宁波东方理工大学

2026 级材料科学与工程本科专业培养方案

Curriculum for the Program of Materials Science and Engineering（2026）
Eastern Institute of Technology, Ningbo

一、专业介绍 Introduction to the Program

材料科学与工程专业面向国家重大战略和区域经济社会发展需求，培养电子信息材料和新能源材料等领域的拔尖创新人才。本专业现有 17 位全职教师，其中中国及发达国家院士 2 名、国家级人才 6 名，均具有博士学位及 2 年以上海外学习与工作经历。本专业拥有省级重点实验室、省级工程中心、以及相关的教学实验平台，并已与十余家龙头企业共建实习基地。专业核心课程包括实验室安全与防护、现代材料科学与技术前沿讲座、计算材料学与 AI 辅助设计、固体物理、半导体物理与器件、新能源材料等，突出电子信息材料与新能源材料两个方向。本专业授予工学学士学位，修业年限 4 年，培养专业特色包括“1+3”通专融合培养模式、科研训练及带学分夏季学期实践强化创新能力等。

The Materials Science and Engineering program is oriented toward the major strategic needs of the nation and the economic and social development of the region, cultivating top-tier innovative talents in fields such as electronic information materials and new energy materials. The program currently has 17 full-time faculty members, including 2 academicians of China and developed countries and 6 nationally recognized high-level talents, all of whom hold doctoral degrees and have more than two years of overseas study and work experience. The program is equipped with a provincial key laboratory, a provincial engineering center, and related teaching and experimental platforms, and has established internship bases in collaboration with more than ten leading enterprises. Core courses include Laboratory Safety and Protection, Frontiers in Modern Materials Science and Technology, Computational Materials Science and AI-Assisted Design, Introduction to Solid State Physics, Semiconductor Physics and Devices, and New Energy Materials, with a focus on the two directions of electronic information materials and new energy materials. The program confers the Bachelor of Engineering degree, with a standard duration of four years. Its distinctive training features include a "1+3" integrated general-and-professional education model, research training, and a summer term with credits for practical intensification of innovation capabilities.

二、培养目标 Program Objective

本专业立足区域经济社会发展，面向新材料产业需求，致力于培养德智体美劳全面发展，具备扎实的基础理论功底、突出的工程实践与创新能力、能够解决材料科学与工程领域基础理论和关键技术问题、引领材料科学与工程发展、拥有家国情怀、国际视野、良好职业道德和社会责任感的拔尖创新型人才。毕业生能够在材料科学与工程及相关领域从事高水平创新研发、复杂工程问题解决及技术管理工作，预期毕业 5 年左右成长为行业骨干、技术中坚或创新先锋等高层次人才。学生毕业后五年左右的预期目标包括：

Grounded in regional economic and social development and oriented toward the demands of the new materials industry, this program is dedicated to cultivating top-tier innovative talents with well-rounded development of morality, intelligence, physical wellness, aesthetic attainment, and labor literacy, who possess a solid foundation in fundamental theories, strong capabilities in engineering practice and innovation, and are able to solve basic theoretical and key technological problems in the field of materials science and engineering, as well as to lead the development of materials science and engineering. These talents are characterized by a sense of patriotism, global vision, sound professional ethics, and social responsibility. Graduates are expected to engage in high-level innovative R&D, complex engineering problem-solving, and technical management in materials science and engineering and related fields, and are anticipated to grow into high-level applied talents such as industry backbone, technical core, or innovation pioneer approximately five years after graduation. The expected goals for students approximately five years after graduation include:

1.具备家国情怀、国际视野；拥有良好的职业道德、社会责任感、领导力等人文素养；面对挫折保持韧性，坚持追求卓越。

Possessing a sense of patriotism and global vision; demonstrating good professional ethics, social responsibility, leadership, and other humanistic qualities; maintaining resilience in the face of setbacks and persistently pursuing excellence.

2.掌握扎实的数理化信基础、材料科学与工程专业及多学科交叉领域知识，具有从事高水平材料科学与工程创新工作的专业能力，以及解决材料科学与工程领域复杂工程问题的能力，特别是在先进半导体材料与工艺、高性能电池材料两个方向；

Mastering a solid foundation in mathematics, physics, chemistry, and information science, as well as knowledge in materials science and engineering and interdisciplinary fields; having the professional competence to engage in high-level innovative work in materials science and engineering, and the ability to solve complex engineering problems in the field of materials science and engineering, particularly in the two directions of advanced semiconductor materials and processes, and high-performance battery materials.

3.具有思辨能力、创造性思维和工程理念，具有良好的表达与沟通能力，具备团队合作和终身学习能力。

Possessing critical thinking, creative thinking, and engineering mindset; demonstrating good expressive and communication skills; and having the ability for teamwork and lifelong learning.

