communicate effectively on complex engineering problems with industry peers and public, such as writing report, making a statement, design manuscript, clear expression or response instruction. and to communicate in cross-cultural contexts with international perspective.

10.1 To develop the abilities of report writing, documental design, clear expression and response instruction about light chemistry engineering and related professions.

10.2 Be able to have knowledge about light chemistry engineering and its related professions with international views.

10.3 To develop the communication skills to people with multi-discipline and cross-cultural backgrounds, as well as team work spirit.

№11. Project Management: To understand the principles engineering management and methods of economic decisions, and able to apply in environments of multidisciplinary.

11.1 Know well about engineering management, basic principle and method of economic decision related to light chemistry and its related professions.

11.2. Be able to have apply the methods learnt from engineering management on education and practice of light chemistry and its related professions.

№12. Lifelong Learning: Be able to engage in independent and lifelong learning, with the ability to keep on learning and adapt to new developments.

12.1 Know well the studying skills about development of self-accomplishment and professional diathesis.

12.2 Be able to have abilities of continuously study and practice, as well as development of self-evaluation.

### **专业简介:**

本专业属于轻工技术与工程学科，始建于上世纪五十年代，是首批进入国家“211 工程”及“985 工程”建设行列的国家级特色专业、省级名牌专业和重点建设专业，一直处于国内领先地位。本科专业 1952 年设置，所属的轻工技术与工程学科 1960 年起开始招收研究生，于 1984 年获得博士学位授予权；1991 年，本学科建立全国首批博士后科研流动站，并于 2005、2010 年连续两次获“全国优秀博士后流动站”称号。2007 年，被评为国家级重点一级学科，并在此之后的历次学科评估中整体实力排名位列第一。本专业作为所在学科的主要支撑，拥有国家重点实验室、国家工程研究中心和国家级本科实验教学示范中心，综合实力居国内同类院校首位，办学历史悠久，打造了一批世界先进水平的科研、教学团队，师资力量雄厚，重视学生科学研究、工程实践和国际交流能力的培养，是我国制浆造纸领域最主要的科学研究和高层次人才培养的基地。

### **Program Profile:**

This major belongs to the light industry technology and engineering discipline, which was built in the last century in 1950s, was one of the first in national-level featured majors, provincial famous brand majors and key constructed majors that were selected into the national "211 Project" and "985 Project", and has been be on the leading place among the universities nationwide. Light industry technology and engineering discipline was established in 1952 and began to recruit graduate students is 1960, and was allowed to grant doctorate degrees in 1984; In 1991, the discipline established the its first post-doctoral research station, which was also one of the first in the country and was named the "National Outstanding Postdoctoral Research Station" for two times in a row in 2005 and 2010. In 2007, the discipline was named as the state level key discipline, and ranked the first in the subsequent national discipline assessments. This major is the main support for light industry technology and engineering discipline, with one state key laboratory, one national engineering research center and one national undergraduate laboratory teaching demonstration center. The comprehensive strength of this major ranks the top among similar domestic institutions. This major has a long history of creating a number of advanced scientific researches and teaching teams. It has an excellent faculty team, focuses on the cultivation of students' scientific research, engineering practice, and international communication abilities, which is the main center for scientific researches and the training of high-level personnel in the pulp and paper engineering field.

### **专业特色:**

国内设立最早且教育部直属院校中唯一设有的专业；国家级实验平台为核心的一系列高水准科研教学平台和国际合作研究中心，院士领衔师资力量雄厚的教师队伍；培养基础扎实、具有国际视野、综合素质突出的复合型人才。

## **Program Features:**

- (1) Being one of the earliest majors established in China and the unique major among the professional institutions directly under the Ministry of Education;
- (2) Having a series of high level scientific research and teaching platforms, international cooperation research centers, and an outstanding faculty team lead by a member of China Engineering Academy;
- (3) Cultivating students with well-knit professional basic knowledges, international perspectives, and comprehensive abilities.

**授予学位:** 工学学士学位

**Degree Conferred:** Bachelor of Engineering

## **主干课程:**

有机化学、物理化学、流体力学与传热、传质与分离工程、机械设计基础、植物纤维化学、制浆造纸原理与工程、制浆造纸机械与设备、化工仪表与自动化、印刷工艺学。

## **Core Courses:**

Organic Chemistry, Physical Chemistry, Fluid Mechanics and Heat Transfer, Mass Transfer and Separation Processes, Basis of Mechanical Design, Lignocellulosic Chemistry, Pulping and Papermaking Principles and Engineering, Paper Machinery, Chemical instruments and automation, Printing Technology.

