南方科技大学

学术学位普博生培养方案

SUSTech
Regular Doctoral Program (Academic Degree) Requirements

一级学科名称	材料科学与工程
First-Level Discipline	Materials Science and Engineering
一级学科代码	0805
Code of the First-Level Discipline	0805

南方科技大学研究生院制

Issued by the Graduate School of Southern University of Science and Technology

2025 年 4 月 29 日

一、培养目标 Education Objectives

培养在材料科学与工程领域具有坚实的科学基础和创新科研能力的高水平人才，能够把握并引领材料科学前沿研究，服务材料产业国家战略，促进粤港澳大湾区高新技术产业升级，支撑深圳综合性国家科学中心建设。

Cultivate high-level talents in Materials Science and Engineering with a solid scientific foundation and innovative research capabilities. Graduates should be able to grasp and lead cutting-edge research in the field, serve the national strategy for the materials industry, promote the upgrading of high-tech industries in the Guangdong-Hong Kong-Macao Greater Bay Area, and support the development of the Shenzhen Comprehensive National Science Center.

培养学风严谨、身心健康，具有社会责任感、家国情怀、国际视野和领导潜力的复合型人才。

Cultivate well-rounded individuals with rigorous academic integrity, physical and mental well-being, social responsibility, patriotism, global vision, and leadership potential.

重视材料科学与工程的基础理论知识和实验技能，培养学生分析问题、解决问题、把握材料科学与工程领域国内外发展趋势和前沿动态的能力，能独立开展材料科学与工程领域的前沿科学研究。

Emphasize fundamental theoretical knowledge and experimental skills in Materials Science and Engineering, train students to analyze and solve problems, understand domestic and international trends and frontiers in the field, and independently conduct cutting-edge scientific research.

培养学生良好的逻辑思维能力，掌握本专业前沿进展，能熟练使用中英文进行科技论文撰写和学术交流。

Enhance students' logical thinking skills, ensure they stay updated on the latest advancements in their discipline, and equip them with the ability to write scientific

papers and engage in academic communication proficiently in both Chinese and English.

二、主要学科方向 Main Research Fields

序号 No.	学科方向 Research Field	主要研究方向 Main Research Focus
1	新能源材料与器件 New Energy Materials and Devices	（1）能量捕获材料与器件 （2）电化学能源存储、转化与循环利用. （3）光/电催化材料 （4）环境友好材料 （1）Energy Capture Materials and Devices （2）Storage, Conversion and Recycling of Electrochemical Energy （3）Photo/Electrocatalytic Materials （4）Eco-Friendly Materials
2	信息材料与器件 Information Materials and Devices	（1）半导体材料与器件 （2）柔性电子材料与器件 （3）功能氧化物材料与器件 （4）量子拓扑材料与结构 （5）传感材料与器件 (1) Semiconductors and Devices (2) Flexible Electronic Materials and Devices (3) Functional Oxide Materials and Devices (4) Quantum Topological Materials and Structures (5) Sensing Materials and Devices
3	材料先进加工与制造 Advanced Processing and Manufacturing of Materials	（1）微纳加工技术和精密制造 （2）增材制造工艺和设备 （3）智能制造加工技术 （4）生物医学材料加工与制造 （1）Micro-Nano Fabrication and Precision Manufacturing （2）Additive Manufacturing and Equipment （3）Intelligent Manufacturing Technology (4) Biomedical Materials Processing and Manufacturing

4	材料学 Materials Science	（1）材料基因工程与计算材料学 （2）先进材料表征方法与技术 （3）生物医学材料 （4）结构材料、智能材料、纳米材料和复合材料 (1) Materials Genome and Computational Materials Science (2) Advanced Materials Characterization and Techniques (3) Biomedical Materials (4) Structural Materials, Smart Materials, Nanomaterials, and Composite Materials

三、修业年限 Stipulated Length of Study

类型 Type of Students	基本学习年限 Normal Duration	最长修业年限 Maximum Duration
硕士起点博士研究生 PhD students with a master's degree	3-4 学年 3-4 years	6 学年 6 years

四、课程学习基本要求 Basic Requirements for Course Study

1. 研究生应在培养方案规定的课程范围内修满规定学分。其他课程成绩录入成绩单，但不计入规定学分。

Graduate students must complete the required credits as outlined below. Though credits earned from other courses are recorded on the transcript, they do not count as the required credits.

