华北电力大学（留学生）英语授课

North China Electric Power University (International Student) Taught in English

电子科学与技术一级学科硕士学位研究生培养方案

Training Program for Postgraduates in First-level Discipline of Electronics Science and Technology

（学科代码：0809　　授予工学硕士学位）
(Discipline Code: 0809, Degree: Master Degree of Engineering)

一、学科简介

I. Brief Introduction to the Discipline

电子科学与技术学科隶属电气与电子工程学院，2003 年 6 月和 2006 年 1 月分别取得“电磁场与微波技术”和“电路与系统”两个二级学科硕士学位授予点，2010 年 8 月取得“电子科学与技术”一级学科硕士学位授予权。

The discipline of Electronics Science and Technology, which belongs to the School of Electrical and Electronic Engineering, was authorized to award the master's degree of two second-level disciplines Electromagnetic Fields & Micro-Wave Technology and Circuits and Systems in June 2003 and January 2006 respectively, and was authorized to award the master's degree of the first-level discipline of Electronics Science and Technology in August 2010.

电子科学与技术学科坚持学科协调发展与电力能源需求相结合的发展方向，结合办学特色和国家经济发展及电子、电力等行业的需求，凝练出具有本校特色的学科研究方向，突出能源电力发展中电子科学技术应用这一宗旨和特色，其研究成果为“大电力”服务是本学科的最大特色。

The discipline of Electronics Science and Technology adheres to the development direction of combining the coordinated discipline development with the electricity and energy demands, and combines the academic characteristics, national economic development and the needs of electronics, electric power and other industries to find out the research direction of the discipline based on the characteristics of our university, highlight the purpose and characteristics of the application of electronics science and technology in the development of energy and electric power. The most important feature of this discipline is that its research results serve for the "bulk power system".

经过几年的凝练和人才引进，本学科形成了以博士生导师和硕士生导师为主要力量的稳定学术梯队，拥有集成电路及其应用系统设计实验室、固体电子器件工艺及测试分析实验室、研究生工作室等专业实验室及良好的计算平台，为研究生的培养提供了坚实的基础。本学科

研究方向和内容涉猎学科的基础科学问题、前沿技术问题以及多学科交叉问题，承担了国家支撑项目、国家自然科学基金项目、国际科技合作等重大项目几十项，在 SCI、EI 检索文章发表、专利授权、各种奖励等方面成果显著。

After several years of consolidation and talent introduction, a stable academic team dominated by doctoral and master supervisors has formed for the discipline, with integrated circuit and its application system design laboratory, solid electronic device technology, test and analysis laboratory, postgraduate studio and other professional laboratories and good computing platform, providing a solid foundation for the cultivation of postgraduates. The research direction and contents of this discipline involve the basic sciences of the discipline, cutting-edge technologies and interdisciplinary issues. The discipline has undertaken dozens of major projects such as national support projects, NSFC projects and international scientific and technological cooperation, and made remarkable results in SCI and EI search, patent authorization, various awards and so on.

二、培养目标

II. Training Objectives

1．培养对中国有良好认知，理解中国社会主流价值观，具有相应的中文语言能力，具备一定跨文化和全球胜任力，在所在学科具有相当专业知识和学术能力的国际化人才。

1. Cultivate international talents who have a good understanding of China, understand the mainstream values of Chinese society, have corresponding Chinese language skills, have certain cross-cultural and global competencies, and have considerable professional knowledge and academic abilities in their disciplines.

2．在电子科学与技术学科领域内掌握坚实的基础理论和系统的专门知识，熟悉所从事的研究领域中科学技术的发展动向，具有创新能力和从事科学研究或独立承担专门技术工作的能力。

2. Cultivate students to master solid basic theory and systematic expertise in the field of Electronics Science and Technology, be familiar with the development trend of science and technology in their research field, and have the abilities of innovation and the abilities to engage in scientific research or undertake specialized technical work independently.

3．品德优良、身心健康，具有高度的社会责任感和工程伦理素养。

3. Good moral character, physical and mental health, with a high sense of social responsibility and engineering ethics literacy.

三、研究方向

III. Research Direction

电子科学与技术一级学科包含电磁场与微波技术、电路与系统、微电子与固体电子学、物理电子学 4 个二级学科。它既是信息与通信工程、控制理论与控制工程、计算机科学与技术等其它电类一级学科的基础，同时又在研究方向上与这些学科门类相互交叉、相互渗透，

从而形成一系列边缘学科或交叉学科。其中，我校电磁场与微波技术方向具有鲜明的能源电力服务特色，在行业具有一定的知名度。

The first-level discipline of Electronics Science and Technology includes 4 second-level disciplines: Electromagnetic Fields & Micro-Wave Technology, Circuits and Systems, Microelectronics and Solid State Electronics, and Physical Electronics. It is not only the foundation of other first-level disciplines of electricity such as Information and Communication Engineering, Control Theory and Control Engineering, and Computer Science and Technology, but also intersects and penetrates with these disciplines in the research direction, forming a series of cross-disciplinary or interdisciplinary subjects. Among them, the Electromagnetic Fields & Micro-Wave Technology of our university has distinct characteristics of serving energy and electric power, enjoying certain popularity in the industry.