## **特色课程:**

新生研讨课: 制浆造纸工程发展历程及展望

专题研讨课: 制浆造纸学科前沿

全英语教学课程: 化学法制浆、生物质精炼概论

双语教学课程: 二次纤维回用技术、制浆漂白新技术、造纸科学与技术

校企合作课程: 制浆造纸工程实践案例

创业教育课程: 制浆造纸产业模式与创业

## **Featured Courses:**

Freshmen Seminars: Development History and Outlook of Pulp and Paper Engineering

Special Topics Course: Description of the pulp and paper engineering frontier

Courses Taught in English: Chemical pulping, Introduction to Biorefining

Bilingual Courses: Paper Recycling Technology, New Technologies in Pulping and Bleaching, Papermaking Science and Technology

Cooperative Courses with Enterprises: Engineering Practice Cases of Pulp and Papermaking

Innovation Practice: Pulp and Paper Industry Model and Entrepreneurship



## 2.类别统计表 (Category Registration Form)

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
2300	1932	368	1844	456	173.0	150.0	23.0	35.0	123.5	14.5	8.0

### 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	143093	思想道德修养与法律基础 Cultivation of Thought and Morals & Fundamental of Law	必修 课 C	(48) (36)				2.5	1	№8.1,8.3,12.1	
	143106	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics		(96) 48				5.0	3	№8.1,8.2	
	143091	中国近现代史纲要 Skeleton of Chinese Modern History		(32) 24				2.0	2	№8.1,8.2	
	143090	马克思主义基本原理 Fundamentals of Marxism Principle		(48) 36				2.5	4	№8.1	
	143094	形势与政策 Analysis of the Situation & Policy		(128)				2.0	1-8	№8.2	
	144001	大学英语 (一) College English(1)		64				4.0	1	№10.3	
	144002	大学英语 (二) College English(2)		64				4.0	2	№10.3	
	145223	大学计算机基础 Foundations of Computer		32				2.0	1	№1.3	
	152001	体育 (一) Physical Education(1)		32			32	1.0	1	№12.1	
	152002	体育 (二) Physical Education(2)		32			32	1.0	2	№12.1	
	152003	体育 (三) Physical Education(3)		32			32	1.0	3	№12.1	
	152004	体育 (四) Physical Education(4)		32			32	1.0	4	№12.1	
	106001	军事理论 Military Principle		(16)				1.0	2	№9.1,9.2	
	140189	微积分 I (一) Calculus(1)		80				5.0	1	№1.1	
	140190	微积分 I (二) Calculus(2)		64				4.0	2	№1.1	
	130139	工程制图 (一) Engineering Drawing(1)		48				3.0	1	№5.2	
	130140	工程制图 (二) Engineering Drawing(2)		32				2.0	2	№5.2	
	141001	大学物理 I (一) General Physics (1)		48				3.0	2	№1.1	
	141002	大学物理 I (二) General Physics (2)		48				3.0	3	№1.1	
	141007	大学物理实验 (一) Physics Experiment( I )		32		32		1.0	2	№2.2, №4.1	
	141008	大学物理实验 (二) Physics Experiment(II)		32		32		1.0	3	№2.2,4.1	
	140013	线性代数与解析几何 Linear Algebra & Analytic Geometry		48				3.0	1	№1.1	
	140014	概率论与数理统计 I Probability & Mathematical Statistics I		48				3.0	2	№2.1	
	145269	VB 语言程序设计 Programming in Visual Basic		48				3.0	2	№5.2	
		人文科学领域 Humanities		通	96				6.0		№3.2,6.3,8.2,11.1