2. 学术学位研究生应在个人培养计划中修读至少一门论文写作指导类课程。

Students should take at least one course on thesis writing.

3. 汉语和中国概况类课程为接受学历教育国际研究生的必修课。

Courses on the Chinese language and an overview of China are compulsory for international graduate students enrolled in degree program.

课程性质 Course Type		**学分要求** Course Credits
公共课 General Courses	思想政治理论课 Ideological and political theory courses	2
	英语课 English courses	2
	通识课 general education courses	3
专业课 Specialized courses		9（专业必修课≥6） 9 (compulsory specialized courses≥6)
劳动教育 Labor education		1
学术研究训练 Academic research training	学术交流 Academic exchange	2
	开题报告 The Proposal	1
	中期考核 Midterm Assessment	1
	总结报告 Summary Report	12
总学分 Total Credits		≥33

五、劳动教育 Labor Education

劳动教育是中国特色社会主义教育制度的重要内容。研究生劳动教育应结合产业新业态、劳动新形态等新型生产劳动和服务型劳动，运用学科和专业知识开展实习实训、专业服务、科普活动、社会实践、创新创业、志愿者服务等校内外劳动锻炼活动，累计不少于 32 学时，填报劳动教育活动记录，经培养单位审查通过后记 1 学分。

Labor education is a vital component of the socialistic education system with Chinese characteristics. Labor education for graduate students should integrate new forms of production and services, such as emerging industrial and innovative labor forms. During labor education, graduate students are supposed to apply their professional knowledge through internships, professional services, science popularization activities, social practice, innovation and entrepreneurship, volunteer services, or other on- and off-campus labor education activities. Students must complete no less than 32 hours of labor education. Upon completion, students should submit the *Graduate Student Labor Education Record Form*, and one credit will be granted after approval by the relevant educational unit.

六、学术研究训练 Academic Research Training

学术学位研究生应完成学术研究训练。学术研究训练是学术学位研究生提升从事学术研究工作能力的重要环节，主要包括学术交流、开题报告、中期考核、总结报告等。

Graduate students are required to complete the academic research training, which is a crucial component in developing their ability to engage in academic research. This training encompasses a range of activities, including academic exchanges, proposal, midterm assessment, and summary report.

（一）学术交流 Academic Exchange

研究生应定期参加课题组的学术讨论会，参加学术讲座、中国研究生创新实

践系列大赛、国内外学术会议等，博士生应参加不少于 16 次学术讲座。其中必听讲座包括科学道德与学风建设类讲座、实验室安全教育类讲座、心理健康教育与咨询类讲座和职业素养与规划类讲座各 1 次。满足培养方案规定的学术交流活动要求后，经培养单位审查通过，博士生记 2 学分。

Graduate students should regularly attend academic seminars within their research groups, as well as academic lectures, the China Postgraduate Innovation & Practice Competitions, and both domestic and international academic conferences. Students must attend at least 16 academic lectures, with at least one lecture from each category listed below: scientific research ethics, laboratory safety education, mental health education and consultation, and career planning. Upon fulfilling the academic exchange activity requirements and receiving review and approval from the relevant educational units, two credits will be granted.

（二）开题报告 The Proposal

研究生应在导师指导下确定学位论文的研究题目，制定论文工作计划，完成开题报告。开题报告应包括文献综述、选题背景及意义、研究内容、可行性分析、工作特色及难点、预期成果及可能的创新点等。

Each graduate student is required to select a research topic for their dissertation, formulate a work plan, and complete a dissertation proposal under the guidance of their supervisor. The proposal should include a literature review, the background and significance of the topic, the research content, the unique challenges and characteristics of the work, the expected outcomes, and any potential innovations, etc.