三、培养要求 Graduate Outcomes

1.工程知识：能够将数学、自然科学、计算、工程基础和专业知识用于解决复杂工程问题。

Engineering Knowledge: Ability to apply mathematics, natural sciences, computational principles, engineering fundamentals, and specialized knowledge to solve complex engineering problems.

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，综合考虑可持续发展的要求，以获得有效结论。

Problem Analysis: Ability to apply the basic principles of mathematics, natural sciences, and engineering sciences to identify, formulate, and analyze complex engineering problems through literature research, with comprehensive consideration of sustainable development requirements, in order to obtain valid conclusions.

3.设计/开发解决方案：能够针对复杂工程问题设计和开发解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，体现创新性，并从健康、安全与环境、全生命周期成本与净零碳要求、法律与伦理、社会与文化等角度考虑可行性。

Design/Development of Solutions: Ability to design and develop solutions for complex engineering problems, designing systems, units (components), or processes that meet specific needs, demonstrating innovation, and considering feasibility from the perspectives of health, safety and environment, life-cycle cost and net-zero carbon requirements, law and ethics, and society and culture.

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。

Research: Ability to conduct research on complex engineering problems based on scientific principles and employing scientific methods, including designing experiments, analyzing and interpreting data, and synthesizing information to arrive at reasonable and valid conclusions.

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。

Use of Modern Tools: Ability to develop, select, and apply appropriate technologies, resources, modern engineering tools, and information technology tools for complex engineering problems, including prediction and simulation of complex engineering problems, while understanding their limitations.

6.工程与可持续发展：在解决复杂工程问题时，能够基于工程相关背景知识，分析和评价工程实践对健康、安全、环境、法律以及经济和社会可持续发展的影响，并理解应承担的责任。

Engineering and Sustainability: In solving complex engineering problems, ability to analyze and evaluate the impacts of engineering practices on health, safety, environment, law, and economic and social sustainable development based on engineering-related background knowledge, and to understand the responsibilities that must be undertaken.

7.工程伦理和职业规范：有工程报国、为民造福的意识，具有人文社会科学素养和社会责任感，能够理解和践行工程伦理，在工程实践中遵守工程职业道德、

规范和相关法律，履行责任。

Engineering Ethics and Professionalism: Possess the awareness of serving the nation and benefiting the people through engineering; demonstrate humanistic and social science literacy and a sense of social responsibility; be able to understand and practice engineering ethics; abide by professional ethics, standards, and relevant laws in engineering practice; and fulfill corresponding responsibilities.

8.个人和团队：能够在多样化、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。

Individual and Teamwork: Be able to function effectively in diverse and multidisciplinary teams, assuming the roles of team member, team leader, or individual contributor as required.

9.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；能够在跨文化背景下进行沟通和交流，理解、尊重语言和文化差异。

Communication: Be able to communicate effectively with peers in the industry and the general public on complex engineering problems, including writing reports and design documentation, delivering presentations, and clearly articulating or responding to instructions; be able to communicate in cross-cultural contexts, understanding and respecting linguistic and cultural differences.

10.项目管理：理解并掌握与工程项目相关的管理原理与经济决策方法，并能够在多学科环境中应用。

Project Management: Understand and master management principles and economic decision-making methods relevant to engineering projects, and be able to apply them in multidisciplinary environments.

11.终身学习：具有自主学习、终身学习和批判性思维的意识和能力，能够理解广泛的技术变革对工程和社会的影响，适应新技术变革。

Lifelong Learning: Possess the awareness and capability for autonomous learning, lifelong learning, and critical thinking; be able to understand the impact of broad technological changes on engineering and society, and adapt to new technological transformations.

四、培养特色 Program Highlights

人工智能（AI）时代背景下，本专业结合实践教学与 AI 辅助教学，培养学生的自主学习、知识融通与实践创新能力；顺应材料科学与工程行业的发展趋势，突出先进半导体材料和高性能电池材料特色，培养具有思辨能力及国际化视野的拔尖创新人才。具体培养特色包括：

In the era of artificial intelligence (AI), this program integrates hands-on practice with AI-assisted teaching to foster students' abilities in self-directed learning, knowledge integration, and innovative problem-solving. In alignment with the evolving trends in the material science and engineering industry, the program emphasizes

advanced semiconductor materials and high-performance battery materials and aims to cultivate top-tier, innovative professionals with critical thinking skills and a global perspective. Key features of the program include:

1.强化通识教育：全校课程设置采用“1+3”模式，第一学年不分专业，在强化数理化基础和计算能力的同时，强化科技教育与人文教育协同，提高学生创新意识，提升写作与沟通能力；学生在第二学期末开始选择专业，之后进入为期两年的专业培养；第四学年在专业选修课的同时，进行创新实践与毕业设计。

Emphasis on General Education: The university adopts a ‘1+3’ curriculum structure: during the first academic year, students are not assigned to a specific major, enabling them to build a strong foundation in mathematics, physics, chemistry, and computational thinking ability. The program emphasizes a coordinated development of science, technology, and humanities to enhance creativity, writing, and communication skills. Students will select their majors at the end of the second Term and, thereafter, enter two years of specialized study. In the fourth year, students will work on their graduation project while taking major electives.

