材料科学与工程专业本科人才培养方案

Curriculum of Bachelor Program of Materials Science and Engineering

（Chinese-Foreign Cooperation program）

专业简介 Program Introduction

材料科学与工程专业是2019年组建的新工科专业，2020年获批成立湖北大学曼城联合学院，并于2021年开始招生。2020年获批成立湖北大学曼城联合学院，并于2021年开始招生。材料科学与工程学科为湖北省一级重点学科，入选湖北省“十三五”省属高校优势特色学科群和湖北省“双一流”建设学科，材料科学学科ESI全球排名进入前4‰。曼彻斯特城市大学材料工程排名英国前二十位，2021年TIMES化学专业英国排名第45。学科已建成国家“能源捕获和环境传感绿色技术”学科创新引智基地（国家111计划）、功能材料绿色制备与应用教育部重点实验室、有机化工新材料省部共建协同创新中心等多个省部级学科发展平台。本专业合格毕业生同时获得湖北大学和曼彻斯特城市大学两校相应学位。

The Program of Materials Science and Engineering is a new engineering major established in 2019. It was approved to establish in Manchester Metropolitan Joint Institute, Hubei University in 2020 and began enrollment in 2021. Material Science and Engineering discipline is a first-class key discipline in Hubei Province. It was selected into the advantageous and characteristic discipline group of provincial colleges and universities in Hubei province during the 13th five-year plan and the "double first-class" construction discipline in Hubei province. The material science discipline ranks among the top 4 ‰ of ESI in the world. Materials engineering discipline in Manchester Metropolitan University ranked in the top twenty in the UK, and TIMES chemistry ranked forty-fifth in the UK in 2021. The discipline has built several provincial and ministerial level discipline development platforms, such as the National Energy Capture and Environmental Sensing Green Technology discipline innovation and talent introduction base (National 111 project), the Key Laboratory of Green Preparation and Application of Functional Materials of the Ministry of Education, and the Provincial and Ministerial Collaborative Innovation Center for New Organic Chemical Materials, etc.. Qualified graduates of this major will obtain corresponding degrees from Hubei University and Manchester Metropolitan University at the same time.

专业代码 Program Code：080401H

一、培养目标 Training Objectives

面向国家、区域战略发展和国际科技创新合作，培养系统掌握材料科学与工程专业基础知识、工程技术、实践应用方法，能够从事材料与化工相关领域的科学研究、教学、设计开发、生产制造、工程管理、工艺设计、性能评价和项目管理等工作，并能够综合考虑法律、安全、环境与可持续发展等因素；具有家国情怀、良好的人文素养、追求卓越、国际视野、工程精神、团队协作精神、组织管理能力以及良好职业道德和社会责任感的卓越复合型工程应用人才。

Facing the national and regional strategic development and international scientific and technological

innovation cooperation, the student must systematically master the basic knowledge, engineering technology and practical application methods of materials science and engineering, be able to engage in scientific research, teaching, design and development, production and manufacturing, engineering management, process design, performance evaluation and project management in the field of materials and chemical engineering, and be able to comprehensively consider the factors of law, safety, environment and sustainable development. Excellent engineering application talents with national feelings, good humanistic quality, pursuit of excellence, international vision, engineering spirit, team spirit, organization and management ability, good professional ethics and sense of social responsibility will be trained.

Have good scientific and humanistic quality, globalization awareness and international vision, innovation awareness and ability, good communication and teamwork ability, sound personality, accomplished and good professional ethics, strong sense of social responsibility, physical and mental healthy, autonomous and lifelong learning habits and ability, be able to continuously improve the comprehensive quality and professional ability in practical work through autonomous learning and lifelong learning, and actively serve the country and society.

学生毕业 5 年左右应具有以下能力：

Students are expected to achieve the following abilities about 5 years after graduation:

（1）能够在材料制备、加工及工程应用领域，独立胜任科学研究、教学、产品开发、工艺设计、性能评价和技术管理等工作；

Be competent for scientific research, teaching, product development, process design, performance evaluation and technical management in the field of material preparation, processing and engineering application;

（2）能够追踪前沿技术发展，综合运用理论知识、专业技能与现代工具，对实际工作中的复杂工程问题进行分析、研究，并提出创新性的解决方案；

Be able to track the development of cutting-edge technology, comprehensively use theoretical knowledge, professional skills and modern tools to analyze and study complex engineering problems in practical work, and put forward innovative solutions;

（3）能够独立承担工程或研发项目，遵守职业规范，并从文化、社会、生态及经济等多方面综合考虑材料制备、加工及工程应用领域的安全、环保及可持续发展等问题；

Be able to independently undertake engineering or R&D projects, abide by professional norms, and comprehensively consider the safety, environmental protection and sustainable development of material preparation, processing and engineering applications from cultural, social, ecological and economic aspects;

（4）具备良好的科学人文素养，具有全球化意识和国际视野，具有创新意识与能力，具有良好的沟通和团队协作能力，具有健全的人格、良好的修养和职业道德，社会责任感强，身心健康，拥有自主的、终生的学习习惯和能力，能够通过自主学习和终身学习在实际工作中持续提升自己的综合素质和专业能力，积极服务于国家与社会。

Have good scientific and humanistic quality, globalization awareness and international vision, innovation

awareness and ability, good communication and teamwork ability, sound personality, accomplished and good professional ethics, strong sense of social responsibility, physical and mental healthy, autonomous and lifelong learning habits and ability, be able to continuously improve the comprehensive quality and professional ability in practical work through autonomous learning and lifelong learning, and actively serve the country and society.