开题报告采用书面报告和答辩的组合形式；一般答辩的时长不少于 40 分钟。开题考核答辩委员会由至少 5 名相关学科博士研究生导师组成，其中包含至少 1 名非本系专家，委员总人数为奇数，可包括导师。

The graduate student will present the proposal as both a written report and an oral

defense. The oral defense must be at least 40 minutes long. The Proposal Committee shall consist of an odd number of at least 5 doctoral advisors from relevant disciplines. Additionally, at least one committee member must be an external expert outside the department, and the advisor may be included.

开题报告完成时间：普博生应在第三学期结束前完成。

The proposal should be completed before the third semester.

开题报告通过的，记 1 学分。第一次开题报告未通过的, 可在 6 个月内再次开题报告，仍未通过的, 予以分流。未按时参加开题报告的，成绩记为“未通过”。

Upon successful completion of the proposal, students will receive one credit. Those who fail the proposal must retake it within six months. Students who fail the second attempt will be redirected to a different program. Failure to attend the scheduled proposal will result in a failing grade.

（三）中期考核 Midterm Assessment

在学术研究训练过程中期，各培养单位应对研究生的综合能力、训练态度、精力投入、学位论文进展情况等方面进行检查。

During the midterm phase of the academic research training, each educational unit should assess students' overall competence, training attitude, level of commitment, and progress on their dissertation work.

中期考核采用书面报告和答辩的组合形式，一般答辩的时长不少于 40 分钟。中期考核委员会至少由 5 名相关学科博士研究生导师组成，其中包含至少 1 名非本系专家，委员会总人数为奇数，可包括导师。

The graduate student will present the Midterm Assessment as both a written report and an oral defense. The oral defense must be at least 40 minutes long. The Midterm Assessment Committee shall consist of an odd number of at least 5 doctoral advisors in the relevant disciplines. Additionally, at least one committee member must be an external expert outside the department, and the advisor may be included.

中期考核完成时间：普博生应在第五学期结束前完成。

The assessment should be completed before the fifth semester.

中期考核通过的，记 1 学分。

Upon successful completion of the assessment, students will receive one credit.

第一次中期考核未通过的，可在 6 个月内再次中期考核，仍未通过的，予以分流。未按时参加中期考核的，成绩记为“未通过”。

Students who fail the Midterm Assessment must retake it within six months. Those who fail the second attempt will be redirected to a different program. Failure to attend the scheduled assessment will result in a failing grade.

（四）总结报告 Summary Report

在完成学术研究工作后、距正式答辩三个月前，研究生应对学术研究训练进行总结，提交书面报告并答辩，一般答辩时长不少于 40 分钟。总结报告考核委员会至少由 5 名相关学科博士研究生导师组成，含至少 1 名一级学科学位评定分会委员。委员会总人数为奇数，可包括导师。考核通过，记 12 学分。未通过者应按照审查意见重新进行。

Upon completion of their academic research and at least three months before their dissertation defense, students must summarize their academic research training and present it through a written report and an oral defense. The oral defense must be at least 40 minutes long.

The Summary Report Committee shall consist of an odd number of at least 5 doctoral advisors from relevant disciplines， including at least one member of the Academic Degree Evaluation Sub-Committee and the advisor may be included.

Students will receive twelve credits upon successful completion of the Summary Report. Those who fail must retake it.

七、毕业（学位）论文工作要求 Requirements for Thesis/Dissertation

（一）学术学位研究生毕业（学位）论文是在导师指导下独立完成的、系统完整的学术研究工作的总结，是评价研究生完成学术研究训练、具备学术研究工作能力并达到申请毕业（学位）条件的主要依据，应体现研究生达到了学业（学位）标准。

A student's thesis/dissertation must offer a comprehensive summary of their academic research and be completed independently by the student under the guidance of their supervisor. It serves as the primary basis for evaluating whether the student has successfully completed the research training, demonstrated academic research skills, and is eligible to apply for graduation and degree conferral. The thesis/dissertation should demonstrate that the student has met all academic requirements.

（二）研究生应当按照学校相关规定撰写毕业（学位）论文。

Each student must complete their thesis/dissertation in accordance with the relevant regulations of the University.