2.书院制培养：实行书院制和生活导师制，开展全员、全过程、全方位育人，致力于培养学生的表达与沟通能力、团队协作能力、领导力等综合素质。

Residential College Model: A residential college and mentorship system is in place to support holistic education through all stages of student development. This model aims to cultivate students’ communication, teamwork, and leadership abilities, as well as their overall personal growth.

3.本研贯通：实行学术导师制，强化科研与创新能力培养；鼓励学生及早参与科研创新活动，融合为期一年的本科“创新实践与毕业设计”与科研课题，为学生进入国内外大学攻读硕、博研究生学位提前做好准备，加速急需拔尖人才培养。

Integrated Undergraduate–Graduate Pathways: An academic advisory system is implemented to strengthen research and innovation training. Students are encouraged to participate in research projects early on, with the year-long “Innovation Practice and Graduation Project” closely integrated with faculty-led research. This approach prepares students for advanced study at top universities in China and abroad, and accelerates the development of top-tier innovative professionals in high demand.

4.加强科教实践：促进产教融合，设置夏季学期实践必修课程，鼓励参与夏季学期科研，系统化支持学生进入科研机构、企事业单位等，参与以实践项目为驱动的全过程人才培养。

Enhanced Scientific and Industrial Practice: To promote university-industry collaboration, compulsory summer practice modules are offered. Students are encouraged to participate in research activities during the summer term and are systematically supported in engaging with research institutes, enterprises, and organizations through project-based learning experiences.

5.国际化培养：发挥国际化师资优势，专业课实行双语教学，支持学生赴世界一流大学与机构参与国际交流、项目合作，拓宽视野，提升国际竞争力。

Global Competence Development: Leveraging a globally oriented faculty team, the program incorporates bilingual instruction in core courses and supports student participation in international exchanges and collaborative projects at top world

institutions, broadening their horizons and enhancing global competitiveness.

6.智能化教育：探索 AI 时代的教学变革，利用智能工具提高知识传授与学习效率；开设人工智能通识课，培养学生利用数字资源和智能工具的自主学习能力。

AI for Education: Explore teaching transformation in the AI era, and enhance teaching and learning efficiency by making use of AI tools; Offer Introduction to AI course, enabling students to develop self-education abilities with digital resources and AI tools.

五、学制和授予学位 Program Duration and Degree Awarded

专业学制：基本学制4年，采用学分制管理，实行弹性学习年限，最多不超过6年。

授予学位：对完成并符合培养方案学位要求的学生，授予工学学士学位。

Program Duration: The standard duration of the program is four years. A credit-based management system is adopted, with maximum 6 years of study.

Degree Awarded: Students who have completed the program and met the degree requirements stipulated in this Educational Program will be awarded the Bachelor of Engineering degree.

六、毕业学分要求 Credit Requirements for Graduation

毕业最低学分要求为 157 学分。课程结构要求如下：

A minimum of 157 credits is required for graduation. The curriculum structure is as follows:

课程模块 Module	课程要求 Requirement	课程类别 Category	学分 Credits
通识与基础课程 General Education and Foundational Module （81学分/Credits）	必修 Required	公共通识必修课 General Education Required Courses	41
		理工基础课 Fundamental Science and Engineering Courses	32
	选修 Elective	通识选修课 General Education Elective Courses	8
专业课程 Major-specific Module （56学分/Credits）	必修 Required	学科基础课程 Discipline-specific Foundational Module	28.5
	必修 Required	专业核心课 Major Core Courses	15.5
	选修 Elective	专业选修课 Major Elective Courses	12
集中实践环节 Intensive Practical Training Module （20学分/Credits）	必修 Required	夏季学期实践 Internship	12（24周/Weeks）
		创新实践与毕业设计 Capstone Project	8（32周/Weeks）
毕业学分要求 Graduation Credits Requirement			157

基于国标要求的各指标如下：Credit Distribution Against National Standard Requirements

课程类别 Category	学分 Credits	所占比例 Percentage (%)	国标要求 National Standard (%)
通识教育类 General Education Courses	49	31.2%	20%
数学和自然科学类课程 Mathematics and Natural Science Courses	32	20.4%	20%
学科基础知识和专业知识课程 Discipline-Specific Foundational and Professional Knowledge Courses	56	35.7%	35%
实践与实训教学（含实验课） Practical Training and Laboratory Teaching	46	29.3%	20%
注：上表中，实践与实训教学学分未包含专业选修课实践学分。 The credit for the practical training and laboratory teaching module excludes practical credits from major elective courses.			

