（085400）电子信息学科 **2020** 级非全日制工程博士培养方案(微纳电子学系)

2020 Part-time PhD Program for Electronic Information

一、基本信息 Basic Information

院系名称 School	(039)电子信息与电气工程学院(微纳电子学系）School of Electronic Information & Electrical Engineering	适用年级 Grade	2020 级 Class
适用专业 Major	电子信息 Electronic Information	标准学制 Duration	4 年 Years
学习形式 Study Mode	非全日制 Part time		
项目类型 Program Type	专业型 Professional		
培养层次 Program Level	普博生 Regular Doctoral Students		
最低学分 Min Credit	16	**最低 GPA 学分** Min GPA Credit　0	**最低 GPA** Min GPA　0

二、学科简介 Introduction

　　微纳电子学系整合了原微纳科学技术研究院和微电子学院的雄厚师资力量，以国家重大战略需求为依据，国际微纳电子学科发展趋势为导向，通过电子、材料、化学、物理、机械等多学科的交叉融合，着眼于培养国际一流的芯片设计和微纳器件高级研究人才。

　　现有在编教职员工 71 名，专任教师 59 名，其中长江学者 1 名，中组部千人计划 3 名，青年千人计划 4 名，教授（含研究员）19 名，副教授（含副研究员）27 名。拥有国家示范性微电子学院、国家级集成电路人才培养基地、"微米/纳米加工技术"国家级重点实验室、"薄膜与微细技术"教育部重点实验室，在三维非硅材料微纳加工技术、纳米功能材料与薄膜电子器件、高频宽带射频芯片实现、高性能信号处理芯

片实现、极低功耗芯片实现技术、生物医疗电子领域有较强的研究实力。

近些年来承担多个国家重点研发计划、国家科技重大专项、国家 973 项目、863 重点项目等项目，获国家级、省部级各类科技奖 20 余项，取得一批重大科研成果。在人才培养方面，注重国际化和产业化，并实行校企联合培养。毕业生大多在科研机构、高校和高新技术产业的重要岗位从事微电子等领域的科学研究和技术开发工作。

The Department of Micro/Nano Electronics integrates the excellent former faculties of the Micro and Nano Research Institute and the School of Microelectronics. Based on the requirements of national major strategies and oriented by the trend of international micro-nano electronic development, our department aims at cultivating the world-class chip designers and advanced device technology researchers through fusion of interdisciplinary, such as electronics, materials, chemistry, physics, and etc. There are 71 staff members with 59 full-time faculties, including 3 Thousand Talents Program Scholars, 4 Youth Thousand Talents Program Scholars, 1 Yangtze River Program Scholars, 19 Professors (including Researchers), and 27 Associate Professors (including Associate Researchers). The Department of Micro and Nano Electronics features (1) Key Laboratory for Thin Film and Microfabrication Technology of the Ministry of Education, and (2) National Key Laboratory of Science and Technology on Micro/Nano Fabrication. The major research areas are three-dimension microfabrication technology of non-silicon materials, preparation and application of nanomaterials, implementation of high-frequency broadband RF chips, implementation of high-performance signal processing chip, extremely low-power chip implementation technology, and biomedical electronics field. The Department of Micro/Nano Electronics has undertaken multiple National 973 Programs, National Science and Technology Major Projects, 863 Programs, National Natural Science Foundations of China, and has won more than 20 science and technology awards at the national and provincial levels. Our student graduates join various research institutions, universities and high-tech industries to specialize in the research and product development in the fields of microelectronics and other related areas.

三、培养目标 Program Objective

博士学位获得者应能系统性地掌握本学科坚实宽广的基础理论知识，深入了解学科的进展、动向和最新发展前沿，具有独立从事科学研究的能力，并在本学科领域取得理论或实践上的创造性研究成；能熟练阅读本专业的外文资料，具有一定的写作能力和进行国际学术交流的能力；具有良好的职业道德，热爱祖国，积极为我国微电子行业的建设服务；能胜任高等院校教学、科学研究、工程技术或科技管理等工作。

The obtainer of doctorate should be obtained by the ones who master the broad and basic theoretical knowledge of micro/nano electronics

systematically, while gaining an in-depth understanding of the research progress and insight of the trends of state-of-art developments in micro/nano electronics. The PhD candidates should be able to engage in scientific research independently and have creative achievements either theoretically or practically in the fields of micro/nano electronics. Furthermore, the abilities of fluent reading the academia research works in foreign languages, as well as the professional writing and communication capabilities with the international academies are required. The candidates should also have strong profession ethics and loyalty to mother country, and have the wiliness to actively participate in the construction of microelectronics industry in our country. The candidates should be competent for teaching in the research institutions, scientific researches, engineering technology or technology management, etc.