二、毕业要求 Graduation Requirements

1、 工程知识：能够将数学、自然科学、工程基础和专业知识用于解决材料制备、加工及工程应用领域内的复杂工程问题。

Engineering knowledge: be able to use mathematics, natural science, engineering foundation and professional knowledge to solve complex engineering problems in the field of material preparation, processing and engineering application.

1.1 掌握数学、自然科学和工程科学知识，能将其语言工具用于工程问题的表述；

Master the knowledge of mathematics, natural science and engineering science, and be able to use these language tools to express engineering problems;

1.2 能针对具体的对象建立数学模型并求解；

Be able to establish and solve mathematical models for specific objects;

1.3 能够将相关知识和数学模型方法用于推演、分析材料制备、加工及工程应用领域的复杂工程问题；

Be able to use relevant knowledge and mathematical model methods to deduce and analyze complex engineering problems in material preparation, processing and engineering application fields;

1.4 能够将相关知识和数学模型方法用于材料制备、加工及工程应用领域的复杂工程问题解决方案的分析、比较与综合。

Be able to apply relevant knowledge and mathematical model method to the analysis, comparison and summary of complex engineering problem solutions in the fields of material preparation, processing and engineering application.

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材料制备、加工及工程应用领域内复杂工程问题，以获得有效结论。

Problem analysis: be able to apply the basic principles of mathematics, natural science and engineering science to identify, express, and through literature research to analyze complex engineering problems in the field of material preparation, processing and engineering application, aiming to obtain effective conclusions.

2.1 能运用相关科学原理，识别和判断材料制备、加工及工程应用领域的复杂工程问题的关键环节和参数；

Be able to use relevant scientific principles to identify and judge the key processes and parameters of

complex engineering problems in the field of material preparation, processing and engineering application;

2.2 能基于相关科学原理和数学模型方法正确表达材料制备、加工及工程应用领域的复杂工程问题；

Be able to correctly express complex engineering problems in material preparation, processing and engineering applications based on relevant scientific principles and mathematical model methods;

2.3 能认识到解决材料制备、加工及工程应用领域的复杂工程问题有多种方案可选择，会通过文献研究寻求可替代的解决方案；

Be able to recognize that there are many alternative solutions to solve complex engineering problems in the field of material preparation, processing and engineering application, and be able to seek alternative solutions through literature research;

2.4 能运用基本原理，借助文献研究，分析材料制备、加工及工程应用领域的内复杂工程问题的影响因素，获得有效结论。

Be able to analyze the influencing factors of complex engineering problems in the field of material preparation, processing and engineering application by using the basic principles and literature research, and obtain effective conclusions.

3、 设计/开发解决方案：能够设计针对材料制备、加工及工程应用领域内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，并对设计方案进行测试与改进，能够在设计环节中体现创新意识，考虑经济、社会、健康、安全、法律、文化以及环境等因素。

Design/development solution: be able to design solutions to complex engineering problems in the field of material preparation, processing and engineering application, design systems, units (components) or technological processes to meet specific demands, test and improve the design scheme, and reflect the sense of innovation in the design process, and consider economic, social, health, safety, legal, cultural and environmental factors.

3.1 掌握工程设计和产品开发全周期、全流程的基本设计/开发方法和技术，了解影响设计目标和技术方案的各种因素；

Master the basic design/development methods and technologies of the whole cycle and process of engineering design and product development, and understand various factors affecting the design objectives and technical solutions;

3.2 能够针对材料制备、加工及工程应用领域的特定需求，完成材料（制品）的结构设计或成型工艺设计；

Be able to complete the structural design or molding process design of materials (products) according to the specific requirements of material preparation, processing and engineering application fields;

3.3 能够针对材料制备、加工及工程应用领域的复杂工程问题进行系统或工艺流程设计，在设计中体现创新意识；

Be able to design system or process flow for complex engineering problems in material preparation, processing and engineering application, and embody innovation consciousness in the design;

3.4 在针对材料制备、加工及工程应用领域的复杂工程问题进行系统或工艺流程设计中，能够考虑安全、健康、法律、文化及环境等因素的制约。

Be able to consider the constraints of safety, health, law, culture and environment in the system or process design for complex engineering problems in the field of material preparation, processing and engineering application。

4、 研究：能够基于科学原理并采用科学方法对材料制备、加工及工程应用领域内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。

Research: be able to investigate complex engineering problems in the field of material preparation, processing and engineering application based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information summarizing.