七、主要课程设置 Core Courses

材料科学基础、物理化学、材料工艺学、材料力学、工程材料、材料物理性能、工程图学与计算机制图、机械设计与制造、电工电子技术、材料表征方法、计算材料学与 AI 辅助设计、电化学、固体物理、半导体物理与器件、新能源材料、储能原理与技术等。

Fundamentals of Materials Science, Physical Chemistry, Materials Technology, Mechanics of Materials, Engineering Materials, Physical Properties of Materials, Engineering Drawing and Computer-aided Designs, Mechanical Design and Manufacture, Electrical and Electronic Technology, Materials Characterization Methods, Computational Materials Science and AI-Assisted Design, Electrochemistry, Solid State Physics, Semiconductor Physics and Devices, Advanced Energy Materials, Principles and Technologies of Energy Storage, etc.

八、主要实践性教学环节和主要专业实验

Practical Training Activities and Major Experiments

主要实践性教学环节包括：夏季学期认知实践、专业实践和创新实践，第四学年全年创新实践与毕业设计，以及各类国内外本科生学术竞赛、创新大赛等。另外，本科生入学即选择学术导师团队，及早参与科研，期间可以选择与夏季学期实践、第四学年创新项目相融合。

Practical Training Activities: Summer Internship I, Summer Internship II, Summer Internship III, Capstone Project, and Undergraduate Academic Competitions. Undergraduates join faculty mentors upon enrollment for early research exposure, which can be integrated with summer Internship and Capstone Project.

主要专业实验包括：材料科学基础实验、电工电子技术实验、工程材料实验、材料物理性能实验、材料表征方法实验、工程图学与计算机制图实验等。

The main professional laboratory experiments include: experiments in

Fundamentals of Materials Science, experiments in Electrical and Electronic Technology, experiments in Engineering Materials, experiments in Physical Properties of Materials, experiments in Material characterization method, and experiments in Engineering Drawing and Computer-aided Designs, etc.

详细内容请参见附表一。

For details, please refer to Appendix Table 1.

九、课程设置与要求 Course Structure and Requirements

（一）通识与基础课程 General Education and Foundational Module

1.公共通识必修课程 General Education Required Courses

（1）思想政治理论课 Ideological and Political Theory Courses

课程代码 Course Code	课程名称 Course Name	必修选修 Required/ Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
GENE1101	思想道德与法治 Ethics and Rule of Law	必 Required	3	1	3	无 None	1/秋 Y1/Fall
GENE1102	马克思主义基本原理 Basic Principles of Marxism	必 Required	3	1	3	无 None	1/春 Y1/Spring
GENE2101	中国近现代史纲要 Modern Chinese History: A Survey	必 Required	3	1	3	无 None	2/秋 Y2/Fall
GENE2102	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Maoism and Chinese Socialism	必 Required	2		2	无 None	2/春 Y2/Spring
GENE3101	习近平新时代中国特色社会主义思想概论 Introduction to Xi Thought on Chinese Socialism	必 Required	3	0.5	3	无 None	3/秋 Y3/Fall
GENE1103	形势与政策I Society and Public Policy in Contemporary China I	必 Required	0.5		0.5	无 None	1/秋 Y1/Fall
GENE1104	形势与政策II Society and Public Policy in Contemporary China II	必 Required	0.5		0.5	无 None	1/春 Y1/Spring
GENE2103	形势与政策III Society and Public Policy in Contemporary China III	必 Required	0.5		0.5	无 None	2/秋 Y2/Fall
GENE2104	形势与政策IV Society and Public Policy in Contemporary China IV	必 Required	0.5		0.5	无 None	2/春 Y2/Spring
GENE3301	思想政治理论课实践 Political Theory and Ideology: Experiential Learning	必 Required	2	2	2	无 None	3/秋 Y3/Fall
GENE3302	劳动教育实践 Practical Labor Education	必 Required	1	1	2	无 None	*
小计/Subtotal			19	7	20		

*具体见通识培养方案
For details, please refer to the Curriculum for General Education.

（2）军事体育健康课 Military, Physical Education and Health Courses

课程代码 Course Code	课程名称 Course Name	必修选修 Required/ Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
GENE1001	军事技能训练 Military Skills Training	必 Required	2	2		无 None	夏 Summer
GENE1002	军事理论与国家安全教育 Military Theory	必 Required	3			无 None	夏 Summer
GENE1401	体育与健康I Physical Education I	必 Required	0.5	0.5	2	无 None	1/秋 Y1/Fall

GENE1402	体育与健康II Physical Education II	必 Required	0.5	0.5	2	无 None	1/春 Y1/Spring
GENE2401	体育与健康III Physical Education III	必 Required	0.5	0.5	2	无 None	2/秋 Y2/Fall
GENE2402	体育与健康IV Physical Education IV	必 Required	0.5	0.5	2	无 None	2/春 Y2/Spring
GENE3401	体育与健康V Physical Education V	必 Required	0.5	0.5	2	无 None	3/秋 Y3/Fall
GENE3402	体育与健康VI Physical Education VI	必 Required	0.5	0.5	2	无 None	3/春 Y3/Spring
小计/Subtotal			8	5	12		

（3）语言和沟通技能提升课 Language and Communication Skills Courses

英语实行 ABC 三级分级教学，根据不同等级要求，总计修满 12 学分。

The English curriculum follows a three-tier A, B, and C level system. Students are required to complete a total of 12 credits according to their assigned level.