八、毕业和学位授予 Graduation and Degree Conferral

研究生在学校规定修业年限内，完成培养方案规定内容（包括课程、训练和答辩），成绩合格，达到学校毕业要求的，依照《南方科技大学研究生毕业实施细则》（南科大研院发〔2025〕1 号）规定的要求和程序申请毕业。通过毕业审核，学校准予毕业，并发给毕业证书。

Any graduate student who fulfills the requirements of their degree program, including courses, trainings, and oral defenses, within the prescribed duration and achieves the required scores may apply for graduation in accordance with the *Graduation Regulations on Postgraduate Programs of the Southern University of*

Science and Technology.(SUSTech Graduate School 〔2025〕No. 1). Upon successfully passing the graduation evaluation and meeting the University's graduation criteria, the student will be granted graduation and awarded a diploma.

毕业生达到博士学业要求、学术水平的，依照《南方科技大学学位管理实施办法》（南科大〔2024〕174 号）相关规定授予学位。

Any graduate student who fulfills the doctoral training requirements and academic standards will be awarded a doctoral degree in accordance with the *Implementation Measures for Degree Management in Southern University of Science and Technology* (SUSTech〔2024〕No. 174).

九、审核意见 Review Comments

经 材料科学与工程 一级学科学位评定分委员会审议，认为该培养方案符合 材料科学与工程 学科 普博生 培养要求，审核通过。

Upon review by the Materials Science and Engineering Academic Degree Evaluation Sub-Committee, this training program is deemed to meet the cultivation requirements of Materials Science and Engineering discipline for regular doctoral student ,and it has been approved.

负责人签名（签章）：

日　　期：2025.04.29

Signature (Seal) of the Person in Charge:

Date:

材料科学与工程 培养方案附录

Appendices to the Doctoral Program in Materials Science and Engineering

附录一：公共课 Appendix I: General Courses

I 国内研究生公共课

I General Courses for Domestic Postgraduate Students

课程类别 Course Type	课程代码 Course Code	课程名称 Course	开课学期 Semester	学分 Credits	学时 Credit Hours	备注 Remarks
思政理论课 Ideological and political theory courses	GGC5021	中国马克思主义与当代 Chinese Marxism and Contemporary	秋/春 Fall& Spring	2	32	
英语课 English courses	GGC5046	南科大研究生英语 SUSTech Post-graduate English	秋 Fall	2	32	
	GGC5056	Writing for Publication	春 Spring	2	32	
通识必修课 General education courses	GGC5009	高级学术写作与交流（或其他科技论文写作课） Literature Research and Academic Writing (or other English writing courses)	春 Spring	2	32	

	GGC5011	实验室安全学 Laboratory Security	秋 Fall	1	16	

注：1.在我校获得硕士学位且已修读过《南科大研究生英语》的普博生，公共英语课应选修 GGC5056 《Writing for Publication》课程。
2.在我校获得硕士学位且已修读过《实验室安全学》的普博生，可修读其他课程。
3.科技论文写作指导类课程，以教务系统中课组列表为准。

II 国际研究生公共课

II General Courses for International Postgraduate Students

课程类别 Course Type	**课程代码 Course Code**	**课程名称 Course**	**开课学期 Semester**	**学分 Credits**	**学时 Credit Hours**	**备注 Remarks**
汉语和中国概况类课程 Chinese language and China overview courses	CLE7001	基础汉语 I Elementary Chinese I	秋 Fall	2	64	国际研究生必选 Both are compulsory for international students
	CLE7002	基础汉语 II Elementary Chinese II	春 Spring	2	64	
	CLE033	中国文化 Introduction to Chinese Culture	秋 Fall	2	32	国际研究生二选一 One is compulsory for international students
	CLE034	中国历史 Introduction to Chinese History	春 Spring	2	32	
通识必修课 General	GGC5046	南科大研究生英语 SUSTech Post-graduate English	秋 Fall	2	32	

education courses	GGC5047	高级学术写作与交流（或其他英文写作课） Advanced Academic Writing and Communication (or other English writing courses)	春 Spring	2	32	
	GGC5011	实验室安全学 Laboratory Security	秋 Fall	1	16	