	社会科学领域 Social Science	识 课 E	64				4.0		№3.2,6.3,8.2,11.1
	<b>合 计</b> <b>Total</b>		1084		64	128	70.0		
学 科 基 础 课 Disciplinary Basic Courses	147001	无机化学 I Inorganic Chemistry I	必 C	32			2.0	1	№1.1
	147034	无机化学实验 (工科) (一) Experiment of Inorganic Chemistry(1)	必 C	16		16	0.5	1	№2.2,4.1,5.3
	147035	无机化学实验 (工科) (二) Experiment of Inorganic Chemistry(2)	必 C	16		16	0.5	2	№2.2,4.1,5.3
	147020	有机化学 II Organic Chemistry II	必 C	64			4.0	2	№1.2
	147007	有机化学实验 I Organic Chemistry Experiments I	必 C	32		32	1.0	3	№2.2,4.1,5.3
	147008	分析化学 I Analytical Chemistry I	必 C	32			2.0	3	№1.2
	147013	分析化学实验 II Analytical Chemistry Experiment II	必 C	32		32	1.0	3	№2.2,4.1,5.3
	147058	物理化学 I Physical Chemistry I	必 C	48			3.0	4	№1.2
	147055	物理化学实验 II Physical Chemistry Experiment II	必 C	32		32	1.0	4	№2.2,4.1,5.3
	133091	工程力学 I Engineering Mechanics I	必 C	48			3.0	4	№3.1
	135092	电工与电子技术 II Electrical Engineering and Electrontechnics II	必 C	64			4.0	4	№1.3
	135081	电工与电子技术实验 Experiment of Electrical Electrontechnics Engineering	必 C	24		24	1.0	5	№2.3
	137036	流体力学与传热 III Fluid Mechanics and Heat Transfer III	必 C	56			3.5	5	№1.2
	170013	传质与分离工程 III Mass Transfer and Separation Processes III	必 C	48			3.0	6	№1.2
	137063	化工原理实验 (一) Experiment of Chemical Engineering Principles(1)	必 C	16		16	0.5	5	№2.2,5.3
	137064	化工原理实验 (二) Experiment of Chemical Engineering Principles(2)	必 C	16		16	0.5	6	№2.2,5.3
	130083	机械设计基础 Basis of Mechanical Design	必 C	48			3.0	5	№1.3
	130311	机械基础综合实验 II Poly-experiment of Mechanical Fundamentals II	必 C	16		16	0.5	5	№2.3
	138013	植物纤维化学 Lignocellulosic Chemistry	必 C	48			3.0	4	№1.4,3.1
	138001	植物纤维化学实验 Experiment of Lignocellulosic Chemistry	必 C	32		32	1.0	4	№4.1
138011	化工仪表与自动化 Chemical instruments and automation	必 C	32			2.0	5	№3.1,6.1	
138020	轻工环境保护 Environmental Protection of Light Chemical Engineering	必 C	32			2.0	6	№3.1,6.1,7.1,7.2	
138030	轻工计算机辅助设计 Light Chemical Engineering Computer Aided Design	选 E	24	12		1.0	6	№5.2	

	138083	文献检索与科技论文写作 Literature retrieval and academic paper writing	选E	24				1.5	3	№5.1,10.1
	138063	印刷材料与适性 Printing Material and Printability	选E	24				1.5	6	№3.1
	<b>合计 Total</b>		必C	784		232		42.0		
			选E	选修课修读最低要求 2.0 学分 minimum elective course credits required: 2.0						
	138084	制浆造纸工程发展历程及展望 Development History and Outlook of Pulp and Paper Engineering	必C	16				1.0	1	№2.4,3.2,7.1
	138066	制浆造纸学科前沿 Description of the pulp and paper engineering frontier	必C	16				1.0	3	№2.3,3.1
	138015	制浆造纸原理与工程（一） Pulping and Papermaking Principles and Engineering (1)	必C	48				3.0	5	№1.4,2.4,3.1,6.1
	138017	制浆造纸原理与工程（二） Pulping and Papermaking Principles and Engineering (2)	必C	48				3.0	6	№1.4,2.4,3.1,6.1
	138008	制浆造纸工艺实验 Experiments of Pulp & Paper Technology	必C	32		32		1.0	6	№4.2
	138016	印刷工艺学 Printing Technology	必C	32				2.0	5	№3.1
	138031	制浆造纸机械与设备 Paper Machinery	必C	32				2.0	6	№2.4,3.1,6.1
	138005	纤维素功能化 Cellulose Functionalization	选E	16				1.0	5	№3.1
	138021	包装原理与工程 Packaging Principles and Engineering	选E	40				2.5	6	№3.1,7.1
专业领域课 Specialty-related Courses	138033	造纸湿部化学与造纸助剂 Additives and Wet-end Chemistry in Papermaking	选E	32				2.0	6	№2.4,6.1
	138064	制浆造纸工厂设计概论 An Introduction to the Design of Paper Mill	选E	24				1.5	6	№2.4,6.2
	138002	加工纸与特种纸 Processed Paper and Specialty Paper	选E	24				1.5	6	№2.4,6.1
	138035	二次纤维回用技术 Paper Recycling Technology	选E	16				1.0	7	№2.4,6.1,10.2
	138032	制浆漂白新技术 New Technologies in Pulping and Bleaching	选E	16				1.0	7	№2.4,6.1,10.2
	138078	造纸科学与技术 Papermaking Science and Technology	选E	24				1.5	7	№2.4,6.1,10.2
	138079	制浆造纸检验与分析 Pulp and paper testing and analysis	选E	24				1.5	7	№4.2,6.2
	139099	化学法制浆 Chemical pulping	选E	32				2.0	7	№2.4,6.1,10.2
	138062	色彩学 Printing Chromatics	选E	24				1.5	4	№3.1
	138085	制浆造纸工程实践案例 Engineering Practice Cases of Pulp and Papermaking	选E	16				1.0	7	№2.4,6.2
	138086	实验设计及数据分析 Experimental Design and Data Analysis	选E	16				1.0	3	№4.2,6.2
139017	生物质精炼概论 Introduction to Biorefining	选E	24				1.5	7	№2.4,6.1,10.2	