课程代码 Course Code	课程名称 Course Name	必修选修 Required / Elective	要求 Requirements	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
LC1501	大学英语I-A General Academic English I-A	必 Required	A级修读 Required for Level A	3		4	无 None	1/秋 Y1/Fall
LC1502	大学英语II-A General Academic English II-A	必 Required		3		4	LC1501	1/春 Y1/Spring
LC2501	大学英语III-A General Academic English III-A	必 Required		3		4	LC1502	2/秋 Y2/Fall
LC1503	大学英语I-B General Academic English I-B	必 Required	B级修读 Required for Level B	3		4	无 None	1/秋 Y1/Fall
LC1504	大学英语II-B General Academic English II-B	必 Required		3		4	LC1503	1/春 Y1/Spring
LC2502	大学英语III-B General Academic English III-B	必 Required		3		4	LC1504	2/秋 Y2/Fall
LC1505	大学英语I-C General Academic English I-C	必 Required	C级修读 Required for Level C	3		4	无 None	1/秋 Y1/Fall
LC1506	大学英语II-C General Academic English II-C	必 Required		3		4	LC1505	1/春 Y1/Spring
LC2503	大学英语III-C General Academic English III-C	必 Required		3		4	LC1506	2/秋 Y2/Fall
LC2504	学术英语写作与交流 Academic Writing and Presentation	必 Required	所有学生修读 Required for All Levels (A, B, C)	3		4	LC2501/ LC2502/ LC2503	2/春 Y2/Spring
小计/Subtotal				30		40		

其他沟通技能提升课程要求如下：Other requirements:

课程代码 Course Code	课程名称 Course Name	必修选修 Required/ Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
GENE2301	沟通与协作 Communication and Collaboration	必 Required	2		2	无 None	2/秋 Y2/Fall
小计/Subtotal			2		2		

2.理工基础课 Fundamental Science and Engineering Courses

课程代码 Course Code	课程名称 Course Name	必修选修 Required/ Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
MATH1101	高等数学I Calculus I	必 Required	4		5	无 None	1/秋 Y1/Fall
MATH1102	高等数学II Calculus II	必 Required	4		5	MATH1101	1/春 Y1/Spring
MATH1103	线性代数 Linear Algebra	必 Required	3		4	无 None	1/秋 Y1/Fall
MATH2101	概率论与数理统计 Probability Theory and Mathematical Statistics	必 Required	3		3	MATH1102	2/秋 Y2/Fall
PHYS1101	大学物理I General Physics I	必 Required	4		4	无 None	1/秋 Y1/Fall
PHYS1102	大学物理II General Physics II	必 Required	4		4	PHYS1101	1/春 Y1/Spring
PHYS1301	大学物理实验I General Physics Experiments I	必 Required	1	1	1	无 None	1/秋 Y1/Fall
PHYS1302	大学物理实验II General Physics Experiments II	必 Required	1	1	1	PHYS1301	1/春 Y1/Spring
CHEM1101	大学化学 General Chemistry	必 Required	3	1	3	无 None	1/春 Y1/Spring
CS1001	人工智能通识 Introduction to AI	必 Required	2	1	2	无 None	1/秋 Y1/Fall
CS1101	Python程序设计基础 Fundamentals of Python Programming	必 Required	3	1	3	无 None	1/春 Y1/Spring
小计/Subtotal			32	5	35		

3.通识选修课程修读要求 Requirements for General Education Elective Courses

下列类型课程有最低学分修读要求

The following types of courses have a minimum credit requirement.

课程类型 Course Type	必修选修 Required/ Elective	最低学分要求 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	推荐修读学期 Recommended Term
人文社科类通识课 Humanity and Social Science	选 Elective	2		2		2/秋 Y2/Fall
艺术类通识课 Arts	选 Elective	2		2		2/春 Y2/Spring
创新创业类通识课 Entrepreneurship	选 Elective	2	0.5	2		3/秋 Y3/Fall
其他通识课 Others	选 Elective	2		2		3/春 Y3/Spring
小计/Subtotal		8	0.5	8		

（二）专业课程 Major-specific Module

1.学科基础课程 Discipline-specific Foundational Module

课程代码 Course Code	课程名称 Course Name	必修选修 Required/ Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
MSE2101	材料科学基础 Fundamentals of Materials Science	必 Required	4	1	4	CHEM1101 PHYS1102	2/秋 Y2/Fall
ME2301	工程图学与计算机制图 Engineering Drawing and Computer-aided Designs	必 Required	2	1	2	无 None	2/秋 Y2/Fall
ME2302	电工电子技术 Electrical and Electronic Technology	必 Required	4	2	4	PHYS1102 MATH1102	2/秋 Y2/Fall

