新能源材料与器件专业
留学生本科培养方案

(专业代码：080414T　学制：4 年　学位：工学学士)

一、培养目标

本专业面向国际科技前沿与世界能源战略重大需求，着力培养在知识、能力、素质各方面全面发展，具有扎实的数理基础，系统掌握材料基本理论、基本知识和基本技能，能够应用本专业理论、方法和技术分析解决复杂工程问题，知华、友华、具备全球视野、能够参与国际交流与合作，引领未来新能源材料与器件及相关领域发展的人才。

三、毕业要求及实现矩阵

1. 汉语毕业要求：学生毕业前须通过汉语水平考试（HSK）4 级，具备基本的汉语听、说、读、写能力，能够适应在中国学习、生活及未来职业发展的语言需求。学生须完成以下指定课程并取得合格成绩：《中国概况（2–1）》《中国概况（2–2）》《初级汉语》《中级汉语》《高级汉语》。

2. 数理与工程基础：具有扎实的数学、物理、化学及材料科学基础理论知识，掌握现代工程工具与信息技术应用能力，基本掌握汉语，能够阅读本专业中文技术资料，具备跨文化环境下的基础沟通能力。

3. 工程实践能力：系统掌握新能源材料与器件领域的基础理论与专业知识，具备针对新能源材料合成、器件设计、工艺流程等复杂工程问题进行分析、设计与解决方案开发的能力。

4. 研究创新能力：能够基于科学原理及研究方法，开展新能源材料与器件相关实验设计与数据分析，具备初步的研究与创新能力。

5. 国际视野与跨文化能力：了解新能源材料与器件领域的国际前沿与发展趋势，掌握专业英语文献检索、阅读与交流能力；能够在跨文化背景下进行国际协作与交流。

6. 职业发展素养：具备终身学习意识和自主学习能力，能够适应新能源领域技术快速发展的挑战；具有工程职业道德、团队合作精神、项目管理与经济决策基础，能够在国际工程环境中从事研发、生产、管理等工作。

毕业要求指标点分解与实现矩阵

毕业要求	指标点	课程
1. 数理与工程基础：具有扎实的数学、物理、化学及材料科学基础理论知识，掌握现代工程工具与信息技术应用能力，基本掌握汉语，能够阅读本专业中文技术资料，具备跨文化环境下的基础沟通能力。	1.1 能够运用数学、物理、化学及材料科学的理论和方法，对新能源材料与器件领域的工程问题进行建模、表达和分析。	高等数学（2-1）/（2-2） 大学化学 大学物理（2-1）/（2-2） 材料科学基础 有机化学 物理化学
	1.2 能够针对专业问题，开发、选择并恰当使用现代工程工具、模拟软件和信息技术工具进行分析和设计，理解其局限性。	程序设计（Python） 大学计算机 材料分析技术
	1.3 基本掌握汉语，能够借助工具阅读和理解本专业的中文资料（如教材、论文等）；具备在跨文化环境下的基础沟通与理解能力。	初级汉语精读（2-1）/（2-2） 初级汉语口语（2-1）/（2-2） 中级汉语（2-1）/（2-2） 高级汉语（2-1）/（2-2） 中国概况（2-1）/（2-2） 学术英语
2. 工程实践能力：系统掌握新能源材料与器件领域的基础理论与专业知识，具备针对新能源材料合成、器件设计、工艺流程等复杂工程问题进行分析、设计与解决方案开发的能力	2.1 能够运用专业基础理论和工程原理，识别和判断新能源材料合成、器件设计与工艺流程中的复杂工程问题的关键环节	材料科学基础 电化学基础 材料成型概论
	2.2 能够针对特定需求，设计新能源材料配方、器件结构或系统工艺流程，并提出可行的解决方案	材料分析技术实验 专业创新实验 专业综合课程设计 毕业设计
	2.3 能够综合考虑技术、社会、健康、安全、法律、文化及环境等多方面因素，对解决方案进行优化、比较与综合	中国概况（2-1）/（2-2） 专业生产实习
3. 研究创新能力：能够基于科学原理及研究方法，开展新能源材料与器件相关实验设计与数据分析，具备初步的研究与创新能力	3.1 能够基于科学原理和文献研究，针对新能源材料与器件领域的问题，设计可行的实验方案或研究路线	材料科学基础 电化学基础 大学物理实验（2-1）/（2-2）
	3.2 能够安全地选用和搭建实验系统，规范开展实验，正确采集、记录和分析实验数据	电工电子学实验 专业创新实验 有机化学实验
	3.3 能够对实验数据和结果进行合理解释与信息综合，获得有效结论，并能针对新技术或新问题提出创新性想法或改进方案	专业综合课程设计 毕业设计 储能材料与器件 智能材料与智能制造 能量转化材料与器件
4. 国际视野与跨文化能力：了解新能源材料与器件领域的国际前沿与发展趋势，掌握专业文献检索、阅读与交流能力；能够在跨文化背景下进行国际协作与交流	4.1 了解新能源材料与器件领域的国际发展趋势、研究热点和重要技术标准	新能源材料与器件导论 学科前沿讲座 专业创新实验 国际教育课程 现代材料学
	4.2 掌握中英文文献检索与阅读方法，能跟踪国际学术动态；能够使用中英文就专业问题进行有效的书面和口头沟通	学术英语 国际教育课程 高级汉语（2-1）/（2-2） 专业生产实习