138080	制浆造纸产业模式与创业 Pulp and Paper Industry Model and Entrepreneurship	选 E	16				1.0	7	№2.4,6,3№11.2
120003	创新研究训练 Innovation Research Training	选 E	32				2.0		№6.1
120004	创新研究实践 I Innovation Research Practice 1	选 E	32				2.0		№6.1
120005	创新研究实践 II Innovation Research Practice 2	选 E	32				2.0		№6.1
120006	创业实践 Entrepreneurial Practice	选 E	32				2.0		№6.1
<b>合 计</b> <b>Total</b>		必 C	224		32		13.0		
		选 E	选修课修读最低要求 11.0 学分 minimum elective course credits required: 11.0						

备注：1.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。2.本专业学生需选修本专业开设的双语课程和全英课程中的两门。

#### 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 Military Training	必 C	3 周		3.0	1	№9.1,9.2
138026	生产实习 Production Practice	必 C	2 周		2.0	4	№9.1,10.1
138037	毕业实习 Graduation Practice	必 C	4 周		4.0	7	№9.1,10.1
141075	电子工艺实习 I Practice of Electronic	必 C	1 周		1.0	5	№3.1
130356	工程训练 I Engineering Training	必 C	2 周		2.0	4	№3.1
130195	机械设计基础课程设计 Course Project of the Basis of Mechanical Design	必 C	2 周		2.0	5	№3.1
147076	化工原理课程设计 Course Design for Chemical Engineering Principles	必 C	2 周		2.0	6	№2.2
138038	毕业论文（设计） Graduation Paper (Design)	必 C	15 周		15.0	8	№11.2
143197	马克思主义理论与实践 Marxism Theory and Practice	必 C	2 周		2.0	假期	№12.2
138087	认知实习 Cognitive Practice	必 C	1 周		1.0	1	№9.1
138088	科学实验规范与安全 Science Experiment Specification and Safety	必 C	1 周		1.0	3	№3.1,8.3
<b>合 计</b> <b>Total</b>		必 C	35 周		35.0		

#### 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**

“Second Classroom” Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

### **1)Basic Requirements of Humanities Quality Education**

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than two credits.

### **2)Basic Requirements of Innovative Ability Cultivation**

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.