ME2202	工程材料 Engineering Materials	必 Required	2	0.5	2	PHYS1101 CHEM1101	2/秋 Y2/Fall
MSE2102	材料工艺学 Materials Technology	必 Required	3	1	3	PHYS1102 PHYS1302	2/春 Y2/Spring
MSE2103	机械设计与制造 Mechanical Design and Manufacture	必 Required	2		2	PHYS1102 PHYS1302	2/春 Y2/Spring
MSE2104	材料力学 Mechanics of Materials	必 Required	2		2	MSE2101 ME2202	2/春 Y2/Spring
MSE2105	材料物理性能 Physical Properties of Materials	必 Required	3	1	3	MSE2101	2/春 Y2/Spring
CHEM3201	物理化学I Physical Chemistry I	必 Required	3		3	CHEM1101	3/秋 Y3/Fall
CHEM3301	物理化学实验I Physical Chemistry Laboratory I	必 Required	1.5	1.5	3	CHEM1101	3/秋 Y3/Fall
MSE3101	材料表征方法 Material Characterization Method	必 Required	2	1	2	MSE2101	3/秋 Y3/Fall
小计/Subtotal			28.5	9	30		

2.专业核心课 Major Core Courses

课程代码 Course Code	课程名称 Course Name		必修选修 Required / Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
MSE2301	实验室安全与防护 Laboratory Safety and Protection		必 Required	0.5		0.5	CHEM1101 PHYS1101	2/秋 Y2/Fall
MSE2302	现代材料科学与技术前沿讲座 Lecture on the Frontiers of Modern Materials Science and Technology		必 Required	2		2	MSE2101	2/春 Y2/Spring
MSE3203	计算材料学与AI辅助设计 Computational Materials Science and AI-Assisted Materials Design		必 Required	3	0.5	3	CS1101	3/春 Y3/Spring
MSE3205	材料热力学与动力学 Thermodynamics and Dynamics of Materials		必 Required	2		2	MSE2101	3/春 Y3/Spring
MSE3202	方向一：半导体材料 Direction 1: Semiconductor Materials	固体物理 Solid-State Physics	必 Required	4		4	PHYS1102	3/秋 Y3/Fall
EE2306		半导体物理与器件 Semiconductor Physics and Devices	必 Required	4	1	4	PHYS1102	3/春 Y3/Spring
MSE3201	方向二：新能源材料 Direction 2: New Energy Materials	新能源材料 Advanced Energy Materials	必 Required	3	0.5	3	MSE2101	3/秋 Y3/Fall
MSE3204		电化学 Electrochemistry	必 Required	3	0.5	3	CHEM1101	3/春 Y3/Spring
MSE3301		储能原理与技术 Principles and Technologies of Energy Storage	必 Required	2		2	MSE2101	3/春 Y3/Spring
小计/Subtotal				23.5	2.5	23.5		

3.专业选修课(至少修读12学分,可自主修读,也可参考附表二的推荐修读'套餐')

Major Elective Courses (A minimum of 12 credits must be completed. Students may choose courses freely or follow the recommended 'bundles' outlined in Appendix Table 2.)