四、培养方式及学习年限 Training Mode and Study Duration

非全日制工程博士生标准学制为 4 年，未能按时完成学业者，博士生最长可延长 3 学年。

Part-time PhD program lasts 4 years. For those who fail to complete their studies on time, the studied can be extended for no more than 3 years.

五、课程学习要求 Course Requirement

须修读完成不少于 16 学分:

课程类别 Course Type	学分要求 Min Credits	门数要求 Min Courses	GPA 学分要求 Min GPA Credit	备注 Note
公共基础课 General Courses	6	4		
专业基础课 Program Core Courses	2	1		
专业前沿课 Program Frontier Courses				

专业选修课 Program Elective Courses				
任意选修课 Elective Courses				非必需

六、培养过程要求 Training Requirement

1. 博士生资格考试

资格考试一般在入学后第三学期结束前完成，最迟应予第五学期结束前完成;

2. 博士论文开题

博士论文开题应在资格考试通过之后一年内完成，非全日制工程博士生一般在第二学年结束前完成。

3. 博士论文年度考核

论文开题满六个月以上者应参加年度考核。

1. Doctoral Qualification Examination

Qualification exams are generally completed before the end of the third semester after admission, and should be completed by the end of the fifth semester at the latest.

2. Thesis Proposal

The proposal of a doctoral dissertation should be completed within one year after the passing of the qualification exam. Generally, the Ph.D. students are completed before the end of the second academic year.

3. Annual assessment:

Those who have completed the thesis proposal for more than six months should participate in the annual assessment.

七、学术成果要求 Requirement on Academic Achievements

　　工程博士生在读期间应做出创造性成果，成果应与学位论文密切相关，且以上海交通大学博士研究生身份署名，成果形式包括科技奖励、行业标准、发明专利、学术论文等，至少满足以下具体要求之一：
1．获省部级以上科技成果奖 1 项，省部级科技成果一等奖需排名前 5 位、二等奖需排名前 3 位；
2．以本人贡献为主的研究成果形成行业标准 1 项；
3．以第一发明人或第一著作人获得重要发明专利授权或软件著作权至少 2 项，并有良好的应用；
4．发表学术论文达到本学院的规定。

　　The students should make creative achievements during their studies, and the achievements should be closely related to the degree thesis which is written as a doctoral student at Shanghai Jiaotong University. The outputs include scientific and technological awards, industry standards, invention patents, academic papers, etc. One of the following must be satisfied:

　　1．One provincial- or ministerial- level scientific and technological achievement award. The first prize of the achievements should be ranked in the top 5 and the second prize should be ranked in the top 3 as the awardee.

　　2．One industry standard which is formed mainly by the research result ot the student's contribution;

　　3．Obtain at least 2 important invention patent or software copyrights with the first inventor or first author, and have good applications;

　　4．Publication of academic papers meets the requirements of the college.

八、学位论文 Thesis/dissertation work

　　学位论文选题应围绕在读期间作为主要成员承担本行业重大、重点工程项目或技术攻关项目开展，选题应具有重要的工程应用价值。学位论文研究内容应与解决重大工程技术问题、实现企业技术进步和推动产业升级紧密结合，可以是工程新技术研究、重大工程设计、新产品或新装置研制等，体现工程技术创新能力。学位论文的形式可为应用研究类、工程设计类和产品研发类。论文应具有较高的应用价值、技术创新及社会经济效益。

论文预答辩

学术成果已达到要求，学位论文已定稿，导师允许预答辩。预答辩应在开题后两年内完成，普博生一般在第三或第四学年完成。

论文评审

预答辩合格后，可以进入博士学位论文评审阶段。博士学位论文要求有三位专家评审。其中有两位专家评审要求以盲审形式完成，另有一篇评审由学生抽签决定评审形式是明审还是盲审。

毕业答辩

三篇评审结果全部通过后，可以申请毕业答辩。一般毕业答辩安排在第 4 学年，最迟不超过第 7 学年。

The topic selection of thesis should be focused on the key engineering projects or technical research projects in the industry in which the student acts as the main contributor during the study period. The topic selection should have important application value. The research content of the degree thesis should be closely combined with solving major engineering and technical problems, realizing enterprise technological progress and promoting industrial upgrading. It can be the engineering of new technology research, major engineering design, new product or new device development, etc., that reflects the engineering technology innovation capability. The thesis can be in the form of applied research, engineering design and product development. The thesis should have high application value, technological innovation and social and economic benefits.