毕业要求	指标点	课程
		毕业设计
	4.3 了解中国与国际发展形势,具备在多学科、跨文化团队中进行有效沟通、协作与项目管理的能力	中国概况（2-1）/（2-2） 国际教育课程 专业生产实习
5. 职业发展素养：具备终身学习意识和自主学习能力，能够适应新能源领域技术快速发展的挑战；具有工程职业道德、团队合作精神、项目管理与经济决策基础，能够在国际工程环境中从事研发、生产、管理等工作	5.1 有正确价值观,理解个人与社会的关系，了解中国国情，知华、友华	中国概况（2-1）/（2-2） 专业认识实习
	5.2 理解材料工程师的职业性质和责任，在工程实践中能自觉遵守诚实公正、诚信守则的工程职业道德和规范	专业生产实习 毕业设计
	5.3 能够在多元化团队中承担个体、团队成员或负责人的角色，有效组织、协调并完成团队任务	专业创新实验 专业综合课程设计 毕业设计
	5.4 具有自主学习和终身学习的意识,能够追踪技术发展，持续更新知识体系，适应职业发展的挑战	学科前沿讲座 毕业设计 跨学科课程

三、主干学科、专业核心课程

主干学科：材料科学与工程

专业核心课程：材料科学基础、材料分析技术、电化学基础、新能源材料与器件导论、专业创新实验、专业综合课程设计

四、特色课程

（一）专业特色课程

专创融合课：专业创新实验

项目式课程：专业综合课程设计

“人工智能+”课程：程序设计

产教融合课：专业生产实习

校企共建课程：（现代产业学院必填）

（二）在地国际化课程

全英语课程：学术英语

双语课程：初级汉语精读（2–1）/（2–2）、初级汉语口语（2–1）/（2–2）、中级汉语（2–1）/（2–2）、高级汉语（2–1）/（2–2）

（三）其他课程

劳动教育实践课程：专业生产实习

课程思政示范课程：中国概况(2–1)、思想道德与法治

五、学分修读要求

本专业学生在学校规定的修业年限内需修满专业培养方案要求的 142 学分，并取得辅助学分要求的 10 学分，通过 HSK4 级，方可毕业；符合学士学位授予条件的，授予学士学位。

授予学位类型：工学学士学位

课 程 类 别		学分	所占比例	理论学时	实践学时	学时合计
通识教育课	通识必修课程	44.5	31.3%	696	24	720
	通识选修课程	10	7.0%			
专业基础课	大类基础课程	31.5	22.2%	424	84+1 周	508+1 周
	专业必修课程	35	24.6&	320	96+19 周	416+19 周
	专业选修课程	17.0	12.0%			
自主发展	跨学科课程	4	2.8%			
	辅助学分	10	10（不计入毕业总学分）			
毕业总学分（总学时）		142				
实践教学（含课内实验）		20.5	14.4%	——	204+19 周	204+19 周
集中性实践教学环节		21.5	15.1%	——	204+20 周	204+20 周

学期修读学分建议	学期	1	2	S1	3	4	S2	5	6	S3	7	8
	必修	21.5	25	1	19.5	17.25	2	4.25	5.25	2	3.25	8
	专业选修	0	0	0	0	0	0	7.5	7.5	0	2	0
	通识选修	0	2	0	2	2	0	2	2	0	2	0
	小计	21.5	27	1	21.5	19.25	2	13.75	14.75	2	7.25	8

六、课程设置

（说明：基础课程按照课程设置方案确定课程名称、学分、开课学期）

课程类别	课程模块	课程编码(初稿只需填写开课单位代码)	课程名称	学分	课内学时					课外学时	学期	备注
					合计	讲授	实验	上机	实践			
通识教育课程	思政类课程	MRX324811031	思想道德与法治 Ideological Morality and Rule of Law	2.5	40	40				40	1	
		2094199	中国概况(2-1) Survey of China (2-1)	3.0	48	48				48	3	
		2094299	中国概况(2-2) Survey of China (2-2)	3.0	48	48				48	4	
	基础素	2091199	初级汉语口语(2-1) Primary Oral Chinese (2-1)	4.0	64	64				64	1	
		2092199	初级汉语精读(2-1) Primary Chinese reading (2-1)	4.0	64	64				64	1	