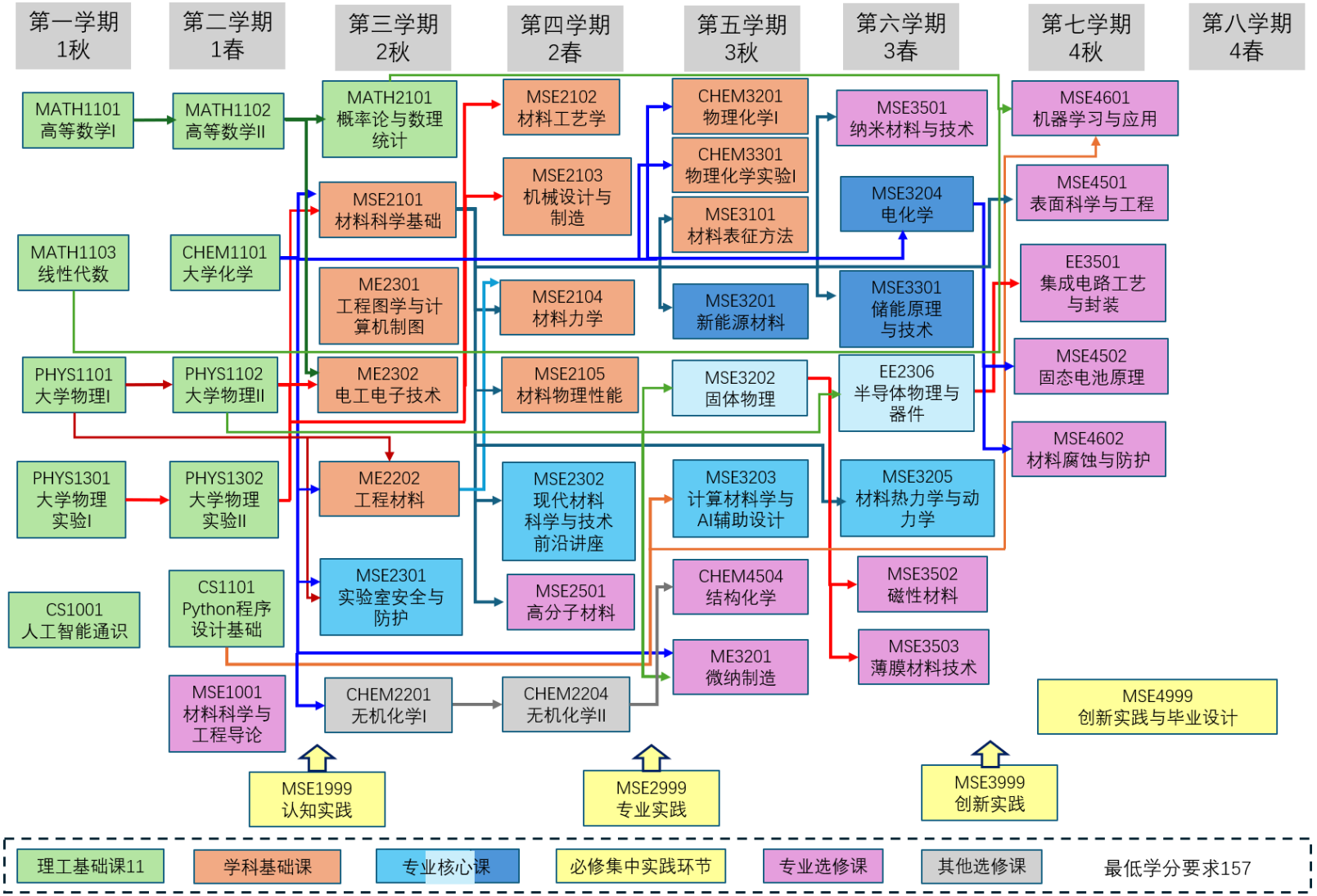
课程代码 Course Code	课程名称 Course Name	必修选修 Required/ Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
MSE1001	材料科学与工程导论 Introduction to Materials Science and Engineering	选 Elective	1		1	无 None	1/春 Y1/Spring
MSE2501	高分子材料 Polymer Materials	选 Elective	2		2	MSE2101	2/春 Y2/Spring

CHEM4504	结构化学 Structural Chemistry	选 Elective	3		3	CHEM2204	3/秋 Y3/Fall
MSE3501	纳米材料与技术 Nanomaterials and Technology	选 Elective	2		2	MSE2101	3/秋 Y3/Fall
ME3201	微纳制造 Fundamentals of Chip Materials	选 Elective	2	1	2	PHYS1102 CHEM1101	3/秋 Y3/Fall
MSE3502	磁性材料 Magnetic Materials	选 Elective	2		2	MSE3202	3/春 Y3/Spring
MSE3503	薄膜材料技术 Thin Film Material Technology	选 Elective	2	0.5	2	MSE3202	3/春 Y3/Spring
MSE4501	表面科学与工程 Surface Science and Engineering	选 Elective	2		2	MSE2101	4/秋 Y4/Fall
MSE4502	固态电池原理 The Principle of Solid-state Batteries	选 Elective	2	0.5	2	MSE3204	4/秋 Y4/Fall
EE3501	集成电路工艺与封装 Integrated Circuit Technology and Packaging	选 Elective	3	1	3	EE2306	4/秋 Y4/Fall
MSE4601	机器学习及应用 Machine Learning and Applications	选 Elective	2		2	MATH1103 MATH2101 CS1101	4/秋 Y4/Fall
MSE4602	材料腐蚀与防护 Material Corrosion and Protection	选 Elective	2	0.5	2	MSE3204	4/秋 Y4/Fall
小计/Subtotal			25	3.5	25		

（三）集中实践环节 Intensive Practical Training Module

课程代码 Course Code	课程名称 Course Name	必修选修 Required / Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
MSE1999	认知实践 Summer Internship I	必 Required	4	4	8 周/ Weeks	无 None	1/夏 Y1/Summer
MSE2999	专业实践 Summer Internship II	必 Required	4	4	8 周/ Weeks	无 None	2/夏 Y2/Summer
MSE3999	创新实践 Summer Internship III	必 Required	4	4	8 周/ Weeks	无 None	3/夏 Y3/Summer
MSE4999	创新实践与毕业设计 Capstone Project	必 Required	8	8	32 周/ Weeks	无 None	4/秋-4/春 Y4/Fall-Y4/Spring
小计/Subtotal			20	20	56 周/ Weeks		

