

## (085400) 电子信息学科 2020 级非全日制工程博士培养方案 (仪器系)

2020 Part-time PhD Program for Electronic Information

### 一、基本信息 Basic Information

院系名称 School	(035)电子信息与电气工程学院(仪器系) 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	5	最低 GPA Min GPA	2.7

### 二、专业领域简介 Introduction to Professional Field

仪器仪表工程领专业学位隶属于仪器科学与技术学科,该学科建立于 1975 年,惯性技术及其导航设备、精密仪器及机械和测试计量技术及仪器学科方向分别在 1978 年、1979 年和 1990 年批准为硕士学位授权点,是我国首批有硕士学位授予权的学科之一。惯性技术及其导航设备学科 1986 年批准为博士学位授权点,成为我国航海领域第一个博士学位点,90 年代根据学校的战略规划和学科内涵发展要求,着手建立精密仪器及机械博士点,并于 1996 年获批,2000 年获批“仪器科学与技术”一级学科博士学位授权点,2003 年获准设立该一级学科博士后流动站。

该领域包括传感器、智能仪器、测控技术、机器人技术、医学精密工程、卫星定位系统、惯性导航、在线检测技术、智能机电系统、光电检测、传感器信息融合、生物信息获取、无线传感器网络、纳米功能材料、科学仪器、特种环境检测等众多研究方向。学科拥有雄厚的师

资力量和先进的教学科研设施，现有专职教师及研究人员总数 57 人，博士生导师 17 名。拥有博士学位教师及海外留学教师占教师总人数比例超过 90%。

学科长期以来秉承面向现代化、面向世界、面向未来的时代教育精神，适应社会主义市场经济体制下对复合型、开放型人才的需求及现代科学技术不断分化又不断综合的新特点。在电气信息类大平台的知识基础上，拓宽知识面，优化专业知识结构，综合出具有应用电子技术、光电技术、计算机应用和智能机电工程背景的知识体系。注重培养学习能力、适应能力、创新精神和实践能力。学科设有仪器科学与技术博士点、仪器科学与技术和仪器仪表工程硕士点，仪器科学与技术博士后流动站。学科已培养博士超过 100 人。其中，1 人获全国优秀博士学位论文提名，2 人获上海市优秀博士学位论文；博士后流动站在站人数 16 人；培养硕士研究生 600 多人。学生先后获全国电子设计大赛二等奖 3 人次、全国大学生“挑战杯”课外科技活动竞赛特等奖 1 项。学科与美国佐治亚理工大学、日本千叶大学联合开展双硕士培养，与西班牙萨拉戈萨大学、日本早稻田大学建立双博士项目。

The degree of Instrument and Meter Engineering belong to the scientific and technical subjects of the instrument. The department was established in 1975, precision instrument and machinery, measuring and testing technologies and instruments and navigation, guidance and control were approved as a master's degree authorized on in 1979, 1990 and 1978, is one of the first batch of subjects in declaring master's degree gift in China. Navigation, guidance and control was approved as a doctor's degree authorized on in 1986 and it became the first doctoral degree in the field of navigation in China. Precision instrument and machinery was approved as a doctor's degree authorized on in 1996 and measuring, the post-doctoral station for the discipline was set up in 2003.

This field includes sensors, intelligent instruments, measurement and control technology, robotics technology, medical precision engineering, satellite positioning system, inertial navigation, online detection technology, intelligent electromechanical system, optoelectronic detection, sensor information fusion, biological information acquisition, wireless sensor networks, nano-functional materials, scientific instruments, special environmental detection and many other research directions. The subject has strong teachers and advanced teaching and scientific research facilities. There are 57 full-time teachers and researchers and 17 doctoral supervisors. Ph.D. teachers and overseas study teachers account for more than 90% of the total number of teachers.

The discipline has long been adhering to the spirit of education oriented toward modernization, the world and the future, and adapted to the new characteristics of the continuous differentiation and integration of modern science and technology in the socialist market economy system for the demand for compound and open talents. On the basis of the knowledge of electrical information platform, broaden the scope of knowledge, optimize the

professional knowledge structure, and synthesize the knowledge system with the background of applied electronic technology, photoelectric technology, computer application and intelligent electromechanical engineering. Pay attention to the cultivation of learning ability, adaptability, innovative spirit and practical ability. There is a doctoral program in instrument science and technology, a master's program in instrument science and technology and a post-doctoral research station in instrument science and technology. The discipline has trained more than 100 doctors. Among them, 1 was nominated as national Excellent Doctoral dissertation and 2 as Shanghai Excellent Doctoral dissertation. The number of postdocs in the station is 16. It has trained more than 600 postgraduate students. Students have won three second prizes in the National Electronic Design Competition and one special prize in the National College students "Challenge Cup" extracurricular science and technology competition. The discipline has cooperated with Georgia Institute of Technology in the United States and Chiba University in Japan to develop double master programs, and has established double doctoral programs with The University of Zaragoza in Spain and Waseda University in Japan.