附录二：专业必修课列表（≥6 学分）

Appendix II:　Compulsory Specialized Courses（≥6 Credits）

课程代码 Course Code	**课程名称 Course**	**开课学期 Semester**	**学分 Credits**	**学时 Credit Hours**	**备注 Remarks**
MSE5001	应用量子力学 Applied Quantum Mechanics	秋 Fall	3	48	专业基础课 Professional basic theoretical courses 至少修读 1 门 One is compulsc
MSE5002	高等材料化学 Advanced Materials Chemistry	春 Spring	3	48	
MSE5003	材料力学行为 Mechanical Behaviours of Materials	春 Spring	3	48	
MSE5023	高等材料物理 Advanced Physics of Materials	秋 Fall	3	48	
MSE5024	高等热力学与动力学 Advanced Thermodynamics &	春 Spring	3	48	

	Kinetics				ry for all students	
MSE5010	有机与生物材料 Organic and Biological Materials	春 Spring	3	48	专业核心课	至少修读 1 门 One is compulsory for all students
MSE5018	先进材料表征技术 Advanced Materials Characterization Techniques	春 Spring	3	48		
MSE5021	计算材料学 Computational Materials Science	春 Spring	3	48		
MSE5031	先进半导体材料 Advanced semiconductor materials	秋 Fall	3	48		
MSE5032	材料表面与界面 Materials Surface and Interface	秋 Fall	3	48		
MSE5038	能源材料原理 Principles of Energy Materials	秋 Fall	3	48		
MEE5217	工程材料：力学性能与测试 Engineering materials: mechanical properties and tests	春 Spring	3	48	专业核心课	/
MEE5406	储能原理与技术 Principle and technology of energy storage	春 Spring	3	48		/
EEE5053	高等固体物理 Advanced Solid State Physics	秋 Fall	3	48		/

注：在满足总学分要求下的前提下，可以用专业必修课学分代替专业选修课学分。

Note: Under the premise of meeting the total credit requirement, credits from compulsory specialized courses can be used to substitute those from elective professional courses.

附录三：专业选修课列表

Appendix Ⅲ: Elective professional Courses

课程代码 Course Code	课程名称 Course	开课学期 Semester	学分 Credits	学时 Credit Hours	备注 Remarks
MSE5004	纳米材料学 Introduction to Nanomaterials	春 Spring	2	32	
MSE5007	现代材料科学与技术前沿讲座 I Seminars on Frontiers of Modern Materials Science and Technology I	秋 Fall	1	16	
MSE5008	现代材料科学与技术前沿讲座 II Seminars on Frontiers of Modern Materials Science and Technology II	春 Spring	1	16	
MSE5011	电化学能量储存与转换 Electrochemical Energy Storage and Conversion	秋 Fall	3	48	
MSE5013	先进电池材料 Advanced Battery Materials	春 Spring	3	48	
MSE5016	胶体与界面系统 Colloidal & Interfacial Systems	春 Spring	3	48	
MSE5017	晶体化学 Crystal Chemistry	春 Spring	3	48	
MSE5019	光学材料与超构材料 Photonic Materials and Materials	春 Spring	3	48	
MSE5022	电解质基础 Fundamentals of Electrolytes	秋 Fall	3	48	

MSE5025	材料科学与人工智能 Materials Science and Artificial Intelligence	秋 Fall	3	48	
MSE5026	先进光源导论 Introduction to Advanced Light Source	秋 Fall	3	48	
MSE5027	材料科学中的有限元模拟 Finite Element Analysis for Materials Science	秋 Fall	3	48	
MSE5028	光子科学在材料研究和交叉前沿的应用 Photon Science and its Application to Materials Research and Interdisciplinary Frontiers	春 Spring	3	48	
MSE5029	声子学与热超结构材料 Phononics and Thermal Metamaterials	秋 Fall	3	48	
MSE5030	固体的磁性概论 Introduction to Magnetic Properties in Solids	秋 Fall	3	48	
MSE5033	晶体生长与表征导论 Introduction to Crystal Growth and Characterization	春 Spring	3	48	
MSE5035	量子材料与量子传感 Quantum Materials and Quantum Sensing (QMQS)	春 Spring	3	48	