Thesis pre-defense:

The pre-defense can be conducted once the academic achievements have reached the requirements, the degree thesis has been finalized, and the approval has been made by the supervisor. The pre-defense should be completed within the third or the fourth of the academic year after the completion of doctoral dissertation proposal.

Thesis review:

After passing the pre-defense, the student can enter the review stage of the doctoral dissertation. A doctoral dissertation requires three experts acting

as the reviewers. Two expert are in the form of blind review, and another review is determined by the students by drawing to determine whether the review is blind or public.

PhD defense:

After all three review results are passed, the students can apply for defense. The general graduation defense is arranged in the 4th year, and no later than the 7th year.

九、课程设置 Courses

课程类别 Category	课程代码 Course Code	课程名称 Course Name		学分 Credit	授课语言 Language*	开课学期 Semester	可以计算GPA	必须计算GPA	备注 Note
		中文 Chinese	English 英文						
公共基础课 General Courses	MARX7001	中国马克思主义与当代	Marxism in China	2	中文 in Chinese	秋季 Fall	否 no	否 no	必修 Compulsory
	GE9002	工程科技前沿专题	Selected Topics in Engineering Frontiers	1	中文 in Chinese	秋季 Fall	否 no	否 no	必修 Compulsory
	MATH6002	工程数学	Engineering Math	2	中文 in Chinese	秋季 Fall	否 no	否 no	必修 Compulsory
	GE6001	学术写作、规范与伦理	Professional Scientific Paper Writing criterion and moral principles	1	中文 in Chinese	秋季 Fall	否 no	否 no	必修 Compulsory
专业基础课 Program Core Courses	MATH6004	计算方法	Numerical Analysis	3	中文 in Chinese	春 spring 秋季 Fall	否 no	否 no	
	MATH6009	数学物理方程	Mathematical-Physical Equation	3	中文 in Chinese	秋季 Fall	否 no	否 no	
	MATH6012	应用泛函分析	Functional Analysis with Application	3	中文 in Chinese	春 spring	否 no	否 no	
	MATH6005	矩阵理论	Matrix Theory	3	中文 in Chinese	秋季 Fall	否 no	否 no	

	STAT6005	应用随机过程	Applied Stochastic Processes	3	中 文 in Chinese	秋季 Fall	否 no	否 no	
	MATH6015	最优化方法	Syllabus for Optimization Methods	3	中 文 in Chinese	春 spring 秋季 Fall	否 no	否 no	
	STAT6001	基础数理统计	Fundamental Mathematical Statistics	3	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6701	高等半导体物理与器件	Semiconductor Physics and Devices	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6702	集成电路设计基础	IC Design Fundamentals	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6703	高等计算机系统结构	Advanced Computer Architecture	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6704	高等数字集成电路设计	Advanced Digital Integrated Circuit Design	3.0	中 文 in Chinese	春 spring	否 no	否 no	
	EST6705	SoC 设计方法	SoC Design	3.0	中 文 in Chinese	春 spring	否 no	否 no	
	EST6706	高等模拟集成电路设计	Advanced Analog Integrated Circuit Design	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6707	射频集成电路设计	CMOS RFIC Design	3.0	中 文 in Chinese	春 spring	否 no	否 no	
	EST6801	微机电系统	Micro Electro Mechanical System	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6802	微传感器与微执行器	Microsensors and Microactuators	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6803	电子材料科学与工程	Electronic Material Science and Engineering	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6804	敏感材料与传感器	Sensitive Materials and Sensors	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6805	新型微纳材料与理论设计	New Micro_Nano Materials and Theoretical Design	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6807	微机械传感器	Micromachined Sensors	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6808	纳米电子学	Nanoelectronics	3.0	中 文 in	秋季 Fall	否 no	否 no	