### 三、培养目标 Program Objective

仪器仪表工程专业的培养目标，主要是培养智能检测及仪器领域的应用型、复合型的工程技术人才和工程管理人才。学位获得者应掌握仪器科学与技术领域坚实的基础理论和宽广的专业知识，了解本领域国内外的科学技术现状和发展趋势，掌握解决测量与控制工程中实际问题的技术方法与手段，具有独立承担工程技术和工程管理工作的能力。攻读工程博士学位的研究生以进校不离岗的方式在职攻读学位论文(设计)，主要研究和解决本单位本部门工作中的实际技术问题。在专业技能上，以解决工程实际问题能力为主，注重学生动手能力和实践经验的锻炼。在专业素养方面，注重培养一定的学科素养、专业敏锐度、创新能力，并且具备技术开发的组织和管理才能。能较熟练地掌握一门外国语，具有一定的科技写作能力和进行国际交流的能力。

The training objective of instrument engineering major is to cultivate application-oriented and compound engineering and technical talents and engineering management talents in the field of intelligent detection and instrument. For the PhD in instrumentation engineering, students should have a solid field of expertise in instrumentation, a certain degree of discipline and innovation, and the organization and management of technology development. Can be more skilled to master a foreign language, with a certain degree of scientific and technological writing ability and the ability to conduct international communication. In terms of professional skills, it focuses on the ability to solve practical engineering problems and pays attention to the training of students' practical ability and practical experience. In terms of professional accomplishment, it pays attention to cultivating certain discipline

accomplishment, professional acuity and innovation ability, and has the organization and management ability of technology development. Can master a foreign language proficiently, have certain technical writing ability and international communication ability.

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

本项目采用非全日制学习、导师制培养模式。非全日制工程博士研究生学制为 3-4 年，经批准可延长或者缩短，但从入学到获得非全日制专业学位的期限最短不少于 3 年，最长不超过 6 年。

This program adopts the mode of full-time study and tutorial training. Engineering PhD's degree of part-time degree is 3 to 4 years. After admission, it can be longer or shorter, but the shortest is no less than 3 years and the longest is not more than 6 years..

#### 五、课程学习要求 Course Requirement

总学分  $\geq 16$ , GPA  $\geq 2.7$ , 课程学习原则上要求在一年半内完成。

Total credits  $\geq 16$ , GPA  $\geq 2.7$ . All the course shall be completed within one and a half years in principle.

各类课程具体要求如下:

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	3	5	
专业基础课 Program Core Courses				
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

在满足总学分和 GPA 要求的前提下，可选修非全日制工程管理硕士的电子信息与电气工程学院开设的专业基础课与专业前沿课，课程详细请见《工程管理(125601)非全日制硕士培养方案》中的课程设置。

On the premise of meeting the requirements of total credits and GPA, professional basic courses and professional frontier courses offered by the SEIEE with part-time master of engineering management can be selected. For the courses, please refer to the curriculum in the training program for part-time master of Engineering Management (125601).

## 六、培养过程要求 Training Requirement

### 1. 重要时间节点

- (1) 普博生的资格考试原则上应在入学后第二学年第一学期内完成；
- (2) 博士生学位论文开题工作应该在通过资格考试后，普博生一般应该在第二学年结束前完成；
- (3) 非全日制工程博士需 1 年以上在合作导师所在单位联合培养。

### 2. 创新实践要求 Practice Training

- 1) 参与相关专业实践类课程的教学或辅导，不少于 16 学时；或作重要工程前沿讲座至少 8 次（每次计 2 个学时）；
- 2) 在读期间协助校内导师指导至少 1 名专业学位硕士，工作量不少于 16 课时；
- 3) 递交《上海交通大学工程博士实践活动总结报告》，由校内外导师、学院审核通过，获得本课程学分。

## 1.Key Time

- (1) In principle, the qualification examination of general PhD students should be completed within the first semester of the second academic year after enrollment.
- (2) The opening work of doctoral dissertation should be completed by the end of the second academic year after passing the qualification examination.
- (3) The part-time doctor of engineering needs more than one year's training in the cooperative tutor's unit.

## 2.Practice Training

- 1) Participate in the teaching or tutoring of relevant professional practice courses, not less than 16 hours, or give at least 8 lectures at the forefront of important engineering (2 hours at a time);
- 2) Assist in the guidance of at least one master of professional degree during the course of study, with a workload of not less than 16 hours;
- 3) Submit the Summary report of practical activities of Engineering Ph.D. of Shanghai Jiaotong University, which is examined and approved by the tutor and college of Shanghai Jiaotong University, and obtains the credit of this course.