附：毕业要求实现矩阵

Enclosed: Realization Matrix for Student Outcomes

毕业要求 Requirement for Graduation	知识与能力要求 Knowledge and capability Requirement	关联矩阵（实现方式） Incidence matrix (Realization way)
1.工程知识 №1. Engineering Knowledge	<p>1.1 掌握数学及其相关领域的基础理论知识，并为解决复杂工程问题奠定扎实的理论基础。</p> <p>1.1 To master the basic theoretical knowledge of mathematics and related fields, and to lay a solid theoretical foundation for solving complex engineering problems.</p>	<p>微积分 I（一）（二），大学物理 I（一）（二），线性代数与解析几何</p> <p>Calculus(1) (2), General Physics (1) (2), Linear Algebra &amp; Analytic Geometry</p>
	<p>1.2 掌握基础化学、化工和物理及其相关领域的基础理论知识，并为解决复杂工程问题奠定扎实的理论基础。</p> <p>1.2 To master the basic knowledge of basic chemistry, chemical engineering and physics, and to lay a solid theoretical foundation for solving complex engineering problems.</p>	<p>无机化学 I，有机化学 II，分析化学 I，物理化学 I，流体力学与传热 III，传质与分离工程 III</p> <p>Inorganic Chemistry, Organic Chemistry, Analytical Chemistry, Physical Chemistry, Fluid Mechanics and Heat Transfer, Mass Transfer and Separation Processes</p>
	<p>1.3 掌握机械、电子和信息等工程基础及其相关领域的基础理论知识，并为解决复杂工程问题奠定扎实的理论基础。</p> <p>1.3 To master the basic theory of mechanical, electronic and information engineering and related fields, and to lay a solid theoretical foundation for solving complex engineering problems.</p>	<p>工程力学 I，电工与电子技术 II，机械设计基础,大学计算机基础</p> <p>Engineering Mechanics, Electrical Engineering and Electrontechnics, Basis of Mechanical Design, Foundations of Computer</p>
	<p>1.4 掌握轻化工程专业及相关专业基础课程及其相关领域的基础理论知识，并结合为解决复杂工程问题奠定扎实的理论基础。</p> <p>1.4 To master the basic knowledge of the basic courses of light chemical engineering and related majors, and to lay a solid theoretical foundation for solving complex engineering problems.</p>	<p>植物纤维化学，制浆造纸原理与工程（一）（二）</p> <p>Lignocellulosic Chemistry, Pulping and Papermaking Principles and Engineering(1) (2)</p>
2.问题分析 №2. Problem Analysis	<p>2.1 能够应用数学基础知识进行轻化及相关专业复杂工程问题分析、识别、表达的能力。</p>	<p>概率论与数理统计 I</p> <p>Probability &amp; Mathematical Statistics</p>

	<p>2.1 Be able to analyze, identify and express complex engineering problems of light chemical engineering and related majors by using basic knowledge of mathematics.</p>	
	<p>2.2 能够应用化学、化工和物理等基础知识进行轻化及相关专业复杂工程问题分析、识别、表达的能力。</p> <p>2.2 Be able to analyze, identify and express complex engineering problems of light chemical engineering and related majors by using basic knowledge of chemistry, chemical engineering and physics.</p>	<p>大学物理实验（一）（二），无机化学实验（工科）（一）（二），有机化学实验 I，分析化学实验 II，物理化学实验 II，化工原理实验（一）（二），化工原理课程设计 Physics Experiment(1) (2), Experiment of Inorganic Chemistry (1) (2), Organic Chemistry Experiments, Analytical Chemistry Experiment, Physical Chemistry Experiment, Experiment of Chemical Engineering Principles(1) (2), Course Design for Chemical Engineering Principles</p>
	<p>2.3 能够应用机械、电子、电工基础知识进行轻化及相关专业复杂工程问题分析、识别、表达的能力。</p> <p>2.3 Be able to analyze, identify and express complex engineering problems of light chemical engineering and related majors by using basic knowledge of mechanical, electronic and electronic engineering.</p>	<p>电工与电子技术实验，机械基础综合实验 II Experiment of Electrical Electrontechnics Engineering, Poly-experiment of Mechanical Fundamentals</p>
	<p>2.4 了解轻化工程领域前沿发展现状和趋势，结合文献资料、专业知识和工程实例分析、识别复杂工程问题并获得有效结论。</p> <p>2.4 To understand the development status and trends in the field of light chemical engineering. And be able to analyze, identify and solve complex engineering problems by combination of literature, professional knowledge and engineering examples.</p>	<p>制浆造纸工程发展历程及展望，制浆造纸学科前沿，制浆造纸原理与工程（一）（二），制浆造纸机械与设备，造纸湿部化学与造纸助剂，制浆造纸工厂设计概论，加工纸与特种纸，二次纤维回用技术（双），制浆漂白新技术（双），造纸科学与技术（双），化学法制浆（全英），生物质精炼概论（全英），制浆造纸工程实践案例，制浆造纸产业模式与创业 Development History and Outlook of Pulp and Paper Engineering, Description of the pulp and paper engineering frontier, Pulping and</p>