					中 文 in Chinese				
	EST6809	纳米材料与器件	Nanomaterials and Devices	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST6810	微系统建模设计	Microsystem Modeling Design	3.0	中 文 in Chinese	春 spring	否 no	否 no	
	MEM6002	工程管理导论	Introduction to Engineering Management	2.0	中 文 in Chinese	春秋季 spring/Fall	否 no	否 no	
	MEM6003	工程经济学	Engineering Economics	2.0	中 文 in Chinese	春秋季 spring/Fall	否 no	否 no	
	MEM6301	人力资源与沟通管理	Human Resource Management & Communication Management	2.0	中 文 in Chinese	春秋季 spring/Fall	否 no	否 no	
	MEM6302	领导力	Leadership	2.0	中 文 in Chinese	春秋季 spring/Fall	否 no	否 no	
专业前沿课 Program Advanced Courses	GE9001	创新工程实践	Innovative Engineering Practice	2.0	中 文 in Chinese	春 spring	否 no	否 no	必修 Compulsory
	EST8701	集成电路设计前沿技术	Advanced Technologies of Integrated Circuit Design	2.0	中 文 in Chinese	春 spring	否 no	否 no	
	EST8702	集成电路高等制造工艺	Advanced Fabrication of Integrated Circuits	2.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST8703	SystemVerilog 电路设计与验证	SystemVerilog for circuit design and verification	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST8704	高性能模数转换器设计	high performance analog-to-digital converter design	3.0	中 文 in Chinese	春 spring	否 no	否 no	
	EST8705	模拟射频集成电路高级课题选讲	Topics in Analog /RF IC	3.0	中 文 in Chinese	春 spring	否 no	否 no	
	EST8706	射频系统设计	RF System Design	3.0	中 文 in Chinese	春 spring	否 no	否 no	
	EST8707	混合信号电路设计与自动化方法	Mixed-Signal Integrated Circuit Design and Automation Methods	3.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	EST8708	模拟集成电路的版图艺术	Art of Layout in Analog Integrated Circuits	2.0	英 文 in English	秋季 Fall	否 no	否 no	

	EST8709	生物医疗植入电路设计	Cricuit Design for Biomedical Implants	2.0	英文 in English	秋季 Fall	否 no	否 no	
	EST8710	神经网络与机器学习	Neural Networks And Machine Learning	3.0	中文 in Chinese	春 spring	否 no	否 no	
	EST8804	电子薄膜及器件	Electronic Thin Film and Devices	3.0	中文 in Chinese	春 spring	否 no	否 no	
	EST8805	纳米光电技术	Nano Photoelectric Technology	3.0	中文 in Chinese	秋季 Fall	否 no	否 no	
	EST8806	锂电池/超级电容储能器件	Lithium-ion Batteries/Supercapacitor Energy Storage Device	3.0	中文 in Chinese	秋季 Fall	否 no	否 no	
	MEM8301	大数据与互联网思维	Big Data and Internet Thinking	2.0	中文 in Chinese	春秋季 spring/Fall	否 no	否 no	
	MEM8302	物联网技术与发展趋势	Technology and Trends for Internet of Things	2.0	中文 in Chinese	春秋季 spring/Fall	否 no	否 no	
	MEM8304	网络信息安全理论与技术	Theory and Technology of Network Information Security	2.0	中文 in Chinese	春秋季 spring/Fall	否 no	否 no	
	MEM8305	移动互联网前沿技术	Mobile Internet	2.0	中文 in Chinese	春秋季 spring/Fall	否 no	否 no	
专业选修课 Program Elective Courses	EST8713	生物芯片技术	Biochip and Microfluidics	2.0	中文 in Chinese	春 spring	否 no	否 no	
	EST8802	先进微纳加工技术与应用	Advanced Micro-Nanofabrication Technologies and Applications	3.0	中文 in Chinese	春 spring	否 no	否 no	
	EST8803	有限元分析	Finite Element Analysis	2.0	中文 in Chinese	秋季 Fall	否 no	否 no	
	EST8808	微纳加工及器件：原理及应用	Micro/Nanoscale Fabrication and Devices:	2.0	中文 in Chinese	秋季 Fall	否 no	否 no	
	EST8717	VLSI 物理设计及自动化算法	Algorithms and Machine Learning in VLSI Physical Design	3.0	英文 in English	秋季 Fall	否 no	否 no	
任意选修课 Elective Courses	CS7304H	统计学习理论与方法	Theory and Methods for Statistical Learning	3.0	中文 in Chinese	秋季 Fall	否 no	否 no	
	CS7317	信息论与编码	Coding and Information Theory	3.0	中文 in Chinese	秋季 Fall	否 no	否 no	

	CS7335	统计学习与推理	Statistical Learning and Inference	2.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	CS7337	生物信息学	Bioinformatics	2.0	中 文 in Chinese	秋季 Fall	否 no	否 no	
	CS7341	算法分析与理论	Algorithm analysis and Theory	3.0	中 文 in Chinese	春 spring	否 no	否 no	