## 七、学术成果要求 Requirement on Academic Achievements

工程博士学位研究生在申请学位论文答辩之前，与学位论文内容相关的学术成果应达到如下要求之一：

1. 获得国家级科技成果奖（一等奖排名前9名、二等奖排名前7名）、或省部级科技成果一等奖（排名前3位）、或省部级科技成果二等奖（排名前2位）；
2. 以本人贡献为主的研究成果形成编写国际、国家标准（前3名）及行业标准（第1名）1项（正式出版或报批稿）；
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，其授权专利技术和软件著作权被应用于工程实践，能提供

相关的实施应用证明材料;

4. 撰写并正式出版学术专著 (排名第一);
5. 发表学术论文达到本学科的学术博士论文发表要求。

上述学术成果必须在博士研究生就读期间获得,且以上海交通大学为第一完成(或署名或权利人)单位。以上学术成果规定是对博士学位研究生申请学位的基本要求,鼓励导师根据博士学位研究生的不同研究方向和内容,提出不低于上述要求的其他补充要求。

Before applying for the dissertation defense, the academic achievements related to dissertation of the PhD candidates should stratify one of the following requirements:

- (1) During the school years, winning first-class national awards (top 9) or second-class awards (top 7) for scientific and technological achievements, or awards for the scientific and technological achievements at the provincial and ministerial levels (top 3) and second-class awards (top 2);
- (2) Prepare at least one international, national standards (top 3) or industry standards (top 1) 1 (formal publication or approval);
- (3) Obtain at least 2 patents for important national inventions patents or software copyrights (No. 1).
- (4) Publication of an academic monograph (No. 1)
- (5) Publishing academic papers to meet the requirements of academic doctoral thesis publication in this subject

The above academic achievements are the basic requirements for doctoral postgraduates to apply for their degrees. According to different research areas, the supervisors can put forward other supplementary requirements not less than the above requirements.

## 八、学位论文 Thesis/dissertation work

工程博士的学位论文必须是以国家重大科技专项中的关键问题作为研究课题或研究内容,与实现行业或企业技术进步和推动产业升级紧密结合,应具有明确的工程技术背景与应用价值,并具有较强的技术难度和工作量,突出工程类博士学位论文的创新性与解决国家重大工程、重大专项技术研究难题的特色。论文的主要标准是在应用科技知识、工程设备等解决有重要意义的实际问题的原创性、在应用工程工具解决

一项有意义的具体问题方面的首创性。

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，可以是工程新技术攻关研究、重大工程设计与研究、新产品或新装置或新型号研制等，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。

博士学位论文具体要求详见：

《上海交通大学关于申请授予工程博士学位的规定》

《上海交通大学博士、硕士学位论文撰写指南》

The doctoral degree thesis of engineering must take the key problems in the major scientific and technological projects of the country as the research topic or research content, which should be closely combined with the realization of the technological progress of the industry or enterprises and the promotion of industrial upgrading, should have a clear engineering technology background and application value, and should have great technical difficulty and workload, highlight the innovation of engineering doctoral degree thesis and solve the major national projects. The characteristics of technical research problems in major projects. The main standard of this paper is the originality of applying scientific and technological knowledge, engineering equipment and so on to solve practical problems of great significance, and the originality of applying engineering tools to solve a meaningful and concrete problem.

The research content of degree thesis should be closely combined with solving major engineering and technical problems, realizing technological progress of enterprises and promoting industrial upgrading, which can be the research of new engineering technology, the design and research of major projects, the development of new products or new devices or new models, etc., which can reflect the innovation ability of engineering technology. The form of dissertation can be applied research, engineering design and product research and development. The paper should have high application value, technological innovation and social and economic benefits.

The specific requirements of the doctoral dissertation are as follows:

Shanghai Jiaotong University on the application for granting a doctorate

Shanghai Jiaotong University doctoral and master 's degree thesis writing guide



## 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	GE6001	学术写作、规范与伦理	Scientific writing, integrity and ethics	1	英文 in English	春秋季 Spring/Fall	是 Yes	否 No	必修 Compulsory
	MARX7001	中国马克思主义与当代	Marxism in China	2	中文 Chinese	秋季 Fall	是 Yes	否 No	必修 Compulsory
	MATH6002	工程数学	Mathmatics in Engineering	2	中文 Chinese	春秋季 Spring/Fall	是 Yes	是 Yes	必修 Compulsory
	GE9002	工程科技前沿专题	Selected topics in Engineering Frontiers	1	中文 Chinese	春秋季 Spring/Fall	是 Yes	否 No	必修 Compulsory
专业基础课 Program Core Courses	MATH6004	计算方法	Numerical Analysis	3	中文 Chinese	春秋季 Spring/Fall	是 Yes	是 Yes	必修 Compulsory
	MATH6005	矩阵理论	Matrix Theory	3	中文 Chinese	春秋季 Spring/Fall	是 Yes	是 Yes	
	STAT6005	应用随机过程	Applied Stochastic Processes	3	中文 Chinese	秋季 Fall	否 No	否 No	
	IST6004	线性系统分析与设计	Analysis and Design of Linear Systems	3	英文 in English	春季 Spring	是 Yes	是 Yes	
	IST6008	计量学导论	Introduction of Metrology	2	中文 Chinese	春季 Spring	是 Yes	是 Yes	
	IST6003	优化方法与最优控制	Optimization and Optimal Control	3	中文 Chinese	春季 Spring	否 No	否 No	