		<p>Papermaking Principles and Engineering (1)(2), Paper Machinery, Additives and Wed-end Chemistry in Papermaking, An Introduction to the Design of Paper, Mill Processed Paper and Specialty Paper, Paper Recycling Technology, New Technologies in Pulping and Bleaching, Papermaking Science and Technology, Chemical pulping, Introduction to Biorefining, Engineering Practice Cases of Pulp and Papermaking, Pulp and Paper Industry Model and Entrepreneurship</p>
<p><b>3.设计/开发解决方案</b> №3. Design/Develop Solutions</p>	<p>3.1 具备将轻化及相关专业所必须的基础知识、核心知识、工程基本技能、工程实践技能和综合研究技能用以设计针对复杂工程问题解决方案的能力。 3.1 Be able to utilize the basic and core knowledge, engineering skills, engineering practice skills and comprehensive research skills in light chemical engineering and related majors to solve the complex engineering problems.</p>	<p>植物纤维化学, 化工仪表与自动化, 轻化工环境保护, 印刷材料与适性, 色彩学, 制浆造纸原理与工程 (一) (二), 印刷工艺学, 制浆造纸机械与设备, 纤维素功能化, 包装原理与工程, 电子工艺实习 I, 工程训练 I, 机械设计基础课程设计, 科学实验规范与安全, 工程力学 I Lignocellulosic Chemistry, Chemical instruments and automation, Environmental Protection of Light Chemical Engineering, Printing Material and Printability, Printing Chromatics, Pulping and Papermaking Principles and Engineering (1) (2), Printing Technology, Paper Machinery, Cellulose Functionalization, Packaging Principles and Engineering, Practice of Electronic, Engineering Training, Course Project of the Basis of Mechanical Design, Science Experiment Specification and Safety, Engineering Mechanics</p>

	<p>3.2 了解轻化专业及相关专业的现状，发展前沿及趋势，将创新意识体现在工程设计中，同时考虑社会、健康、安全、法律、文化以及环境等综合因素的影响。</p> <p>3.2 To understand the current research activities and future perspectives of light chemical engineering and related majors, to develop creative design in the engineering, considering the impact factors of society, health, safety, law, culture and environment.</p>	<p>人文科学领域通识课，社会科学领域通识课，制浆造纸工程发展历程及展望，制浆造纸学科前沿</p> <p>Humanities, Social Science, Development History and Outlook of Pulp and Paper Engineering, Description of the pulp and paper engineering frontier</p>
<p><b>4.研究</b> №4. Research</p>	<p>4.1 掌握基于科学原理并采用科学方法对轻化及相关专业复杂工程问题进行研究的基本方法、基本理论（数据整理和分析），以及物理及材料结构表征及分析测试、化学分析测试表征的基本方法和技能。</p> <p>4.1 Be able to master and utilize the scientific principle to investigate complex engineering problems in light chemical engineering and related fields, such as basic methods, basic theory (the data collation and analysis), and basic methods and skills about physical and structural characterization of materials as well as chemical analysis.</p>	<p>大学物理实验（一）（二），无机化学实验（工科）（一）（二），有机化学实验 I，分析化学实验 II，物理化学实验 II，植物纤维化学实验，制浆造纸检测与分析</p> <p>Physics Experiment(1) (2), Experiment of Inorganic Chemistry (1) (2), Organic Chemistry Experiments, Analytical Chemistry Experiment, Physical Chemistry Experiment, Laboratory of Lignocellulosic Chemistry, Pulp and paper testing and analysis</p>
	<p>4.2 培养基于科学原理并采用科学方法对复杂工程问题进行研究所需的实验设计、实验结果整理、分析和归纳，并获得结论的能力。</p> <p>4.2 To cultivate the capacity of experimental design, analysis of results, and summarization for complex engineering problems based on scientific principle.</p>	<p>制浆造纸工艺实验，制浆造纸检测与分析，实验设计及数据分析</p> <p>Experiments of Pulp &amp; Paper Technology, Pulp and paper testing and analysis, Experimental Design and Data Analysis</p>
<p><b>5.使用现代工具</b> №5. Utilization of Modern Tools</p>	<p>5.1 掌握运用网络、数据库等现代信息手段检索科技文献、查询专业资料的能力。</p> <p>5.1 Be able to retrieve the scientific and technical documents and query the professional data by using the modern information means such as network and database.</p>	<p>文献检索与科技论文写作</p> <p>Literature retrieval and academic paper writing</p>
	<p>5.2 掌握运用各类专业绘图和图形处理软件进行工程设计和工程实践的技能。</p> <p>5.2 Be able to carry out engineering design and engineering practice by using various kinds of professional software about</p>	<p>工程制图（一）（二），VB 语言程序设计，轻化工计算机辅助设计</p> <p>Engineering Drawing(1) (2),</p>