4.1 能够基于数学、自然科学、工程科学和材料科学与工程的基本原理，通过文献研究或相关方法，调研和分析材料制备、加工及工程应用领域复杂工程问题的解决方案；

Based on the basic principles of mathematics, natural science, engineering science and materials science and engineering, through literature research or related methods, investigate and analyze solutions to complex engineering problems in material preparation, processing and engineering applications;

4.2 能够根据材料制备、加工及工程应用领域复杂工程问题的特征，选择研究路线，设计实验方案；

Be able to choose the research route and design the experimental scheme according to the characteristics of complex engineering problems in the field of material preparation, processing and engineering application;

4.3 能够根据实验方案构建实验系统，安全地开展实验，正确地采集实验数据；

Be able to build the experimental system according to the experimental scheme, carry out the experiment safely and collect the experimental data correctly;

4.4 能够对不同的实验方案进行分析、对比和改进，能对实验结果进行分析和解释，并通过信息综合得到合理有效的结论。

Be able to analyze, compare and improve different experimental schemes, analyze and explain the experimental results, and get reasonable and effective conclusions through information summarizing.

5、 使用现代工具：能够针对材料制备、加工及工程应用领域内复杂工程问题，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。

Modern-tool use: be able to develop, select and use appropriate technology, resources, modern engineering tools and information technology tools for solving complex engineering problems in the field of material preparation, processing and engineering application, including prediction and simulation of complex engineering problems, and understand their limitations.

5.1 了解材料科学与工程专业领域内常用的现代仪器、信息技术工具、工程工具和模拟软件的使用

原理和方法，并理解其局限性；

Understand the principles and methods of modern instruments, information technology tools, engineering tools and simulation software commonly used in the field of materials science and engineering, and understand their limitations;

5.2 能够选择与使用恰当的仪器、信息资源、工程工具和专业模拟软件，对材料制备、加工与工程应用领域内复杂工程问题进行预测、分析、计算；

Be able to select and use appropriate instruments, information resources, engineering tools and professional simulation software to predict, analyze and calculate complex engineering problems in the field of material preparation, processing and engineering application;

5.3 能够针对具体的对象，开发或选用满足特定需求的现代工具，模拟和预测材料制备、加工与工程应用领域的复杂工程问题，并能够分析其局限性。

Be able to develop or select modern tools to meet specific demands for specific objects, simulate and predict complex engineering problems in material preparation, processing and engineering applications, and analyze their limitations.

6、 工程与社会：能够基于工程相关背景知识进行合理分析，评价材料科学与工程领域内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。

Engineering and society: be able to make reasonable analysis based on engineering related background knowledge, to evaluate the impact of engineering practice and complex engineering problem solutions in the field of materials science and engineering on society, health, safety, law and culture, and understand the responsibilities.

6.1 具有工程实习和社会实践经历，了解材料科学与工程专业领域的技术标准体系、知识产权、产业政策和法律法规、企业管理体系，理解不同社会文化对工程活动的影响；

Have engineering practice and social practice experience, understand the technical standard system, intellectual property rights, industrial policies, laws and regulations, enterprise management system in the field of materials science and engineering, and understand the influence of different social cultures on engineering activities;

6.2 能客观分析和评价材料科学与工程专业实践和复杂工程问题对社会、健康、安全、法律、文化的影响，以及这些制约因素对项目实施的影响，并理解应承担的责任；

Be able to objectively analyze and evaluate the impact of materials science and engineering practice and complex engineering problems on society, health, safety, law and culture, as well as the impact of these constraints on project implementation, and understand the responsibilities;

6.3 具有一定的军事理论和国防知识，了解中国国情，了解材料科学与工程在国民经济和社会发展中的作用、地位及其发展的社会制约因素。

Have certain military theory and national defense knowledge, understand China's national conditions, and understand the role, status and social constraints of materials science and engineering in national economic and society development.

7、 环境和可持续发展：能够理解和评价针对材料制备、加工及工程应用领域内复杂工程问题的工程实践对环境、社会可持续发展的影响。

Environment and sustainable development: Be able to understand and evaluate the impact of engineering practice aiming at complex engineering problems in the field of material preparation, processing and engineering application on environmental and social sustainable development.

7.1 针对材料制备、加工及工程应用领域内复杂工程问题的工程实践，知晓和理解环境保护和可持续发展的理念和内涵；

Be aware of and understand the concept and connotation of environmental protection and sustainable development for the engineering practice of complex engineering problems in the field of material preparation, processing and engineering application;

7.2 能够站在环境保护和可持续发展的角度思考材料科学与工程专业工程实践的可持续性，客观评价产品周期中可能对人类和环境造成的损害和隐患。

Be able to consider the sustainability of engineering practice of materials science and engineering from the perspective of environmental protection and sustainable development, and objectively evaluate the possible damage and hidden dangers to human and environment in the product cycle.