	IST6002	高级数字信号处理	Advanced Digital Signal Processing	3	中文 Chinese	in	秋季 Fall	是 Yes	是 Yes	
	IST6005	纳米化学与分子生物学	Nano-chemistry and Molecular Biology	2	英文 English	in	秋季 Fall	是 Yes	是 Yes	
	IST6009	微纳表征与测量技术	Micro-Nano characterization and technology	2	中文 Chinese	in	秋季 Fall	是 Yes	是 Yes	
	IST6001H	现代测试仪器设计及应用	Design and Application of Modern Measurement Instrument	2	中文 Chinese	in	秋季 Fall	否 No	否 No	
	IST6006	动态测试分析	Dynamic Testing Analysis	2	中文 Chinese	in	春季 Spring	否 No	否 No	
	IST6007	微弱信号检测	Low-noise electronic Design & Detection of Signal in Noise	2	英文 English	in	秋季 Fall	是 Yes	是 Yes	
专业前沿课 Program Frontier Courses	IST9001	机械系统动力学及其控制	Dynamics and Control of Mechanical Systems	2	中文 Chinese	in	秋季 Fall	否 No	否 No	
	GE9001	创新工程实践	Innovative engineering practice	2	中文 Chinese	in		是 Yes	否 No	必修 Compulsory
	IST9002	全球定位系统原理及应用	Global Positioning System: Principles and Applications	2	中文 Chinese	in	秋季 Fall	否 No	否 No	
	EST8809	纳米科学与技术	Nanoscience and Technology	3	中文 Chinese	in	秋季 Fall	是 Yes	是 Yes	
	EST8806	锂电池/超级电容储能器件	Lithium-ion Batteries/Supercapacitor Energy Storage Device	2	中文 Chinese	in	秋季 Fall	是 Yes	是 Yes	
	IST8002	智能仪器技术	Intelligent Instrumentation Technology	2	中文 Chinese	in	春季 Spring	否 No	否 No	
	IST8003	光学测试原理与技术	Principle and technology of optical measurement	3	中文 Chinese	in	秋季 Fall	是 Yes	是 Yes	
	IST8004	机器人技术	Robotics	3	中文 Chinese	in	春季 Spring	是 Yes	是 Yes	

IST8005	声学检测	Acoustic Measurement	3	中文 Chinese	in	秋季 Fall	是 Yes	是 Yes	
IST8006	视觉检测	Vision Measurement	3	英文 English	in	秋季 Fall	是 Yes	是 Yes	
IST8007	惯性导航技术	Inertial Navigation Technology	3	中文 Chinese	in	秋季 Fall	是 Yes	是 Yes	
IST8008	微纳制造与微电子机械系统	Micro/nano Fabrication and Micro Electro Mechanical Systems	3	英文 English		秋季 Fall	是 Yes	是 Yes	
IST8009	数据融合技术	Technology of Data Fusion	3	中文 Chinese	in	春季 Spring	是 Yes	否 No	
IST8010	空间飞行器姿态动力学与控制	Spacecraft Attitude Dynamics and Control	3	中文 Chinese	in	秋季 Fall	否 No	否 No	
IST8011	仪器科学技术创新基础	Fundamentals in Instrumentation Science and Technology	2	中文 Chinese	in	春季 Spring	是 Yes	是 Yes	
MSE6603	功能材料的物理性能	Fundamentals of Functional Materials	3	中文 Chinese	in	春季 Spring	是 Yes	是 Yes	
MSE8402	高分子物理和化学	Polymer Physics and Chemistry	2	中文 Chinese	in	春季 Spring	是 Yes	是 Yes	
GE6012	学术报告与研讨会	Academic Reports	2	中文 Chinese	in	秋季 Fall	否 No	否 No	必修 Compulsory
IST8001	机电控制技术	Control Technology of Electro-mechanical-Systems	2	中文 Chinese	in	春季 Spring	是 Yes	否 No	
MSE6303	材料光电磁性能	Optical, Electronic and Magnetic Properties of Materials	3	中文 Chinese	in	秋季 Fall	是 Yes	是 Yes	
IST6026	光学与光子学	Optics and Photonics	3	中文 Chinese	in	秋季 Fall	是 Yes	否 No	