课程类别	课程模块	课程编码(初稿只需填写开课单位代码)	课程名称	学分	课内学时					课外学时	学期	备注
					合计	讲授	实验	上机	实践			
	养课程	2091299	初级汉语口语(2-2) Primary Oral Chinese (2-2)	4.0	64	64				64	2	
		2092299	初级汉语精读(2-2) Primary Chinese reading (2-2)	4.0	64	64				64	2	
		2095199	中级汉语(2-1) Intermediate Chinese (2-1)	4.0	64	64				64	3	
		2095299	中级汉语(2-2) Intermediate Chinese (2-2)	4.0	64	64				64	4	
		2096199	高级汉语(2-1) Advanced Chinese (2-1)	4.0	64	64				64	5	
		2096299	高级汉语(2-2) Advanced Chinese (2-2)	4.0	64	64				64	6	
		CST110311025	程序设计（Python） Programming (Python)	3.0	48	24		24			1	
		CST110611015	大学计算机 Fundamentals of Computer	1.0	24	24					2	
	通识选修课程	至少修读 10 学分通识教育选修课程，其中通识教育核心课程不少于 4 学分（应分布于不同模块，且全球视野与思维表达模块不少于 2 学分）；非艺术类学生修读艺术类课程不少于 2 个学分。		10.0							1-8	
专业教育	大类基础课程	SCC110112100	高等数学（2-1） Advanced Mathematics (2-1)	6.0	96	96				96	1	
		SCC110112200	高等数学（2-2） Advanced Mathematics (2-2)	5.0	80	80				80	2	
		SCC850611035	大学化学 College Chemistry	4.0	60	48	12			48	2	
		SCC410112101	大学物理（2-1） University Physics (2-1)	4.0	64	64				64	2	
		SCC710112100	大学物理实验（2-1） College Physics Experiment (2-1)	1.0	24		24				2	
		SCC410112200	大学物理（2-2） University Physics (2-2)	3.5	56	56				56	3	
		SCC710112200	大学物理实验（2-2） College Physics Experiment (2-2)	1.0	24		24				3	
		SFS110212100	学术英语 Academic English	2.0	32	32				32	3	
		CTL210111030	电工电子学 Electrotechnics and Electronics	3.0	48	48				48	4	
		CTL310111010	电工电子学实验 Experiment of Electrotechnics and Electronics	1.0	24		24			24	4	
		MAT114911010	专业认识实习 Cognition Practice	1.0					1周		S1	
	专业必修课程	MAT529311020	新能源材料与器件导论 Introduction to New Energy Materials and Devices	2.0	32	32					1	
		MAT111111035	材料科学基础 Fundamentals of Material Science	2.0	32	32					2	
		SCC813711020	有机化学 Organic Chemistry	2.0	32	32				32	3	

课程类别	课程模块	课程编码(初稿只需填写开课单位代码)	课程名称	学分	课内学时					课外学时	学期	备注
					合计	讲授	实验	上机	实践			
		SCC828911010	有机化学实验 Organic Chemistry Experiment	1.0	24		24			24	3	
		SCC812211030	物理化学 Physical Chemistry	3.0	48	48				48	3	
		MAT520711020	电化学基础 Electrochemistry Basis	2.5	40	40				40	4	
		MAT120311010	材料成型概论 Introduction to Material Forming	2.5	40	40				40	4	
		MAT520311021	材料分析技术 Material Analysis Technology	3.0	48	48				48	5	
		MAT522712100	专业创新实验 Innovative Experiment	1.0	1周				1周		6	
		MAT522811020	专业生产实习 Specialty Practice	2.0	2周				2周		S3	
		MAT521911030	专业综合课程设计 Specialty Comprehensive Course Designs	3.0	72		72			72	7	
		0118699	学科前沿讲座（听16次学术报告）Frontier Lectures in the Discipline (Attend 16 Academic Reports)	1.0	16	16					3-7	
		MAT520211080	毕业设计 Graduation Project	8.0	16周				16周		8	
		MAT531511020	国际教育课程（此课程名称为统一设置请勿改动）	2.0	32	32					S2	
	专业选修课程	MAT531421020	光化学原理与技术 Principle and Technology of Photochemistry	2.5	40	40				40	5	A
		MAT520621020	储能材料与器件 Energy Storage Materials and Devices	2.5	40	40				40	5	A
		MAT326611015	先进材料与技术 Advanced Materials and Technology	2.5	40	40				40	5	A
		MAT130211020	现代材料学 Modern Materials Science	2.5	40	40				40	6	B
		MAT526321020	新能源隔膜原理与技术 Principles and Technologies Membranes for New Energy	2.5	40	40				40	6	B
		MAT410321020	膜分离科学与技术 Membrane Separation Science and Technology	2.5	40	40				40	6	B
		MAT524721020	智能材料与智能制造 Intelligent materials and intelligent manufacturing	2.0	32	32				32	7	C

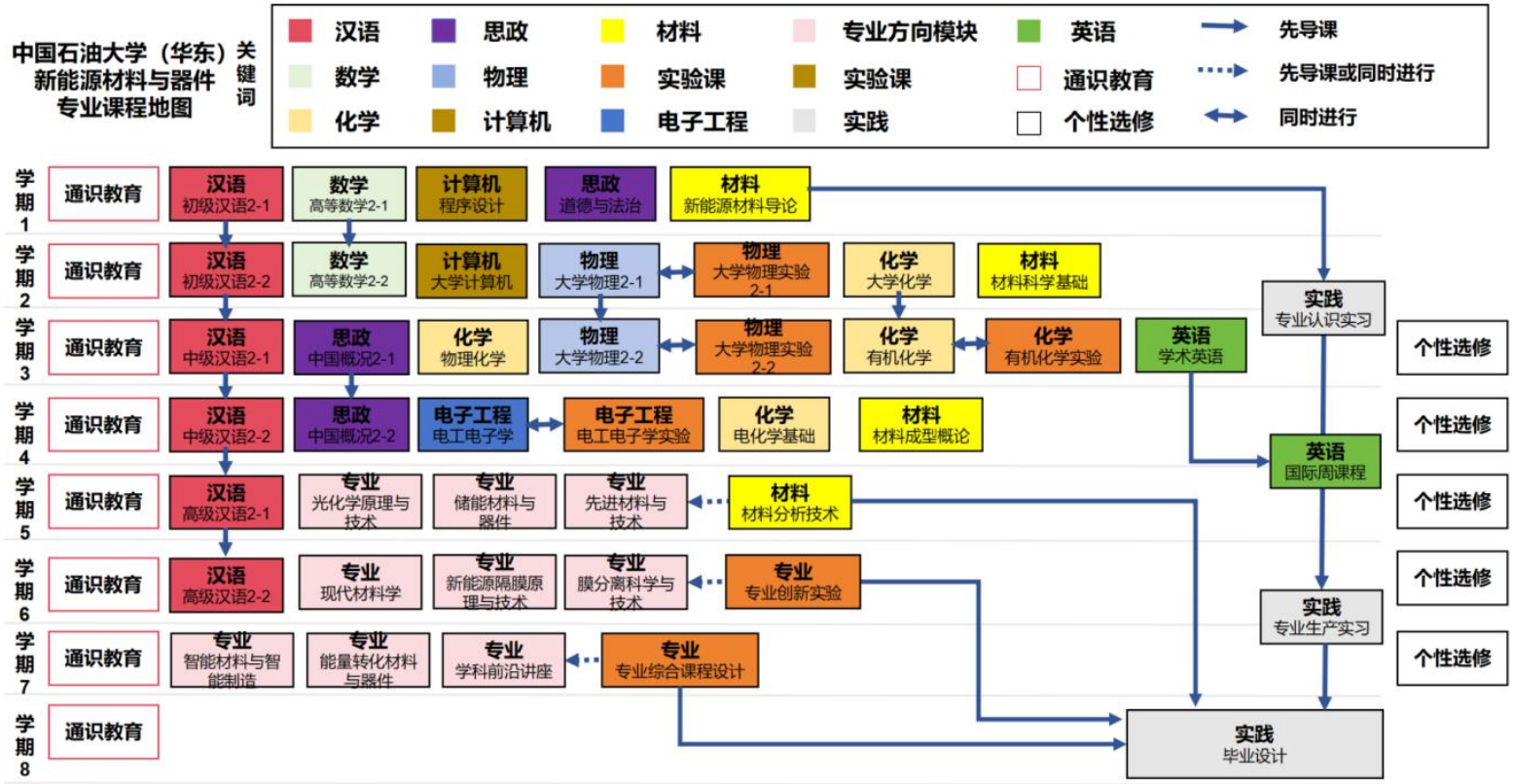
课程类别	课程模块	课程编码(初稿只需填写开课单位代码)	课程名称	学分	课内学时					课外学时	学期	备注
					合计	讲授	实验	上机	实践			
		MAT521121020	能量转化材料与器件 Energy Conversion Materials and Devices	2.0	32	32				32	7	C
		修读说明	(1)专业选修课程要求修满 17 个学分，从 A、B、C 共 3 类中任选。 (2)课程选修建议：专业基础选修类(A 类)取得 7.5 学分；专业拓展选修类(B 类)取得 7.5 学分；专业特色选修类(C 类)取得 2 学分。									
自主发展	跨学科课程	选修本专业所属专业类以外的专业开设的专业教育课程，也可通过修读微专业、辅修等途径替代（如本专业有修读建议可予以写明）		≥4							3-8	
	辅助学分	辅助学分不少于 10 个学分，活动设置、学分要求及认定方式见《本科生“第二课堂成绩单”实施细则》		≥10							1-8	

选课其他须知：

学科前沿讲座：需听满 16 场学术报告，并在指定笔记本记录笔记，该笔记本须在第 7 学期提交。

跨学科课程：暂不提供具体的跨学科课程推荐，需修满至少 4 学分。

七、课程体系拓扑图


中国石油大学（华东）
新能源材料与器件
专业课程地图
关键词
汉语
思政
材料
专业方向模块
英语
先导课
数学
物理
实验课
实验课
通识教育
先导课或同时进行
化学
计算机
电子工程
实践
个性选修
同时进行
学期1
通识教育
汉语 初级汉语2-1
数学 高等数学2-1
计算机 程序设计
思政 道德与法治
材料 新能源材料导论
学期2
通识教育
汉语 初级汉语2-2
数学 高等数学2-2
计算机 大学计算机
物理 大学物理2-1
物理 大学物理实验2-1
化学 大学化学
材料 材料科学基础
实践 专业认识实习
学期3
通识教育
汉语 中级汉语2-1
思政 中国概况2-1
化学 物理化学
物理 大学物理2-2
物理 大学物理实验2-2
化学 有机化学
化学 有机化学实验
英语 学术英语
个性选修
学期4
通识教育
汉语 中级汉语2-2
思政 中国概况2-2
电子工程 电工电子学
电子工程 电工电子学实验
化学 电化学基础
材料 材料成型概论
英语 国际周课程
个性选修
学期5
通识教育
汉语 高级汉语2-1
专业 光化学原理与技术
专业 储能材料与器件
专业 先进材料与技术
材料 材料分析技术
个性选修
学期6
通识教育
汉语 高级汉语2-2
专业 现代材料学
专业 新能源隔膜原理与技术
专业 膜分离科学与技术
专业 专业创新实验
实践 专业生产实习
个性选修
学期7
通识教育
专业 智能材料与智能制造
专业 能量转化材料与器件
专业 学科前沿讲座
专业 专业综合课程设计
个性选修
学期8
通识教育
实践 毕业设计

New Energy Materials and Devices (International Class) Undergraduate Training Program

(Major Code: 080414T Length of Study: 4 Years Degree Awarded: Bachelor of Engineering)

I. Educational Objectives

This major faces the international forefront of technology and the major needs of the world's energy strategy. It aims to cultivate all-round development in terms of knowledge, abilities, and qualities. Students should have a solid foundation in mathematics and physics, systematically master the basic theories, knowledge, and skills of materials, and be able to apply the professional theories, methods, and technologies of this major to analyze and solve complex engineering problems. Graduates should have an understanding of China and goodwill towards it, possess a global perspective, be able to participate in international exchange and cooperation, and lead future development in the field of new energy materials and devices and related areas.

II. Graduation Requirements and Achievement Matrix

Graduates should acquire the following knowledge and abilities:

1. Language Requirements: Students must pass the HSK Level 4 prior to graduation and possess basic Chinese listening, speaking, reading and writing skills, so as to meet the language requirements for their study, daily life and future career development in China. Students are required to complete the designated courses listed below and obtain passing grades: Survey of China (2-1), Survey of China (2-2), Elementary Chinese, Intermediate Chinese, Advanced Chinese.

2. Foundation in Mathematics, Science, and Engineering: Possess solid fundamental theoretical knowledge in mathematics, physics, chemistry, and materials science; master the application capabilities of modern engineering tools and information technology; have a basic command of Chinese, enabling them to read professional technical materials in Chinese; and

possess basic communication skills in cross-cultural environments.

3. Engineering Practice Ability: Systematically master the basic theories and professional knowledge in the field of new energy materials and devices, and possess the ability to analyze, design, and develop solutions for complex engineering problems such as new energy material synthesis, device design, and process flows.

4. Research and Innovation Capability: Be able to design experiments and conduct data analysis related to new energy materials and devices based on scientific principles and research methods, and have preliminary research and innovation abilities.

5. International Vision and Cross-cultural Competence: Understand the international frontiers and development trends in the field of new energy materials and devices; master the ability to search, read, and communicate professional English literature; and be able to collaborate and communicate effectively in an international context across cultures.

6. Professional Development Literacy: Possess lifelong learning awareness and independent learning abilities to adapt to the challenges of rapid technological development in the new energy field; have engineering professional ethics, teamwork spirit, basics in project management and economic decision-making, and be able to engage in research and development, production, and management in an international engineering environment.

Graduation Requirement Indicators and Achievement Matrix

Graduation Requirements	Performance Indicators	Courses
1. Foundation in Mathematics, Science, and Engineering: Possess solid fundamental theoretical knowledge in mathematics, physics, chemistry, and materials science; master the application capabilities of modern engineering tools and information technology; have a basic command of Chinese, enabling them to read professional technical materials in Chinese; and possess basic communication skills in cross-cultural environments.	1.1 Be able to apply theories and methods of mathematics, physics, chemistry, and materials science to model, express, and analyze engineering problems in the field of new energy materials and devices.	Advanced Mathematics (2-1)/(2-2) College Chemistry University Physics (2-1)/(2-2) Fundamentals of Material Science Organic Chemistry Physical Chemistry
	1.2 Be able to develop, select, and appropriately use modern engineering tools, simulation software, and information technology tools to analyze and design for professional problems, understanding their limitations.	Programming (Python) Fundamentals of Computer Material Analysis Technology
	1.3 Possess basic Chinese language skills and be able to read and understand professional Chinese materials (such as textbooks, papers, etc.) with the help of tools; possess basic communication and comprehension abilities in cross-cultural environments.	Primary Chinese Reading (2-1)/(2-2) Primary Oral Chinese (2-1)/(2-2) Intermediate Chinese (2-1)/(2-2) Advanced Chinese (2-1)/(2-2) Survey of China (2-1)/(2-2) Academic English

Graduation Requirements	Performance Indicators	Courses
2. Engineering Practice Ability: Systematically master the basic theories and professional knowledge in the field of new energy materials and devices, and possess the ability to analyze, design, and develop solutions for complex engineering problems such as new energy material synthesis, device design, and process flows	2.1 Be able to use professional basic theories and engineering principles to identify and judge key aspects in complex engineering problems of new energy material synthesis, device design, and process flows.	Fundamentals of Material Science Electrochemistry Basis Introduction to Material Forming
	2.2 Be able to design new energy material formulations, device structures, or system process flows for specific needs, and propose feasible solutions.	Material Analysis Technology Experiment Innovative Experiment Specialty Comprehensive Course Design Graduation Project
	2.3 Be able to optimize, compare, and synthesize solutions by comprehensively considering multiple factors including technology, society, health, safety, law, culture, and environment.	Survey of China (2-1)/(2-2) Specialty Practice
3. Be able to design feasible experimental plans or research routes for problems in the field of new energy materials and devices based on scientific principles and literature research.	3.1 Be able to design feasible experimental plans or research routes for problems in the field of new energy materials and devices based on scientific principles and literature research.	Fundamentals of Material Science Electrochemistry Basis College Physics Experiment (2-1)/(2-2)
	3.2 Be able to safely select and set up experimental systems, conduct experiments in a standardized manner, and correctly collect, record, and analyze experimental data.	Experiment of Electrotechnics and Electronics Innovative Experiment Organic Chemistry Experiment
	3.3 Be able to reasonably explain and synthesize information from experimental data and results to obtain valid conclusions, and can propose innovative ideas or improvement plans for new technologies or problems.	Specialty Comprehensive Course Design Graduation Project Energy Storage Materials and Devices Intelligent Materials and Intelligent Manufacturing Energy Conversion Materials and Devices
4. International Vision and Cross-cultural Competence: Understand the international frontiers and development trends in the field of new energy materials and devices; master the ability to search, read, and communicate professional English literature; and be able to collaborate and communicate effectively in an international context across cultures.	4.1 Understand international development trends, research hotspots, and important technical standards in the field of new energy materials and devices.	Introduction to New Energy Materials and Devices Frontier Lectures in the Discipline Innovative Experiment International Education Program Modern Materials Science
	4.2 Master Chinese and English literature search and reading methods, and be able to track international academic dynamics; be able to effectively communicate professional issues in writing and orally using both Chinese and English.	Academic English International Education Program Advanced Chinese (2-1)/(2-2) Specialty Practice Graduation Project
	4.3 Understand China's and international development situations, and possess the ability to communicate, collaborate, and manage projects effectively in multidisciplinary, cross-cultural teams.	Survey of China (2-1)/(2-2) | International Education Program | Specialty Practice
5. Professional Development Literacy: Possess lifelong learning awareness and independent learning abilities	5.1 Have correct values, understand the relationship between individuals and society, understand China's national conditions, and have knowledge of and friendship towards China.	Survey of China (2-1)/(2-2) Cognition Practice

Graduation Requirements	Performance Indicators	Courses
to adapt to the challenges of rapid technological development in the new energy field; have engineering professional ethics, teamwork spirit, basics in project management and economic decision-making, and be able to engage in research and development, production, and management in an international engineering environment.	5.2 Understand the professional nature and responsibilities of a materials engineer, and consciously abide by honest, fair, and ethical engineering professional ethics and norms in engineering practice.	Specialty Practice Graduation Project
	5.3 Be able to assume the roles of individual, team member, or leader in a diversified team, effectively organize, coordinate, and complete team tasks.	Innovative Experiment Specialty Comprehensive Course Design Graduation Project
	5.4 Possess awareness of self-directed and lifelong learning, be able to track technological development, continuously update the knowledge system, and adapt to the challenges of career development.	Frontier Lectures in the Discipline Graduation Project Interdisciplinary Courses

III. Main Disciplines and Core Courses

Main Discipline: Materials Science and Engineering

Core Courses: Fundamentals of Material Science, Material Analysis Technology, Electrochemistry Basis, Introduction to New Energy Materials and Devices, Innovative Experiment, Specialty Comprehensive Course Design

IV. Featured Courses

1. Specialized Featured Courses

Innovation and Entrepreneurship Integrated Course: Innovative Experiment

Project-Based Courses: Specialty Comprehensive Course Design

"Artificial Intelligence +" Courses: Programming

Industry-Education Integration Course: Specialty Practice

University-Enterprise Co-developed Course: (Required for Modern Industrial College programs)