MSE5036	封装材料与技术 Packaging Materials and Technology	秋 Fall	3	48	
MSE5037	超快光谱学基础 Fundamentals of Ultrafast Spectroscopy	春 Spring	3	48	
MSE5039	粉末冶金与增材制造 Powder Metallurgy and Additive Manufacturing	春 Spring	3	48	
MSE5040	现代材料分析测试实验 Modern Materials Analysis and Testing Experiments	春 Spring/秋 Fall	2	64	
MSE5041	二维电子材料及其电子器件应用 Two-dimensional Materials for Electronic Device Applications	秋 Fall	3	48	
MSE5042	柔性电子材料与器件 Flexible Electronic Materials and Devices	春 Spring	3	48	
MSE5043	信息存储材料与器件 Materials and Devices for Information Storage	秋 Fall	3	48	
MSE5044	先进原子力显微方法 Advanced Atomic Force Microscopy	秋 Fall	3	48	
MSE5046	先进电子显微学方法及其应用 Advanced electron microscopy	秋 Fall	3	48	

	methods and their applications				
MSE5047	纳米材料与结构 Nanomaterials and Nanostructures	春 Spring	3	48	
PHY5009	密度泛函方法和固态电子结构 Fundamentals of electronic structures and density functional theory	秋 Fall	3	48	
MEE5002	项目管理基础与实践 Fundamentals and Practices of Project Management	春 Spring	3	48	
MEE5003	矩阵分析及其应用 Matrix Analysis and Its Applications	秋 Fall	3	48	
MEE5107	微加工与微系统 Microfabrication and Microsystems	秋 Fall	3	48	
MEE5201	创新设计理论与应用 Innovation Design Theory and Application	春 Spring	3	64	
MEE5205	断裂力学与失效分析 Failure Analysis and Fracture Mechanics of Engineering Materials	秋 Fall	3	48	
MEE5207	先进激光加工及检测技术 Innovative Application of Laser	秋 Fall	3	48	
MEE5210	微观组织表征与分析 Microstructure Characterization	秋 Fall	3	48	

	and Analysis				
MEE5213	软材料学科前沿 Frontiers of Soft Materials Science	春 Spring	3	48	
MEE5214	软物质物理基础 Fundamental Physics of Soft Matter	秋 Fall	3	48	
MEE5215	柔性电子制造：材料、器件与工艺 Flexible and Wearable Electronics: Design and Fabrication Techniques	春 Spring	3	48	
MEE5216	功能软材料与 4D 打印 Soft Functional Materials and 4D Printing	秋 Fall	3	48	
MEE5218	工程结构分析与性能 Engineering Structure Analysis and Properties	秋 Fall	3	48	
MEE5301	先进制造基础 Fundamentals of Advanced Manufacturing Technology	秋 Fall	3	48	
MEE5304	复合制造技术前沿 Frontiers in Hybrid Manufacturing Processes	秋 Fall	3	48	
MEE5305	等离子体原理与应用 Fundamentals and Applications of Plasma	春 Spring	3	48	
MEE5307	精密加工技术 Precision Machining Technology	秋 Fall	3	48	

MEE5402	新能源技术：氢能与燃料电池技术 New Energy Technology: Hydrogen and Fuel Cell Technology	秋 Fall	3	48	
MEE5405	太阳能热利用技术 Solar Thermal Energy Utilization Technologies	春 Spring	3	48	
MEE5407	光电与光化学转化原理 Principle of Solar to Electricity and Solar Photochemistry Conversion	春 Spring	3	48	
MEE5411	新能源转化与利用技术 Renewable Energy Conversion and Utilization Technology	春 Spring	3	48	
SDM5001	电子封装结构中的高分子材料失效行为 Failure Mechanisms of Polymers in Microelectronic Packages	秋 Fall	4	64	
SDM5003	工程复合材料结构及功能化技术 Engineering Composite Structures and Functional Technology	秋 Fall	4	64	
SDM5004	产品可靠性设计与分析 Product Reliability Design and Analysis	春 Spring	3	48	
SDM5018	逻辑思维与人工智能 Logical Thinking and Artificial Intelligence	春 Spring	3	48	

SDM5021	柔性储能材料与器件 Flexible Energy Storage Materials and Devices	春 Spring	3	48	

附录修订日期 2025 年 4 月 29 日

Appendix Revision Date: