

南方科技大学

学术型博士研究生培养方案

SUSTech

Doctoral Program (Research Degree) for International Students

一级学科名称

物理学

Name of the First-level Discipline

Physics

一级学科代码

0702

Code of the First-level Discipline

适用于 2019 级

This PhD Program applies to the international doctoral students admitted in 2019

年 月 日

YYYY—MM—DD

一、培养目标 Program Objectives

1. 要求掌握本专业领域的基础理论以及系统深入的专门知识，具有严谨的治学态度、理论与实践相结合的科学方法和作风。
1. Master the fundamental theories and systematic, in-depth special knowledge in the professional field; hold a rigorous attitude towards academic studies; adopt scientific methods and styles combining theories with practice;
2. 具有独立从事科学研究工作的能力，并在学科相关领域做出创新性的成果。
2. Have the ability of independent scientific research and make innovative achievements in discipline-related fields;
3. 能够熟练掌握英语，检索、查阅本专业英文资料，撰写英文学术论文，并具有良好的英语听说能力以及进行国际学术交流能力。
3. Have good English proficiency to retrieve and consult English literature in the professional field and write academic papers in English; have good English listening and speaking abilities and be able to conduct international academic exchange;
4. 具有良好的身体和心理素质，学术视野开阔，善于在研究工作中与其他学科交叉渗透，做出突出成绩。
4. Have good physical and psychological qualities; hold a broad academic vision; be skillful in relating to other disciplines in researches; make outstanding achievements.

二、主要学科方向 Major Research Areas

序号 NO.	学科方向 Research Areas	主要研究方向 Main Research Focus
1	凝聚态物理 Condensed Matter Physics	1. 凝聚态理论 Condensed Matter Theory 2. 半导体物理 Semiconductor Physics 3. 材料物理 Materials Physics 4. 凝聚态物理及其交叉方向 Condensed Matter Physics and Interdisciplinary Fields
2	理论物理 Theoretical Physics	1. 理论粒子物理 1. Theoretical Particle Physics 2. 广义相对论以及宇宙学 2. General Relativity and Cosmology 3. 量子信息与量子计算 3. Quantum Information and Quantum Computing

		4. 空间物理 4. Space Physics
3	计算物理 Computational Physics	1. 计算材料学 1. Computational Materials Science 2. 计算地球物理学 2. Computational Geophysics
4	光学 Optics	1. 量子光学 1. Quantum Optics 2. 激光光谱学 2. Laser Spectroscopy 3. 光电子学 3. Photoelectronics 4. 光学及其交叉方向 4. Optics and Interdisciplinary Fields

三、学习年限 Program Duration

类型 Type of Students	基本学习年限 Normal Program Duration
硕士起点博士研究生 PhD students with a master's degree	4 years

四、应修学分 Required Credits

课程类别 Course Type		学分 Credits
公共课 General Required Courses	英语课 English language courses	2
	中国汉语课 Chinese language courses	4
	中国概况课 Chinese cultural courses	2
	通识通修课 General research courses	2
专业课 Discipline-based courses		12
学术讲座 Seminar		4
总计 Total		26

五、博士资格考核 PhD Qualifying Examination

内容: 考核博士研究生的基础理论、专业知识、学科前沿知识, 以及发现、分析、解决问题的能力;

Contents: Examine the fundamental theories, professional knowledge, and discipline frontier knowledge that the PhD student has mastered, and the ability to discover, analyze and solve problems;

时间: 硕士起点博士研究生应在入学后第三学期结束前通过资格考核;

Time: The PhD student with a master's degree shall pass the Qualifying Examination before the end of the third semester after entering the university;

方式: 笔试加答辩;

Mode: Written examination and oral defense;

委员会: 至少由 5 名相关学科的博士研究生导师组成, 其中至少包含 1 名非本系的相关专家, 委员总人数为奇数, 可包括导师;

Committee: It shall consist of at least 5 doctoral advisors in the related disciplines, who shall include at least 1 related expert from outside the same department; the total number of committee members shall be an odd number, and the advisor may be included;

笔试: 申请参加资格考核的学生需在申请时考核笔试科目。笔试成绩为通过或不通过。

Written Examination: The student applying for the Qualifying Examination shall take the written examination at the time of application. The result of written examination shall be PASS or FAIL.

答辩: 博士资格考核的答辩时长不少于 40 分钟;

Oral Defense: The duration of oral defense for PhD Qualifying Examination shall be no shorter than 40 minutes;

结果: 考核结果设为通过和不通过。答辩环节的决议采取不记名投票方式, 经全体成员三分之二或以上同意方可通过。笔试和答辩均考核通过的博士研究生可进入博士学位论文工作阶段。考核未通过者应在三个月内申请第二次考核, 仍未通过者, 须退学或转为硕士研究生。

Result: The result of the Examination shall be PASS or FAIL. The resolution for oral defense shall be made through secret ballot, and a PASS requires approval from at least two thirds of all the committee members. The PhD student having passed the written examination and the oral defense may start the stage of doctoral dissertation. Those having failed shall apply for the second examination within

three months; if still failing, they shall discontinue the schooling or learn as a master's student.

六、学位论文开题考核 Dissertation Proposal Assessment

内容: 考核博士研究生所选课题的研究背景、研究计划及创新点、预期成果等;

Contents: Assess the research background, research plan, innovation points, and expected results etc of the topic selected by the PhD student;

时间: 博士研究生应在第五个学期结束前完成开题考核;

Time: The PhD student shall finish the Proposal Assessment before the end of the fifth semester;

方式: 提交书面报告加答辩。

Mode: Submit a written report to attend the oral defense.

组织: 博士开题考核的答辩时长不少于 40 分钟。开题考核委员会至少由 5 名相关学科的博士研究生导师组成, 其中至少包含 1 名非本系的相关专家, 委员总人数为奇数, 可包括导师;

Organizing: The duration of oral defense for PhD Dissertation Proposal Assessment shall be no shorter than 40 minutes. The Dissertation Proposal Assessment Committee shall consist of at least 5 doctoral advisors in the related disciplines, who shall include at least 1 related expert from outside the same department; the total number of committee members shall be an odd number, and the advisor may be included;

结果: 考核结果设为通过和不通过。考核决议采取不记名投票的方式, 经全体成员三分之二或以上同意方可通过。考核通过的博士研究生应根据考核意见修改开题报告。考核未通过的博士研究生应在六个月内进行第二次考核, 仍未通过者, 须退学或转为硕士研究生。

Result: The result of the Examination shall be PASS or FAIL. The resolution for the Assessment shall be made through secret ballot, and a PASS requires approval from at least two thirds of all the committee members. The PhD student having passed the Assessment shall modify his/her dissertation proposal according to the assessment opinions. Those PhD students having failed shall attend the second examination within six months; if still failing, they shall discontinue the

schooling or learn as a master's student.

七、年度考核 Annual Assessment

内容: 考查研究生的论文工作进展、科研精力投入和已取得成果等情况;

Contents: Assess the student's dissertation progress, scientific research input and achieved results, etc.;

时间: 硕士起点博士研究生应在入学后第二学年和第三学年结束前各完成一次考查。研究生每延长学习年限一年须增加一次考查, 延长半年及以上不满一年的, 按一年计算;

Time: The PhD student with a master's degree shall finish one assessment before the end of the second academic year and third academic year, respectively, after entering the university. For each extended schooling year, the student shall receive one additional assessment; any extension of half a year or longer but less than one year shall be deemed as one year for this purpose;

方式: 提交年度研究进展报告;

Mode: Submit the annual research progress report;

组织: 至少由 3 名相关学科的博士研究生导师组成, 可包括导师;

Organizing: At least 3 doctoral advisors in the related disciplines shall be included, and the advisor may be included;

结果: 考查决议采取不记名投票的方式, 经全体成员三分之二或以上同意方可通过。两次或两次以上考查不通过者, 须退学或转为硕士研究生。

Result: The resolution for the Assessment shall be made through secret ballot, and a PASS requires approval from at least two thirds of all the committee members. Any student failing in the second or later assessment shall discontinue the schooling or learn as a master's student.

八、学位论文总体要求 General Requirements of PhD Dissertation

学术水平: 博士学位论文要求作者对所研究的课题在科学研究或专门技术上做出创造性的成果, 表明作者已经掌握本学科坚实宽广的基础理论和系统深

入的专门知识，具有独立从事高水平科学研究工作的能力；

Academic Level: As for the PhD dissertation, it is required that the author should make creative achievements in scientific research or special technology in the research topic, so as to show that the author has mastered solid, broad fundamental theories and systematic, in-depth special knowledge in the discipline and has the ability to independently carry out high-level scientific research;

查重: 原则上“去除本人已发表文献复制比”低于 5%，视为查重通过；复制比在 5%~10%之间，须填写说明，导师、系主任（或负责研究生工作的副系主任）签字确认同意后，视为通过；复制比高于等于 10%，视为不通过。

Plagiarism Check: In principle, the “similarity rate with the author’s own published literature deducted” shall be lower than 5%, which shall be deemed PASS in the check; if the similarity rate is between 5% and 10%, an explanation description must be submitted, and, subject to the signature of the advisor and the dean of department (or the vice dean of department in charge of postgraduates) for approval, it shall then be deemed PASS; any check with a similarity rate higher than or equal to 10% shall be deemed FAIL.

九、学位论文评审 PhD Dissertation Examination

时间: 通过学位论文的形式审查和论文重合度检查后，可申请学位论文评审；

Time: The student may apply for PhD Dissertation Examination after passing the formal examination and plagiarism check of PhD dissertation.

方式: 同行专家实名评审；

Mode: Examination by peer experts by real names;

组织: 由至少 2 名论文相关学科的校外博士研究生导师组成，鼓励邀请境外大学专家参与评审；

Organizing: The examination shall be conducted by at least 2 doctoral advisors in the related disciplines from outside the university, and it is encouraged to invite experts from overseas universities for this examination;

结果: 博士研究生通过评审后应根据专家意见修改论文。评审中有 1 名专家不同意答辩，被评审人可于一个月内修改论文后，提交该名专家或另聘 1 名专家再次评审；有 2 名专家不同意答辩，则取消本次评审申请。博士研究生两

次申请学位论文评审的时间至少间隔六个月，第二次评审仍未通过者，须退学或转为硕士研究生。

Result: After the examination, the PhD student shall modify his/her dissertation according to the experts' opinions. If 1 expert does not approve of oral defense during this examination, the examinee may, after modifying the dissertation within one month, submit it to that expert or hire another expert for re-examination; if 2 experts do not approve of oral defense, this examination application shall be cancelled. The interval for a PhD student to apply for two PhD Dissertation Examinations shall be at least six months; any student failing in the second examination shall discontinue the schooling or learn as a master's student.

十、学位论文答辩 Oral Defense of PhD Dissertation

时间: 博士研究生通过学位论文评审后，可申请学位论文答辩；

Time: After passing the PhD Dissertation Examination, the PhD student may apply for the Oral Defense of PhD Dissertation;

组织: 学位论文答辩委员会至少由 5 名相关学科的专家组成（含至少 1 名论文评审专家），委员总人数为奇数，其中应至少有 2 名校外专家。委员会主席一般由教授或具有相当职称的专家担任。所有委员应具备博士研究生导师资格和副高及以上职称，同时委员中半数以上是教授或相当职称的专家。导师不可担任委员。

Organizing: The Committee for Oral Defense of PhD Dissertation shall consist of at least 5 experts in the related disciplines (including at least 1 paper examination expert); the total number of committee members shall be an odd number, including at least 2 experts from outside the university. The committee chair shall be a professor or an expert with equivalent professional title. All the committee members shall have the qualification of doctoral advisor and the professional title of associate professor or equivalent or higher, and at least half of those members shall be experts with the professional title of professor or equivalent. The student's advisor shall not be a member here.

结果: 答辩决议采取不记名投票方式，经全体成员三分之二或以上同意方可通过。博士学位论文答辩未通过者，可在两年内（不超过博士研究生最长学习年限）修改论文，重新答辩一次，仍未通过者，学校不再受理该生学位论文

答辩申请。

Result: The resolution for the Oral Defense shall be made through secret ballot, and a PASS requires approval from at least two thirds of all the committee members. The student having failed in the Oral Defense of PhD Dissertation may modify the dissertation within two years (within the maximum program duration for the PhD student) and attend one more oral defense; for any student failing again, the university will no longer accept his/her application for Oral Defense of PhD Dissertation.

十一、学术成果要求 Requirements of Scholarly Achievement

博士生在 SCI 检索源文章上以第一作者或共同第一作者发表与博士学位论文相关的学术论文总数不少于 2 篇；或其他情况由本学科学位委员会判断。其他具体要求请参见《南方科技大学物理系研究生在读期间发表学术成果具体要求及指导性目录》中对物理学博士生的要求。

A PhD student shall publish, as the first author or joint first author, at least 2 academic papers related to his/her PhD dissertation on SCI-indexed journals; the Degree Assessment Committee of the Discipline has the right to assess any other cases. For other specific requirements, refer to the requirements for the PhD student in physics in the Detailed Requirements and Guidance List for Academic Achievement Publishing for Postgraduates in the Department of Physics of the Southern University of Science and Technology.

十二、其他说明 Others

学科学位评定分委员会意见:

Comments from the Degree Assessment Sub-committee of the Discipline:

Signature of the Committee Chair:
(Stamp)

Date:

校学位评定委员会意见:

Comments from the Degree Assessment Committee of the University

Signature of the Committee Chair:
(Stamp)

Date:

物理学培养方案附录

Appendices to the Doctoral Program in Physics

附录一：课程设置 Appendix I: Courses

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	周学时/ 总学时 Weekly Credit Hours/Total Credit Hours
公共课 General Required Courses		中国历史概论 Introduction to Chinese History	春 Spring	2	2/32
	GGC5016	博士英语 Topics for Advanced Research	春/秋 Spring & Fall	2	2/32
		基础汉语 I Elementary Chinese I	秋 Fall	2	2/64
		基础汉语 II Elementary Chinese II	春 Spring	2	2/64
		Literature Research and Academic Writing	秋 Fall	2	2/32
学位必修课 (要求 4 学分以 上) Degree Compulsory Courses (more than 4 credits required)	PHY5001	高等量子力学 Advanced Quantum Mechanics	秋 Fall	4	4/64
	PHY5033	高等量子力学 B Advanced Quantum Mechanics B	春 Spring	3	3/48
	PHY5034	前沿物理选讲 A Selected Topics in Frontier Physics A	秋 Fall	3	3/48
	PHY5035	前沿物理选讲 B Selected Topics in Frontier Physics B	秋 Fall	3	3/48
	PHY5036	前沿物理选讲 C Selected Topics in Frontier Physics C	秋 Fall	3	3/48
	PHY5037	前沿物理选讲 D Selected Topics in Frontier Physics D	秋 Fall	3	3/48
	PHY5038	现代物理实验 A Modern Physical Experiments A	春 Spring	3	3/48
	PHY5039	现代物理实验 B Modern Physical Experiments B	春 Spring	3	3/48
	PHY5040	现代物理实验 C Modern Physical Experiments C	春 Spring	2	3/48

		Modern Physical Experiments C	Spring		
	PHY5041	现代物理实验 D Modern Physical Experiments D	春 Spring	3	3/48
	PHY5042	先进微纳半导体器件物理 Advanced power electronics and MEMS devices physics	秋 Fall	3	3/48
学位必选课 (要求 6 学分以 上) Degree Required Courses (more than 6 credits required)	PHY5004	高等固体物理 Advanced Solid State Physics	春 Spring	4	4/64
	PHY5011	群论 Group Theory for Physicists	秋 Fall	4	4/64
	PHY5003	高等统计物理 Advanced Statistical Physics	秋 Fall	3	3/48
	PHY5006	计算物理 Computational Physics	春 Spring	3	3/48
	PHY5002	固体理论 Solid State Theory	春 Spring	4	4/64
	PHY5012	量子信息 Quantum Information	秋 Fall	3	3/48
	PHY5020	量子光学 Quantum Optics	春 Spring	3	3/48
选修课 Elective Courses	PHY5009	密度泛函方法和固态电子结构 Fundamentals of Electronic Structure and Density Functional Theory	秋 Fall	3	3/48
	PHY5013	先进电子显微学 Advanced Electron Microscopy	秋 Fall	3	3/64
	PHY5008	量子输运理论 Quantum Transport Theory	春 Spring	3	3/48
	PHY5010	薄膜物理 Physics of Thin Film	秋 Fall	3	3/48
	PHY5015	激光光谱学 Laser Spectroscopy	秋 Fall	3	3/48
	PHY5014	超快光谱学 Ultrafast Spectroscopy of Semiconductors	春 Spring	3	3/48
	PHY5017	非线性光学 Nonlinear Optics	秋 Fall	3	3/48
	PHY5019	半导体器件物理 Physics of Semiconductor Device	春 Spring	4	4/64
	PHY5021	量子多体理论 Quantum Many-body Theory	秋 Fall	4	4/64
	PHY5016	高等电动力学 Advanced Electrodynamics	春 Spring	3	3/48
	PHY5018	低维物理	春	3	3/48

		Physics of Low Dimensional Materials	Spring		
	PHY5023	自旋电子学 Spintronics	秋 Fall	3	3/48
	PHY5022	量子场论 Quantum Field Theory	春 Spring	3	3/48
	PHY5024	低温物理 Low Temperature Physics	春 Spring	3	3/48
	PHY5025	表面物理 Surface Physics	春 Spring	4	4/64
	PHY5026	General Relativity: from Black Holes to Cosmology	春 Spring	3	3/48
	PHY5029	固体光电子学 Optical Properties of Solids	春 Spring	3	3/48
	PHY5030	Introduction to Quantum Field Theory	秋 Fall	4	4/64
	PHY5032	量子计算 Quantum Computation	春 Spring	3	3/64
	PHY5031	微纳结构加工 Introduction to Microelectronic Fabrication	秋 Fall	2	2/48
	PHY5028	凝聚态物理讲坛 Condensed Matter Physics Forum	秋 Fall	3	3/48
	IQS5001	量子信息物理学 Physics principle of quantum information	秋 Fall	3	3/48
	IQS5002	量子比特 Quantum bits	春 Spring	3	3/48
学术讲座 Seminar	ACA6001	报告 Report		4	
<p>每“听讲 seminar”20 场+“主讲 seminar”1 场，且被评定合格，计 2 学分，毕业审查前至少须修 4 学分 seminar</p> <p>2 credits will be given for “attending 20 seminars” and “being the speaker at 1 seminar” each (assessed PASS); at least 4 credits for seminars are required before graduation review.</p>					

Note:

1. *Topics for Advanced Research* (博士英语) is the English language course for doctoral students.

2. Chinese Language Requirements:

Elementary Chinese I & II, totaling 4 course credits, are mandatory for international students. Both courses would help students develop an equivalent language ability of level-3 of Chinese Proficiency Test (HSK), which is required for graduation.

博士留学生的中文能力在毕业时应至少达到《国际汉语能力标准》三级水平（等同于HSK 汉语水平考试三级）。完成《基础汉语 I&II》课程的留学生汉语综合运用能力可达到 HSK 三级。

The Chinese proficiency of the international PhD student shall reach, at graduation, at least level 3 according to the Chinese Language Proficiency Scales for Speakers of Other Languages (equivalent to level 3 in the Chinese Proficiency Test (HSK). The comprehensive Chinese language application ability of International students finishing learning *Elementary Chinese I & II* may reach level 3 in HSK.

附录二：相近研究方向推荐课程

Appendix II: Recommended Courses in Related Fields

课程类别	课程代码 Course Code	课程名称 Course	开课学期 Semester	学分 Credits	周学时/ 总学时 Weekly Credit Hours/Total Credit Hours
	BME5101	高级显微镜：基础与应用 Advanced microscopy: fundamentals and applications	秋 Fall	3	3/48
	BME5006	生物医学成像 Biomedical Imaging	春 Spring	3	3/48
	ESS5030	空间等离子体物理学 Space Plasma Physics	春 Spring	3	3/48
	ESS5001	高等弹性动力学 Quantitative Seismology	秋 Fall	3	3/48
	ESS5029	高等地球电磁学 Advanced Geo-Electromagnetism	春 Spring	3	3/48
	MSE5024	高等热力学与动力学 Advanced Thermodynamics & Kinetics	春 Spring	3	3/48
	MSE5023	高等材料物理 Advanced Physics of Materials	秋 Fall	3	3/48
	ESE5010	高等环境化学 Advanced Environmental chemistry	秋 Fall	3	3/48
	ESE5068	固体废物处置与资源化 Treatment and Beneficial Utilization of Solid Waste	春 Spring	3	3/48
		环境材料性能与表征 Function and Characterization of Eco-materials	秋 Fall	3	3/48
	ESE5032	环境遥感 Environment Remote Sensing	春 Spring	3	3/48
		计算方法	秋	3	3/48

		Computational Method	Fall		
		信息技术基础 Fundamentals of Information Technology	春 Spring	3	3/48
		现代信号处理 Modern Signal Processing	秋 Fall	3	3/48
		天线理论与技术 Antenna Theory and Techniques	春 Spring	3	3/48
		计算电磁学 Antenna Theory and Techniques	春 Spring	3	3/48
		高等电磁场理论 Advanced Electromagnetic Theory	秋 Fall	3	3/48
		集成电路材料与工艺 Silicon VLSI Technology, Materials, Practice	秋 Fall	3	4/64
		高阶 CMOS 超大规模集成电路设计 Advanced CMOS VLSI Design	春 Spring	3	4/64
		模拟集成电路设计 Analog Integrated Circuit Design	秋 Fall	3	4/64
		微型计算机处理器设计 Microprocessor Design	秋 Fall	3	4/64
		片上系统集成电路设计 System-on-a-Chip Design	秋 Fall	3	4/64
选修课	BME5002	先进生物材料 Advanced Biomaterials	秋 Fall	3	3/48
	BME5005	纳米生物医学 Nano-Biomedicine	秋 Fall	3	3/48
	BME5008	运动生物力学 Sports Biomechanics	春 Spring	3	3/48
	ESS5026	地球物理反演理论 Geophysical Inverse Problem	春 Spring	3	3/48
	ESS5031	震源动力学 Earthquake source dynamics	春 Spring	3	3/48
	ESS5002	地球动力学 Geodynamics	春 Spring	3	3/48
	ESS5006	地球与行星内部物理学 Physics of Earth and Planetary Interiors	秋 Fall	3	3/48
	ESS5007	观测地震学 Observational Seismology	秋 Fall	3	3/48
	ESS5003	地震波传播和成像 Seismic wave propagation and imaging	秋 Fall	3	3/48
	ESS5015	现代应用地球物理学 Modern Applied Geophysics	秋 Fall	3	3/64
	ESS5027	力电耦合原理 Principal of Mechanical-Electromagnetic	春 Spring	2	2/32

		Coupling			
ESS5030	计算地球动力学 Numerical Geodynamics	春 Spring	3	3/48	
ESS5022	地球物理野外观测实验 Geophysical Field Trip Experiment	秋 Fall	3	3/48	
ESS5005	计算地球物理学 Computational Geophysics	秋 Fall	3	3/48	
ESS5029	统计地震学 Statistical Seismology	春 Spring	2	2/32	
ESS5040	地球物理经典文献阅读 Classical literature reading in geophysics	春 Spring	1	1/16	
MSE5004	纳米材料学 Introduction to Nanomaterials	春 Spring	3	3/48	
MSE5002	高等材料化学 Advanced Materials Chemistry	春 Spring	3	3/48	
MSE5007	现代材料科学与技术前沿 I Seminars on Frontiers of Modern Materials Science and Technology I	秋 Fall	1	1/16	
MSE5008	现代材料科学与技术前沿 II Seminars on Frontiers of Modern Materials Science and Technology II	春 Spring	1	1/16	
MSE5009	增材制造与粉末冶金 Additive manufacturing and powder metallurgy	秋 Fall	2	2/32	
MSE5010	有机与生物材料 Organic and Biological Materials	春 Spring	3	3/48	
MSE5011	电化学能量储存与转换 Electrochemical Energy Storage and Conversion	秋 Fall	3	3/48	
MSE5012	先进太阳能材料与技术 Advanced Solar Energy Materials and Technologies	春 Spring	3	3/48	
MSE5013	先进电池材料 Advanced Battery Materials	秋 Fall	3	3/48	
MSE5014	柔性电子材料 MATERIALS FOR FLEXIBLE ELECTRONICS	春 Spring	3	3/48	
MSE5015	材料基因组学 The Material Genome Science	秋 Fall	3	3/48	
MSE5016	胶体与界面系统 Colloidal & Interfacial Systems	春 Spring	3	3/48	
MSE5017	晶体化学 Crystal Chemistry	春 Spring	3	3/48	

MSE5019	光学材料和超构材料 Photonic materials and metamaterials	秋 Fall	3	3/48
MSE5021	计算材料学 Computational Materials Science	春 Spring	3	3/48
MSE5003	材料力学行为 Mechanical Behaviours of Materials	春 Spring	3	3/48
ESE5022	环境生物技术 Environmental Biotechnology	秋 Fall	3	3/48
ESE5015	环境空间统计学 Spatial Statistics in Environment	秋 Fall	3	3/48
ESE5090	全球水文与环境前沿 Global Hydrology and Frontier of Environmental Science	秋 Fall	3	3/48
ESE5055	高级地下水水文学 Advanced Groundwater Hydrology	春 Spring	3	3/48
CSE5001	机器学习 Machine Learning	秋 Fall	3	3/48
EEE5003	非线性光学 Nonlinear Optics	秋 Fall	3	3/48
EEE5005	现代激光技术 Modern Laser Technology	秋 Fall	3	3/48
EEE5007	先进显示与照明技术 Advanced Display and Lighting Technologies	秋 Fall	3	3/48
EEE5021	高级非线性优化技术 Advanced Nonlinear Optimization	秋 Fall	3	4/64
EEE5028	无线通信导论 Fundamentals of Wireless Communications	秋 Fall	3	4/64
EEE5002	微电子材料与工艺 Microelectronics Material and Process	春 Spring	3	4/64
EEE5013	电源管理集成电路设计 Power Management Integrated Circuits Design	春 Spring	3	3/48
EEE5014	光谱学与光谱技术 Spectroscopy and Spectral Technology	春 Spring	3	3/48
EEE5024	高级微波工程 Advanced Microwave Engineering	春 Spring	3	4/64
	射频集成电路与系统设计 Radio-Frequency Integrated Circuits and Systems Design	春 Spring	3	4/64
	电子设计自动化 EDA 基础 Introduction to Electronic Design Automation	秋 Fall	3	3/48
	深度学习芯片设计 Deep learning on chip	春 Spring	3	4/64

		微电子前沿研究报告 Frontier Seminars in Microelectronics and IC Designs	春 Spring	1	1/16
		半导体芯片封装测试与可靠性 Semiconductor IC assembly, test, and reliability	春 Spring	2	3/48
		科学与工程类专利基础 Patent Basics for Scientists and Engineers	夏 Summer	1	1/16

注：研究生选修上表课程，可以认定为专业选修课学分。

Note: Courses listed above can be counted as discipline-based electives.

附录修订日期 201 年 月 日

Appendices revised on