2. Localized International Courses

Fully English-Taught Course: Academic English

Bilingual Courses: Primary Chinese Reading (2-1)/(2-2), Primary Oral Chinese (2-1)/(2-2), Intermediate Chinese (2-1)/(2-2), Advanced Chinese (2-1)/(2-2)

3. Other Courses

Labor Education Practice Courses: Specialty Practice

Model Courses for Curriculum-Based Ideological and Political Education: Survey of China (2-1), Ideological Morality and Rule of Law

V. Credit Requirements

Students of this major are required to complete a total of **142 credits** stipulated in the professional training program within the prescribed study period of the university and obtain **10 credits** required for the Auxiliary training program. Graduation is contingent upon passing HSK Level 4. Students who meet the requirements for the bachelor's degree will be awarded a bachelor's degree.

Degree Awarded: Bachelor of Engineering

Course Category		Credits	Percentage	Theoretical Hours	Practical Hours	Total Hours
General Education Courses	General Required Courses	44.5	31.3%	696	24 hours	720 hours
	General Elective Courses	10	7.0%			
Major Foundation Courses	Discipline Foundation Courses	31.5	22.2%	424	84hours +1week	508hours +1week
	Major Required Courses	35	24.6&	320	96hours +19week	416hours +19week
	Major Elective Courses	17.0	12.0%			
Independent Development	Interdisciplinary Courses	4	2.8%			
	Auxiliary training program	10	10（Not included in total graduation credits）			
Total Graduation Credits (Total Hours)		142				
Practical Teaching (including in-class experiments)		20.5	14.4%	——	204 +19weeks	204 +19weeks
Intensive Practical Teaching Components		21.5	15.1%	——	204 +20weeks	204 +20weeks

	Category	1	2	S1	3	4	S2	5	6	S3	7	8
Recommended Credits by Semester	Required Courses	21.5	25	1	19.5	17.25	2	4.25	5.25	2	3.25	8
	General Electives	0	0	0	0	0	0	7.5	7.5	0	2	0
	Major Electives	0	2	0	2	2	0	2	2	0	2	0
	Interdisciplinary Electives	21.5	27	1	21.5	19.25	2	13.75	14.75	2	7.25	8

VI. Curriculum Structure

(Note: Foundation courses shall follow the curriculum plan regarding course names, credits, and semester offerings.)

Course Category	Course Module	Course Code (初稿只需填写开课单位代码)	Course Name	Credits	In-Class Hours					Extracurricular Hours	Semester	Remarks
					Total Hours	Lecture	Experiment	Computer Lab	Practice			
General Education Courses	Ideological and Political Courses	MRX324811031	思想道德与法治 Ideological Morality and Rule of Law	2.5	40	40				40	1	
		2094199	中国概况(2-1) Survey of China (2-1)	3.0	48	48				48	3	
		2094299	中国概况(2-2) Survey of China (2-2)	3.0	48	48				48	4	
	Basic Literacy Courses	2091199	初级汉语口语(2-1) Primary Oral Chinese (2-1)	4.0	64	64				64	1	
		2092199	初级汉语精读(2-1) Primary Chinese reading (2-1)	4.0	64	64				64	1	
		2091299	初级汉语口语(2-2) Primary Oral Chinese (2-2)	4.0	64	64				64	2	
		2092299	初级汉语精读(2-2) Primary Chinese reading (2-2)	4.0	64	64				64	2	
		2095199	中级汉语(2-1) Intermediate Chinese (2-1)	4.0	64	64				64	3	
		2095299	中级汉语(2-2) Intermediate Chinese (2-2)	4.0	64	64				64	4	
		2096199	高级汉语(2-1) Advanced Chinese (2-1)	4.0	64	64				64	5	
		2096299	高级汉语(2-2) Advanced Chinese (2-2)	4.0	64	64				64	6	
		CST110311025	程序设计（Python） Programming (Python)	3.0	48	24		24			1	
		CST110611015	大学计算机 Fundamentals of Computer	1.0	24	24					2	
	General Elective Courses	Students must complete at least 10 credits of general elective courses, including at least 4 credits of core general education courses distributed across different modules, with at least 2 credits from the Global Vision and Critical Thinking module. Non-art students must complete at least 2 credits of art courses.		10.0							1-8	
Professional Education	Discipline Foundation Courses	SCC110112100	高等数学（2-1） Advanced Mathematics (2-1)	6.0	96	96				96	1	
		SCC110112200	高等数学（2-2）	5.0	80	80				80	2	