	drawing and graphic processing.	Programming in Visual Basic, Light Chemical Engineering Computer Aided Design
	5.3 掌握运用化学、化工分析方法和手段进行相应的实践的技能。 5.3 Be able to work by using chemical and chemical analysis methods.	无机化学实验(工科)(一)(二), 有机化学实验 I, 分析化学实验 II, 物理化学实验 II, 化工原理实验(一)(二) Experiment of Inorganic Chemistry (1) (2), Organic Chemistry Experiments I, Analytical Chemistry Experiment II, Physical Chemistry Experiment II, Experiment of Chemical Engineering Principles(1) (2)
	5.4 具备运用计算机语言、专业软件解决轻化及相关专业较复杂工程技术问题的技能。 5.4 Be able to solve the complex engineering problems in light chemical engineering and related fields with the use of computer language and professional software.	VB 语言程序设计, 轻化工计算机辅助设计 Programming in Visual Basic, Light Chemical Engineering Computer Aided Design
<b>6.工程与社会</b> №6. Engineering and Society	6.1 具有运用轻化工程专业知识分析工程技术问题及制定解决方案的能力。 6.1 Be able to analyze and solve the engineering technical problems by using the knowledge of light engineering.	化工仪表与自动化, 轻化工环境保护, 制浆造纸原理与工程(一)(二), 制浆造纸机械与设备, 造纸湿部化学与造纸助剂, 制浆造纸工厂设计概论, 加工纸与特种纸, 二次纤维回用技术(双语), 制浆漂白新技术(双语), 造纸科学与技术(双语), 制浆造纸检测与分析, 化学法制浆(全英), 生物质精炼概论(全英), 制浆造纸工程实践案例, 创新研究训练, 创新研究实践 I II, 创业实践 Chemical instruments and automation, Environmental Protection of Light Chemical Engineering, Pulping and Papermaking Principles and Engineering(1) (2), Paper Machinery, Additives and

		Wed-end Chemistry in Papermaking, An Introduction to the Design of Paper Mill, Processed Paper and Specialty Paper, Paper Recycling Technology, New Technologies in Pulping and Bleaching, Papermaking Science and Technology, Pulp and paper testing and analysis, Chemical pulping, Introduction to Biorefining, Engineering Practice Cases of Pulp and Papermaking, Innovation Research Training, Innovation Research Practice 1 2, Entrepreneurial Practice
	6.2 具备工程技术人员所必需的工程实验设计能力, 以及对工程技术问题和实验结果进行整理、归纳和分析的能力。 6.2 To master the ability of engineering design. Be able to organize, summarize and analyze the technical problems and the experimental results.	制浆造纸工厂设计概论, 制浆造纸检测与分析, 制浆造纸工程实践案例, 实验设计及数据分析 An Introduction to the Design of Paper Mill, Pulp and paper testing and analysis, Chemical pulping, Engineering Practice Cases of Pulp and Papermaking
	6.3 培养评价轻化及相关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的基本能力, 树立对社会、健康、安全、法律以及文化相应责任感。 6.3 Be able to evaluate the impacts of professional engineering practice and complex engineering solutions on issues on social, health, safety, law and culture. To establish the corresponding responsibilities for social, health, safety, law and culture.	人文科学领域通识课, 社会科学领域通识课, 轻化工环境保护, 制浆造纸产业模式与创业 Humanities, Social Science, Environmental Protection of Light Chemical Engineering, Pulp and Paper Industry Model and Entrepreneurship
<b>7.环境和可持续发展</b> №7. Environment and Sustainable Development	7.1 正确评价轻化工程及其相关行业的产业、环境和社会可持续发展的关系。 7.1 Evaluate properly the relationships among industries, environments and social sustainable development of light chemistry engineering and its related professions.	轻化工环境保护, 制浆造纸工程发展历程及展望, 包装原理与工程 Environmental Protection of Light Chemical Engineering, Development History and Outlook of Pulp and Paper Engineering, Packaging Principles and Engineering
	7.2 正确的分析、认识和评价轻化及相关工程专业在复杂工程实践中对环境和可持续发展的影响。 7.2 Analyze, recognize and evaluate properly the impacts of	轻化工环境保护 Environmental Protection of Light Chemical Engineering