8、 职业规范：具有人文社会科学素养、社会责任感，能够在材料制备、加工及工程应用领域内的工程实践中理解并遵守工程职业道德和规范，履行责任。

Professional norms: have humanities and social science literacy, social responsibility, be able to understand and abide by the engineering professional ethics and norms in the engineering practice in the field of material preparation, processing and engineering application, and fulfill the responsibility.

8.1 有正确价值观，理解个人与社会的关系，了解中国国情，具有人文知识、思辨能力和科学精神，心理健康；

Establish correct values, understand the relationship between individuals and society, understand national conditions of China, have humanistic knowledge, critical thinking ability and scientific spirit, and have mental health;

8.2 理解社会主义核心价值观，理解诚实公正、诚信守则的工程职业道德和规范，并能在材料制备、加工及工程应用领域内的工程实践中自觉遵守；了解中国材料科学与技术的发展现状，具有推动民族复兴和社会进步的责任感；

Understand the core socialist values, understand the engineering professional ethics and norms of honesty, justice and integrity code, and consciously abide by them in the engineering practice in the field of material preparation, processing and engineering application; understand the development status of China's materials science and technology, and have a sense of responsibility to promote national rejuvenation and social progress;

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，能够在材料制备、加工、工程应用领域内的工程实践中自觉履行责任。

Understand engineer's social responsibility for public safety, health and well-being, as well as

environmental protection, and be able to consciously fulfill their responsibilities in engineering practice in the fields of material preparation, processing and engineering application.

9、 个人和团队：具有协作精神和团队意识，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，并负责完成角色的工作任务。

Individual and team: have the spirit of cooperation and team awareness, be able to act as the individual, common team member and leader in the team under the multi-disciplinary background, and be responsible for the task of completing the role.

9.1 能主动与本学科和跨学科的成员合作，共同组建团队，顺利开展工作，并通过相互沟通、协调与妥协，理解团队工作中不同角色的责任，合作共事；

Be able to actively cooperate with the members of this discipline and interdisciplinary, build a team together, carry out the work smoothly, and understand the responsibilities of different roles in the team work through mutual communication, coordination and compromise;

9.2 能够在团队中独立或合作开展工作；

Be able to work independently or cooperatively in a team;

9.3 能够组织、协调和指挥团队开展工作。

Be able to organize, coordinate and command the team to carry out the work.

10、 沟通：能够就材料科学与工程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。

Communication: be able to communicate and exchange effectively with industry peers and the public on complex engineering issues of materials science and engineering fields, including writing reports and design documents, presenting statements, clearly expressing or responding to instructions. And have a certain international vision, can communicate and exchange in the cross-cultural context.

10.1 能就材料科学与工程专业内的复杂工程问题，以口头、文稿、图表等方式，准确表达自己的观点，回应质疑，理解与业界同行和社会公众交流的差异性；

Be able to accurately express views, respond to queries, and understand the differences in communication with peers and the public on complex engineering problems in materials science and engineering fields using oral, manuscript, chart, and so on;

10.2 了解材料科学与工程专业的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性；

Understand the international development trend and research hotspot of materials science and engineering, understand and respect the differences and diversity of different cultures in the world;

10.3 掌握跨文化交流的语言和书面表达方法，能就材料科学与工程专业内的复杂工程问题，在跨文化背景下进行基本沟通和交流。

Master the language and written expression of cross-cultural communication, and can communicate

and exchange with others in the cross-cultural context on the complex engineering problems in the field of material science and engineering.

11、项目管理：理解并掌握从事材料科学与工程及相关领域所需的工程管理原理与经济决策方法，并能在多学科环境中应用。

Project management: understand and master the engineering management principle and economic decision method required for materials science and engineering and related fields, and can be applied in multi-disciplinary environment.

11.1 理解并掌握工程项目管理的基本原理与经济决策的整体框架、方法，理解工程项目的时间及成本管理、质量、安全及风险管理以及人力资源管理；

Understand and master the basic principles of engineering project management and the overall framework and method of economic decision-making, understand the time and cost management, quality, safety and risk management and human resource management of the project;

11.2 了解材料制备、加工及工程应用领域内工程及产品全周期、全流程的成本构成，理解其中涉及的工程管理与经济决策问题；

Understand the cost structure of the whole cycle and processes of engineering and products in the field of material preparation, processing and engineering application, and understand the involved engineering management and economic decision-making issues;

11.3 能在多学科环境下(包括模拟环境)，在设计开发解决方案的过程中，运用工程管理与经济决策方法。

Be able to use engineering management and economic decision-making methods in the process of designing and developing solutions in a multi-disciplinary environment (including simulation environment).

12、终身学习：具有自主学习和终身学习的意识，了解在材料科学领域及未来职业发展过程中终身学习的重要性，有不断学习和适应未来发展的能力。

Lifelong learning: have the consciousness of independent learning and lifelong learning, understand the importance of lifelong learning in the field of materials science and the future career development, and have the ability to learn and adapt to the needs of future development.

12.1 能在社会发展的大背景下，认识到自主和终身学习的必要性；

In the context of social development, be able to understand the necessity of independent learning and lifelong learning;

12.2 掌握跟踪本专业学科前沿、发展趋势的基本方法和途径，包括对材料科学领域内新技术的调研、理解、归纳总结和提出问题等，通过线上线下等多种渠道进行终身学习，以适应职业发展的需求。

Master the basic methods and ways to track the frontier and development trend of this discipline, including the investigation, understanding, summary and question-raising method of new technologies in the field of materials science, and carry out lifelong learning through online and

offline channels to meet the demands of career development.

三、培养目标与毕业要求对应矩阵 Matrix of Graduation Requirements and Training Objectives

表 1　毕业要求与培养目标对应矩阵

Table 2-1 Support Matrix of Graduation Requirements and Training Objectives

毕业要求 Graduation Requirements	培养目标 Training Objectives			
	1	2	3	4
1：工程知识- Engineering knowledge	√	√		
2：问题分析- Problem analysis	√	√		
3：设计/开发解决方案- Design/development solution	√	√	√	
4：研究- Research	√	√	√	
5：使用现代工具- Modern-tool use		√	√	
6：工程与社会- Engineering and society	√		√	√
7：环境与可持续发展- Environment and sustainable development			√	
8：职业规范- Professional norms			√	√
9：个人与团队- Individual and team				√
10：沟通- Communication				√
11：项目管理- Project management		√		√
12：终身学习- Lifelong learning				√

四、毕业要求指标点与课程及教学活动对应矩阵 Matrix of Graduation Requirements and Courses and Teaching Activities

表 2　毕业要求指标点与课程及教学活动对应矩阵

课程体系	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、环境与或持续发展		8、职业规范			9、个人与团队			10、沟通			11、项目管理			12、终身学习	
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	5.3	6.1	6.2	6.3	7.1	7.2	8.1	8.2	8.3	9.1	9.2	9.3	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2
思想道德修养与法律基础												L								H			M				L											
中国近现代史纲要																									H					M							
毛泽东思想和中国特色社会主义理论体系概论																									H												L	
马克思主义基本原理																									H													L
形式与政策																							H		M													
英语听说																												L			H		M					
英语读写																																H	M				L	
批判性思维																					H												M					
大学体育类																													H									M
职业生涯规划																																					H	M
大学生心理健康教育																												H				M						
创业基础																												H						H				
通识选修课																															M						H	
军事理论与训练																						H							H									
劳动教育																					M												M					
高等数学	H	H			M																																	
无机化学	H				M																																	
有机化学		H				M																																
物理化学		H		M		H																																
电子与电工技术									H								M																					
高级计算机语言编程																	H																				M	H
专业导论																				H			H															
材料科学基础	M	H																																				M
热力学动力学导论		H		M	M																																	
有机化学 2（羰基化学）		H				M																																
分析化学						M	H										M																					

课程体系	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、环境与或持续发展		8、职业规范			9、个人与团队			10、沟通			11、项目管理			12、终身学习	
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	5.3	6.1	6.2	6.3	7.1	7.2	8.1	8.2	8.3	9.1	9.2	9.3	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2
固态、d 区和 f 区化学			M		H																																	
结构和光谱						M											M																					
实验室技术 1 (无机、物理和计算)												M						M						L														
仪器分析																M	M																					
高等无机化学	H				M																																	
绿色化学及应用					M																			H								L						
高级仪器分析																M	M																					
实验室技术 2 (有机、分析和制药)												M						M						L														
高等物理化学		H		M		M																																
高等有机化学		H				M																																
电子电工技术实验													H	L																								
金工实习									L																	H	M		M									
生产见习																				H			H													L		
专业实习																										H	M			M	H				H	H		
毕业设计（论文）								H								M			L											H		H						

五、核心课程 Core Curriculum

热力学和动力学导论、结构和光谱、固态，d 区和 f 区化学、材料科学基础、高等无机化学、高等有机化学、高分子化学与物理、分子材料及应用、绿色化学及应用、纳米材料及应用、光电材料与器件、电子封装技术等。

Introduction to Thermodynamics and Kinetics, Structure and Spectroscopy, Solid State, d-block and f-block Chemistry, Fundamentals of Materials Science, Advanced Inorganic Chemistry, Advanced Organic Chemistry, Polymer Chemistry and Physics, Molecular-materials and Application, Green Chemistry and Application, Optic-electronic Materials and Devices, Electronic Package Technology etc.

六、学制与学分要求 Program Length and Credits requirement

（一）学制：4 年 Duration: 4 years

（二）最低学分：毕业最低学分 153 学分。其中必修 115.5 学分，学科和专业类选修课程达到 9.5 学分，通识教育选修课程达到 6 学分，课外创新实践活动 4 学分，实践教学环节 18 学分。满足培养方案规定的相关要求，通过论文答辩者，准予毕业。符合湖北大学和曼彻斯特城市大学两校学位授予条件者，授予两校相应学士学位。

Minimum Credits of Curricular 153 credits including 115.5 credits for compulsory courses, 9.5 credits for professional elective courses, 6 credits for general education elective courses, 4 credits for extracurricular innovative and practical activities, and 18 credits for concentrated practice. Those who meet the relevant requirements of the training program and pass the thesis defense will be allowed to graduate. Those who meet the requirements for awarding the degrees from Hubei University and Manchester City University will be awarded the corresponding bachelor's degrees from the two Universities.

七、授予学位 Degrees Conferred

工学学士学位

Degree Conferred: Bachelor of Engineering

八、课程平台及实践教学体系学分分配表

Credit allocation table of course platform and practice teaching system

（一） 课程平台学分分配汇总表

Course platform credit allocation table

课程平台	课程性质	第一学期	第二学期	第三学期	第四学期	第五学期	第六学期	第七学期	第八学期	总计	毕业最低学分	占毕业最低学分百分比（%）
通识教育	必修	16	11	7	4	2		1		41	41	26.8
	选修	选修 6 个学分								6	6	3.9
学科大类	必修	7.5	6.5							14	14	9.2
	选修	1		2.5						3.5	2.5	1.6

课程平台	课程性质	第一学期	第二学期	第三学期	第四学期	第五学期	第六学期	第七学期	第八学期	总计	毕业最低学分	占毕业最低学分百分比（%）
专业核心	必修		5	3	6	10	5	6		35	35	23.2
专业方向	必修		2	8.5	3	4	7			24.5	24.5	15.4
	选修					4	3	1		8	8	4.9
集中实践教学环节	必修	2		2	2			4	8	18	18	11.7
课外创新实践		必修 4 个学分								4	4	3.3
总学分		26.5	24.5	23	15	19.5	16	12	8	153	153	100

（二） 专业实践教学体系学分分配表

Specialty Practical Lecturing Credit Allocation Table

实践教学 **Practical Lecturing**	实践教学内容 **Content**	学分分配 **Credit**	占总学分百分比（%）
专业课内实践教学 Specialty Course Internal Practical Lecturing	专业课程教学内的实践内容 Specialty Course Internal Practical Lecturing Content	9	6%
独立实践（实验）课 Independent Practical (experimental) Courses	实践（实验）课 Practical Lecturing	7	4.7%
集中实践教学环节 Group Practical Training	劳动教育 Labor Education	2	1.3%
	见习、实习 Internship	6	4%
	毕业论文（设计）Undergraduate Thesis (ManMet: Project and Personal) Development)	8	5.3%
课外创新实践 Extracurricular Innovation Activity	课外创新实践活动 Extracurricular Innovation Activity	5	3.3%
小计		37	24.6%

九、课程设置明细 Details of the curriculum

（一）通识教育课程平台（应修 47 学分，必修 41 学分，选修 6 学分）

General education course platform (47 credits required, 41 credits required and 6 credits optional)

1.通识教育课程平台必修课程（41 学分）

General Education Curriculum Platform Compulsory Course (41 credits)

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
思想道德修养与法律基础 Cultivation of Ethic Thought and Fundamentals of Law	161I01	3	64	32	32		1	
中国近现代史纲要 A Concise Outline of Chinese Modern History	161I02	3	64	32	32		2	
毛泽东思想和中国特色社会主义理论体系概论 An Introduction to Mao Zedong Thought and Theoretical System of the Chinese Characteristic Socialism	161I06	3	56	40	16		3	
习近平新时代中国特色社会主义思想概论 An Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	161I05	3	56	40	16		3	
马克思主义基本原理 Fundamental Principles of Marxism	161I04	3	64	32	32		4	
形势与政策 Situation and Policy	621I01	2	64	64			1-8	
大学体育基础素质课 College Physical Education (1)	411S11	1	36	4	32		1	
大学体育基础技能课 College Physical Education (2)	411S12	1	36	4	32		2	
大学体育专项素质课 College Physical Education (3)	411S13	1	36	4	32		3	
大学体育专项技能课 College Physical Education (4)	411S14	1	36	4	32		4	
英语听说 1 English Listening and Speaking 1	741Y01	4	72	56	16		1	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
英语读写 1 English Reading and Writing 1	741Y02	4	64	64			1	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
英语听说 2 English Listening and Speaking 2	741Y03	2	32	32			2	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
英语读写 2 English Reading and Writing 2	741Y04	2	48	16	32		2	合作授课(曼城大质量保证) Joint delivery (ManMet QA)

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
批判性思维 Critical Thinking	741Y05	2	32	32			2	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
大学生心理健康教育 Mental Health Education	631X01	2	48	16	32		1	
职业生涯规划 Career Planning	641Z01	1	18	14	4		2	
创业基础 Basics of Entrepreneurship	641Z02	1	20	12	4		7	
军事理论 Military Theory	631J01	2	32	32			1	