Course Category	Course Module	Course Code (初稿只需填写开课单位代码)	Course Name	Credits	In-Class Hours					Extracurricular Hours	Semester	Remarks
					Total Hours	Lecture	Experiment	Computer Lab	Practice			
			Advanced Mathematics (2-2)									
		SCC850611035	大学化学 College Chemistry	4.0	60	48	12			48	2	
		SCC410112101	大学物理（2-1） University Physics (2-1)	4.0	64	64				64	2	
		SCC710112100	大学物理实验（2-1） College Physics Experiment (2-1)	1.0	24		24				2	
		SCC410112200	大学物理（2-2） University Physics (2-2)	3.5	56	56				56	3	
		SCC710112200	大学物理实验（2-2） College Physics Experiment (2-2)	1.0	24		24				3	
		SFS110212100	学术英语 Academic English	2.0	32	32				32	3	
		CTL210111030	电工电子学 Electrotechnics and Electronics	3.0	48	48				48	4	
		CTL310111010	电工电子学实验 Experiment of Electrotechnics and Electronics	1.0	24		24			24	4	
		MAT114911010	专业认识实习 Cognition Practice	1.0					1 周		S1	
	Major Required Courses	MAT529311020	新能源材料与器件导论 Introduction to New Energy Materials and Devices	2.0	32	32					1	
		MAT111111035	材料科学基础 Fundamentals of Material Science	2.0	32	32					2	
		SCC813711020	有机化学 Organic Chemistry	2.0	32	32				32	3	
		SCC828911010	有机化学实验 Organic Chemistry Experiment	1.0	24		24			24	3	
		SCC812211030	物理化学 Physical Chemistry	3.0	48	48				48	3	
		MAT520711020	电化学基础 Electrochemistry Basis	2.5	40	40				40	4	

Course Category	Course Module	Course Code (初稿只需填写开课单位代码)	Course Name	Credits	In-Class Hours					Extracurricular Hours	Semester	Remarks
					Total Hours	Lecture	Experiment	Computer Lab	Practice			
		MAT120311010	材料成型概论 Introduction to Material Forming	2.5	40	40				40	4	
		MAT520311021	材料分析技术 Material Analysis Technology	3.0	48	48				48	5	
		MAT522712100	专业创新实验 Innovative Experiment	1.0	1 周				1 周		6	
		MAT522811020	专业生产实习 Specialty Practice	2.0	2 周				2 周		S3	
		MAT521911030	专业综合课程设计 Specialty Comprehensive Course Designs	3.0	72		72			72	7	
		0118699	学科前沿讲座（听 16 次学术报告） Frontier Lectures in the Discipline (Attend 16 Academic Reports)	1.0	16	16					3-7	
		MAT520211080	毕业设计 Graduation Project	8.0	16 周				16 周		8	
		MAT531511020	国际教育课程（此课程名称为统一设置请勿改动）	2.0	32	32					S2	
	Major Elective Courses	MAT531421020	光化学原理与技术 Principle and Technology of Photochemistry	2.5	40	40				40	5	A
		MAT520621020	储能材料与器件 Energy Storage Materials and Devices	2.5	40	40				40	5	A
		MAT326611015	先进材料与技术 Advanced Materials and Technology	2.5	40	40				40	5	A
		MAT130211020	现代材料学 Modern Materials Science	2.5	40	40				40	6	B
		MAT526321020	新能源隔膜原理与技术 Principles and Technologies Membranes for New Energy	2.5	40	40				40	6	B
		MAT410321020	膜分离科学与技术 Membrane Separation Science and Technology	2.5	40	40				40	6	B

Course Category	Course Module	Course Code (初稿只需填写开课单位代码)	Course Name	Credits	In-Class Hours					Extracurricular Hours	Semester	Remarks
					Total Hours	Lecture	Experiment	Computer Lab	Practice			
		MAT524721020	智能材料与智能制造 Intelligent materials and intelligent manufacturing	2.0	32	32				32	7	C
		MAT521121020	能量转化材料与器件 Energy Conversion Materials and Devices	2.0	32	32				32	7	C
		Course Selection Note	(1) Students are required to complete a total of 17 credits of Major Elective Courses, which can be freely selected from three categories: A, B and C. (2) Course Selection Recommendation: obtain at least 7.5 credits from Basic Major Electives (Category A); obtain at least 7.5 credits from Expanded Major Electives (Category B); obtain at least 2 credits from Specialized Major Electives (Category C).									
Independent Development	Interdisciplinary Courses	Interdisciplinary Courses: Students may take professional education courses offered outside their own discipline, or substitute them through minors, micro-majors, or other approved pathways. (If applicable, recommended courses may be specified by the program.)		≥4							3-8	
	Auxiliary training program	Students are required to complete no fewer than 10 credits of auxiliary training program activities. The activity arrangements, credit requirements, and recognition methods shall follow the Implementation Rules for the Undergraduate 'Auxiliary training program/ Second Classroom Transcript'.		≥10							1-8	

Other Notes for Course Selection:

1. Frontier Lectures in the Discipline: Attendance at 16 academic reports is required, and notes must be taken in a designated notebook. The notebook must be submitted in the 7th semester.

2. Interdisciplinary Courses: No specific recommendations are provided for interdisciplinary courses; at least 4 credits must be completed.