	light chemistry and its related engineering professions to the environment and sustainable development during complex engineering practice.	
<b>8.职业规范</b> №8. Professional norms	8.1 培养正确的世界观、人生观，正确认识个人在历史以及社会、自然环境中的地位； 8.1 Be able to have proper perspective about world and life; understand well about the roles of individual in history, society and nature environment.	思想道德修养与法律基础，毛泽东思想和中国特色社会主义理论体系概论，中国近代史纲要，马克思主义基本原理 Cultivation of Thought and Morals & Fundamental of Law, Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics, Skeleton of Chinese Modern History, Fundamentals of Marxism Principle
	8.2 理解中国可持续发展的科学发展道路，具有人文素质修养和社会责任感； 8.2 To understand the scientific developing path of sustainable development in China, and have humanity self-cultivation and social responsibilities.	毛泽东思想和中国特色社会主义理论体系概论，中国近代史纲要，形势与政策，人文科学领域通识课，社会科学领域通识课 Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics, Skeleton of Chinese Modern History, Analysis of the Situation & Policy, Humanities, Social Science
	8.3 培养并在实践中践行科研技术人员职业道德和规范。 8.3 To develop and achieve professional ethics and norms of researchers in practice.	思想道德修养与法律基础，科学实验规范与安全 Cultivation of Thought and Morals & Fundamental of Law, Science Experiment Specification and Safety
<b>9.个人和团队</b> №9. Individual and Teams	9.1 培养多学科团队中人际交往能力和团队协作能力。 9.1 To develop the abilities of interpersonal communication and team work in multi-disciplinary team.	军事理论，军训，生产实习，毕业实习，认知实习 Military Principle, Military Training, Production Practice, Graduation Practice, Cognitive Practice
	9.2 培养多学科团队中的组织管理能力和统筹协调技能。 9.2 To develop the ability of organization and management as well as overall coordination skills.	军事理论，军训 Military Principle, Military Training

<b>10.沟通</b> №10. Communication	10.1 培养轻化工程及相关专业的报告撰写、文档设计、清晰表达和回应指令的能力。 10.1 To develop the abilities of report writing, documental design, clear expression and response instruction about light chemistry engineering and related professions.	文献检索与科技论文写作，生产实习，毕业实习 Literature retrieval and academic paper writing, Production Practice, Graduation Practice
	10.2 具有轻化工程专业及相关专业领域知识，以及国际化视野。 10.2 Be able to have knowledge about light chemistry engineering and its related professions with international views.	二次纤维回用技术（双语），制浆漂白新技术（双语），造纸科学与技术（双语），化学法制浆（全英），生物质精炼概论（全英） Paper Recycling Technology, New Technologies in Pulping and Bleaching, Papermaking Science and Technology, Chemical pulping, Introduction to Biorefining
	10.3 培养多学科、不同文化背景下的人际交往和沟通交流技能，以及团队合作精神。 10.3 To develop the communication skills to people with multi-discipline and cross-cultural backgrounds, as well as team work spirit.	大学英语（一）（二） College English(1)(2)
<b>11.项目管理</b> №11. Project Management	11.1 掌握轻化及相关专业工程管理、经济决策的基本原理和方法。 11.1 Know well about engineering management, basic principle and method of economic decision related to light chemistry and its related professions.	人文科学领域通识课，社会科学领域通识课 Humanities, Social Science
	11.2 具有将所学的工程管理与经济决策方法应用在轻化及相关专业教育和实践中的能力。 11.2 Be able to have apply the methods learnt from engineering management on education and practice of light chemistry and its related professions.	制浆造纸工程实践案例，毕业论文（设计），制浆造纸产业模式与创业 Engineering Practice Cases of Pulp and Papermaking, Graduation Paper (Design), Pulp and Paper Industry Model and Entrepreneurship
<b>12.终身学习</b> №12. Lifelong Learning	12.1 掌握提高自身素养和专业素质的学习技能。 12.1 Know well the studying skills about development of self-accomplishment and professional diathesis	思想道德修养与法律基础，体育（一）（二）（三）（四） Cultivation of Thought and Morals & Fundamental of Law, Physical Education(1)(2)(3)(4)
	12.2 具有不断学习实践和自我评价提高的能力。 12.2 Be able to have abilities of continuously study and	马克思主义理论与实践 Marxism Theory and Practice

	practice, as well as development of self-evaluation.	
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