2.通识教育课程平台选修课程　（6 学分）

General Education Curriculum Platform Elective Course (6 credits)

通识选修课程模块 General elective course module	修读说明 Note
科学精神与科学技术 Scientific spirit and science and technology	至少修满 6 学分。其中“艺术鉴赏与审美人生”模块不少于 2 学分。 At least 6 credits. The module of "Art appreciation and aesthetic Life" is no less than 2 credits.
社会发展与公民教育（含“四史”教育） Social development and civic education	
人文经典与人生修养 Humanistic classics and life cultivation	
艺术鉴赏与审美人生 Art Appreciation and Aesthetic Life	
跨文化交际 Intercultural Communication	

（二）学科大类课程平台（共 16.5 学分，必修 14 学分，选修 2.5 学分）

Major courses platform (16.5 credits in total, 14 compulsory, 2.5 elective)

1. 学科大类课程平台必修课程（14 学分）

Compulsory courses of Major Courses Platform (14 credits)

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
高级计算机语言编程 Advanced computer language programming	742E01	2.5	48	32	16		1	
高等数学 A（1） Advanced Mathematics A (1)	742M02	5	80	80			1	合作授课(曼城大质量保证) Joint delivery

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
								(ManMet QA)
高等数学 A（2） Advanced Mathematics A (2)	742M03	6.5	104	104			2	合作授课(曼城大质量保证) Joint delivery (ManMet QA)

2.学科大类课程平台选修课程（共 7.5 学分，最少选修 2.5 学分）

Elective courses of Major Courses Platform (7.5 credits, at least 2.5 elective credits)

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
材料前言讲座 Introduction to Materials	742M21	1	16	16			1	合作授课 (曼城大质量保证) Joint delivery (ManMet QA)
电子电工技术 Electrical and Electronic Engineering	742M07	2	32	32			3	指定选修
电子电工技术实验 Electrical and Electronic Engineering Experiment	746M07	0.5	16			16	3	指定选修
雅思口语 IELTS Speaking	742Y01	2	32	32			4	
雅思写作 IELTS Speaking	742Y02	2	32	32			4	

（三）专业核心课程平台（共 35 学分，必修 35 学分）

Professional core course platform (35 credits in total, 35 compulsory)

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
无机化学 Inorganic Chemistry	743M01	3	48	48			2	曼城大授课 MMU delivery
热力学动力学导论 Introduction to Thermodynamics and Kinetics	743M02	2	36	32	4		2	合作授课 Joint delivery
有机化学 1 Organic Chemistry 1	743M03	3	48	48			3	曼城大授课 MMU delivery
有机化学 2（碳族化学） Organic Chemistry 2	743M04	3	48	48			4	曼城大授课 MMU delivery

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
(Chemistry of the Carbonyl Group)								
固态、d 区和 f 区化学 Solid State, d-block and f-block chemistry	743M12	3	48	48			4	合作授课 Joint delivery
高等无机化学 Advanced Inorganic Chemistry	743M16	3	48	48			5	曼城大授课 MMU delivery
结构和光谱 Structure and Spectroscopy	743M14	2.5	40	32	8		5	曼城大授课 MMU delivery
实验室技术 2A (无机、物化和计算) Laboratory Techniques 2A (Inorganic, Physical and Computational)	746M19	2	69			69	5	合作授课 Joint delivery
仪器分析 Instrumental Analysis	743M15	2.5	48	32	16		5	合作授课 Joint delivery
高等仪器分析 Advanced Instrumental Analysis	743M13	3	48	48			6	曼城大授课 MMU delivery
实验室技术 2B （有机、分析和制药） Laboratory Techniques 2B (Organic, Analytical and Pharmaceutical)	746M20	2	69			69	6	合作授课 Joint delivery
高等物理化学 Advanced Physical Chemistry	743M17	3	48	48			7	曼城大授课 MMU delivery
高等有机化学 Advanced Organic Chemistry	743M18	3	48	48			7	曼城大授课 MMU delivery

（四）专业方向课程平台（共 32.5 学分，必修 24.5 学分，选修 8 学分）

Professional course platform (32.5 credits in total, 24.5 compulsory, 8 elective)

1、方向必修课程(24.5 学分) Compulsory courses (24.5 credits)

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
化学平衡与数学方法 Chemical Equilibrium and Mathematical Methods	744M26	2	36	32	4		2	合作授课 (曼城大质量保证) Joint delivery (ManMet QA)
材料科学基础 Fundamentals of Materials Science	744M35	2.5	40	40			3	合作授课 (曼城大质量保证) Joint delivery (ManMet QA)