十、专业课程关联图 Roadmap for Major Courses



附表一：主要专业实验和集中实践性环节

Appendix Table 1: Major Experiments and Intensive Practical Training Activities

课程代码 Course Code	课程名称 Course Name	必修选修 Required/ Elective	总学分 Credits	实践学分 Practical Credits	周学时 Weekly Load	先修课程 Prerequisites	学期 Term
MSE2101	材料科学基础 Fundamentals of Materials Science	必 Required	4	1	4	CHEM1101 PHYS1102	2/秋 Y2/Fall
ME2301	工程图学与计算机制图 Engineering Drawing and Computer-aided Designs	必 Required	2	1	2	无 None	2/秋 Y2/Fall
ME2302	电工电子技术 Electrical and Electronic Technology	必 Required	4	2	4	PHYS1102 MATH1102	2/秋 Y2/Fall
ME2202	工程材料 Engineering Materials	必 Required	2	0.5	2	PHYS1101 CHEM1101	2/秋 Y2/Fall
MSE2102	材料工艺学 Materials Technology	必 Required	3	1	3	PHYS1102 PHYS1302	2/春 Y2/Spring
MSE2105	材料物理性能 Physical Properties of Materials	必 Required	3	1	3	MSE2101	2/春 Y2/Spring
CHEM3301	物理化学实验I Physical Chemistry Laboratory I	必 Required	1.5	1.5	3	CHEM1101	3/秋 Y3/Fall
MSE3101	材料表征方法 Material Characterization Method	必 Required	2	1	2	MSE2101	3/秋 Y3/Fall
MSE3203	计算材料学与AI辅助设计 Computational Materials Science and AI-Assisted Materials Design	必 Required	3	0.5	3	CS1101	3/春 Y3/Spring
EE2306	半导体物理与器件 Semiconductor Physics and Devices	必 Required	4	1	4	PHYS1102	3/春 Y3/Spring
MSE3201	新能源材料 Advanced Energy Materials	必 Required	3	0.5	3	MSE2101	3/秋 Y3/Fall
MSE3204	电化学 Electrochemistry	必 Required	3	0.5	3	CHEM1101	3/春 Y3/Spring
ME3201	微纳制造 Fundamentals of Chip Materials	选 Elective	2	1	2	PHYS1102 CHEM1101	3/秋 Y3/Fall
MSE3503	薄膜材料技术 Thin Film Material Technology	选 Elective	2	0.5	2	MSE3202	3/春 Y3/Spring
MSE4502	固态电池原理 The Principle of Solid-state Batteries	选 Elective	2	0.5	2	MSE3204	4/秋 Y4/Fall
EE3501	集成电路工艺与封装 Integrated Circuit Technology and Packaging	选 Elective	3	1	3	EE2306	4/秋 Y4/Fall
MSE4602	材料腐蚀与防护 Material Corrosion and Protection	选 Elective	2	0.5	2	MSE3204	4/秋 Y4/Fall
MSE1999	认知实践 Summer Internship I	必 Required	4	4	8周/ Weeks	无	1/夏 Y1/Summer
MSE2999	专业实践 Summer Internship II	必 Required	4	4	8周/ Weeks	无	2/夏 Y2/Summer
MSE3999	创新实践 Summer Internship III	必 Required	4	4	8周/ Weeks	无	3/夏 Y3/Summer
MSE4999	创新实践与毕业设计 Capstone Project	必 Required	8	8	32周/ Weeks	无	4/秋–4/春 Y4/Fall-Y4/Spring
小计/Subtotal			65.5	35	47+56周/ Weeks		

附表二：专业选修课修读方向推荐

可侧重修读下列两个方向之一的课程，为未来进入该领域的研究打下基础。

Appendix Table 2: Recommended Directions for Elective Courses in the Major. Students may choose to focus on one of the following two directions, laying a foundation for future research in the field.

方向一：信息材料类 **Direction 1：Information materials**		**方向二：能源材料类** **Direction 2：Energy materials**	
课程代码 **Course Code**	**课程名称** **Course Name**	**课程代码** **Course Code**	**课程名称** **Course Name**
MSE1001	材料科学与工程导论 Introduction to Materials Science and Engineering	MSE1001	材料科学与工程导论 Introduction to Materials Science and Engineering
MSE3502	磁性材料 Magnetic Materials	MSE2501	高分子材料 Polymer Materials
MSE3503	薄膜材料技术 Thin Film Material Technology	CHEM4504	结构化学 Structural Chemistry
MSE4601	机器学习及应用 Machine Learning and Applications	MSE3501	纳米材料与技术 Nanomaterials and Technology
EE3501	集成电路工艺与封装 Integrated Circuit Technology and Packaging	MSE3503	薄膜材料技术 Thin Film Material Technology
MSE4501	表面科学与工程 Surface Science and Engineering	MSE4501	表面科学与工程 Surface Science and Engineering
ME3201	微纳制造 Fundamentals of Chip Materials	MSE4502	固态电池原理 The Principle of Solid-state Batteries
		MSE4602	材料腐蚀与防护 Material Corrosion and Protection