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
化学分析导论 Introduction to Chemical Analysis	744M27	2	36	32	4		3	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
社会中的化学 1 Chemistry in Society 1	744M28	2	32	32			3	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
实验室技术 1A Laboratory Techniques 1A	746M29	2	66			66	3	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
材料物理 Materials Physics	744M10	2	32	32			4	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
实验室技术 1B Laboratory Techniques 1B	746M15	1	36			36	4	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
热力学与动力学 Thermodynamics and Kinetics	744M034	2	36	32	4		5	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
社会中的化学 2 Chemistry in Society 2	744M31	2	33	33			5	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
绿色化学及应用 Green Chemistry	744M08	2	33	33			6	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
材料与绿色化学进展 Advances in Materials & Green Chemistry	744M32	2	32	32			6	合作授课(曼城大质量保证) Joint delivery (ManMet QA)
高等实验技术 Advanced Laboratory Techniques	746M16	3	99			99	6	合作授课(曼城大质量保证) Joint delivery

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
								(ManMet QA)

2、方向模块选修课程(共 15 学分，至少修满 6 学分)

Elective courses (15 credits, at least 8 credits)

课程名称（中英文） Course Name	课程编码 Course Code	学分 Credit	总学时 Hours	学时分配			建议修读学期 Semester	修读说明 Notes
				讲授 Lecture	实践 Practice	实验 Experiment		
半导体物理 Semiconductor Physics	744M33	2	36	28	8		5	
光电材料与器件 Optic-electronic Materials and Devices	744M14	2	32	32			5	指定选修 Designated elective
电子封装技术 Electronic Packaging Technology	744M21	2	32	16		16	6	
高分子化学与物理 Polymer Chemistry and Physics	744M11	3	56	40		16	6	指定选修 Designated elective
集成电路工艺 Integrated Circuit Process Technology	744M25	2	32	32			6	
计算材料学 Computational Materials Science	743M11	1.5	32	16	16		6	
科学研究方法 Methods for Scientific Research	743M10	1.5	32	16	16		6	指定选修 Designated elective
综合创新实验 Comprehensive Innovation Experiments	746M17	1	32			32	7	

3、专业任意选修课课程(2 学分，至少修满 2 学分，本专业学生可在全校范围内选修跨专业的相关课程，不限于以下两门课程)

集成电路版图设计 IC Layout Design	324M04	1	32			32	6	
机器学习与边缘人工智能实验 Machine Learning and Edge AI Experiments	324G20	1	32			32	6	

（五）课外创新实践活动 (4 学分)

Extracurricular Innovation Practice Activities (4 credits)

执行《湖北大学“第二课堂成绩单”制度实施方案》、《湖北大学“第二课堂成绩单”学分认定管

理办法》文件规定。

The implementation of the "Hubei University "Second Class transcripts" system implementation plan", "Hubei University "Second Class transcripts" credit management measures" document.

十、集中性实践教学环节课程设置一览（18 学分）

List of courses in concentrated practice teaching (18 credits)

课程名称（中英文）Course Name	课程编码 Course Code	学分数 Credit	总学时 Hours	修读学期 Semester
劳动教育 Labor Education	636L01	2	48	1-8
军事训练 Military Training	636J02	2	32	1
金工实习 Metal Processing	746T02	1	1 周	4
生产见习 Production Practice	746T04	1	1 周	4
毕业实习 Graduation practice	746T06	4	8 周	7
毕业设计 (论文) Undergraduate Thesis (ManMet: Project and Personal Development)	746T07	8	16 周	8

十一、修读指导 Guidance

1．学校统一开设《形势与政策》、《创业基础》、《公益劳动》等课程，课程实施按照相关文件执行。

The school offers courses such as situation and policy, foundation of entrepreneurship and public welfare labor. The implementation of the courses is in accordance with the relevant documents.

2．学生应按照学校有关规定修满不少于 5 个课外活动学分。

Students should complete no less than 5 credits of extracurricular activities according to the relevant regulations of the school.

3．本专业的专业基础课没有与其他专业基础课相同的情况。

The foundation courses of this major are not the same as other major’s foundation courses.

4. 所有外方课程和合作课程由曼彻斯特城市大学质量保证。

All imported and cooperative courses are guaranteed by Manchester Metropolitan University.

5．本专业毕业要求：

Graduation requirements of this major:

本专业学生在规定修业年限内修满 153 学分，其中必修课程达到 115.5 学分，学科和专业类选修课程达到 9.5 学分，通识教育选修课程达到 6 学分，课外创新实践活动 4 学分，实践教学环节 18 学分，满

足培养方案规定的相关要求，外语考试成绩符合本科毕业生的要求，通过论文答辩者，准予毕业。符合学校学位授予条件者，授予工学学士学位。

The students of this major have to complete 153 credits within the specified length of study, including 115.5 credits for compulsory courses, 9.5 credits for professional elective courses, 6 credits for general education elective courses, 4 credits for extracurricular innovative and practical activities, which meet the relevant requirements of the training program. Those who have their foreign language examination results meet the requirements of undergraduate graduates, passed the thesis defense are allowed to graduate. A bachelor's degree of engineering will be awarded to those who meet the requirements of the University.

专业负责人：祁亚军

教学副院长：高云