主要研究方向如下：

The main research directions are as follows:

1．电子材料物理及应用

1. Electronic Materials Physics and Application

2．新型电子器件

2. New Electronic Devices

3．电磁环境及电磁兼容

3. Electromagnetic Environment and Electromagnetic Compatibility

4. 微波电子学及波束物理

4. Physics of Microwave Electronics and Beams

5．集成电路及系统芯片设计与应用

5. Design and Application of Integrated Circuit and System-On-Chip

6. 智能感知与信息处理技术

6. Intelligent Sensing and Information Processing Technology

7．嵌入式系统与智能控制

7. Embedded System and Intelligent Control

四、培养方式

IV. Training Method

1．硕士生的培养方式为导师负责制，导师是研究生培养第一责任人，要了解掌握研究生的具体状况，将专业教育与日常教育有机融合，既做学业导师，又做人生导师，严格要求学生遵守科学道德和学术规范。提倡按二级学科组成导师指导小组集体培养。对跨学科或交叉学科以及与有关研究部门、企业联合培养研究生时，应从相关学科及有关单位中聘请具有高级职称的有关人员进入导师指导小组协助指导。导师指导小组要负责审查研究生的文献综述与选题报告、论文中期检查以及论文预答辩等培养环节的工作完成情况。

1. The training implements supervisor responsibility system, the supervisor is the person of primary responsibility for postgraduate training. The supervisor shall understand and master the specific condition of postgraduates and organically integrate professional education with daily education both as academic mentors and life mentors. The supervisor shall also strictly require students to abide by scientific ethics and academic norms. Advocate composing the supervisor steering group for collective cultivation according to the second-level disciplines. For interdisciplinary or cross-disciplinary training or training in conjunction with relevant research departments and enterprises, relevant personnel with senior professional titles shall be recruited from relevant disciplines and relevant units to assist in supervisor steering groups. The supervisor steering group is responsible to inspect the postgraduates' completion status of the literature review and thesis proposal, mid-term review and pre-defense of dissertation.

2．导师应根据培养方案的要求，多方面了解所指导的硕士生的知识结构、学术特长、研究兴趣、能力基础等具体情况，据此制定出研究生个人培养计划，并督促检查其实施情况。

2. The supervisor should acknowledge the knowledge structure, academic skills, research interests, and abilities of the postgraduate according to the requirement of the training scheme, based on which to formulate a training plan for individual postgraduate and supervise the implementation according to the plan.

3．硕士研究生的培养采用课程学习与科学研究并重的方式。既要使硕士生掌握坚实的基础理论和系统的专业知识，又要培养研究生掌握科学研究或独立担负设计、管理等方面工作的能力。

3. The training of postgraduates adopts the way of attaching equal importance to course learning and scientific research. It is necessary to make postgraduates master solid basic theory and systematic professional knowledge and cultivate postgraduates' ability to undertake scientific research or design and management work independently.

4．导师应指导研究生学习有关课程，指导学位论文选题，检查科学研究进展情况，帮助解决科研中的困难，适时地指导研究生撰写论文，认真审阅学位论文，切实把好研究生的培养质量关。

4. The supervisor should guide postgraduates to study relevant courses, guide the topic selection of the degree thesis, check the progress of scientific research, help them solve the difficulties in scientific research, timely guide postgraduates to write the thesis, carefully review the degree thesis, and ensure the training quality of postgraduates.

五、学制与学习年限

V. Educational System and Duration of the Program

学制 3 年，学习年限 2-4 年。如果达到《电气与电子工程学院全日制硕士研究生提前毕业实施办法（2020 版）》规定的条件，可以申请提前毕业。

The educational system is 3 years, and the duration of the program is 2-4 years. If the postgraduate meets the conditions stipulated in the Measures for Early Graduation of Full-time Postgraduates of the School of Electrical and Electronic Engineering (2020 Edition), he/she can apply for early graduation.

六、课程设置与学分要求

VI. Curriculum and Credit Requirements

硕士生的课程学习实行学分制。要求各学科硕士生应修满的学分数为：总学分应不少于 31 学分，其中学位课不少于 22 学分。具体要求如下：

The course study of postgraduates implements credit system. The required credits for postgraduates in all disciplines: no less than 31 credits in total, including no less than 22 credits for degree courses. The specific requirements are as follows:

1．学位课（不少于 **22** 学分），其中：

1. Degree courses (no less than 22 credits), of which:

(1) 公共课：汉语综合(1)：4 学分；

(1) Public courses: Chinese Comprehension (1): 4 credits;

汉语综合(2)：4 学分；

Chinese Comprehension (2): 4 credits;

中国概况(英文)：2 学分

Introduction to China (English): 2 credits.

(2) 基础理论课：4 学分。

(2) Basic theoretical courses: 4 credits.

(3) 学科基础课：不少于 4 学分。

(3) Basic courses of disciplines: No less than 4 credits.

(4)学科专业课：不少于 4 学分。

(4) Specialized courses of disciplines: No less than 4 credits.

2．必修课程与必修环节（**6** 学分），其中：

2. Compulsory courses and required links (6 credits), of which:

(1) 研究生科学道德与学术规范：1 学分。

(1) Scientific Ethics and Academic Norms for Postgraduates: 1 credit.

(2) 专题课程/研讨课程：1 学分。

(2) Program Course/Seminar Course: 1 credit.

专题课程/研讨课程结合本领域学术前沿和研究生学位论文的选题进行设置。课程可采用教师讲授与研究生研讨相结合的方法进行学习。专题课程在研究生学位论文阶段完成。

Program course/seminar course should be set up in combination with the academic frontiers in this field and the topic of master dissertation. The courses can be conducted by the combination of professor teaching with postgraduate discussion. The program course should be completed in the process of master dissertation.

(3) 实践环节：1 学分。

(3) Practice Links: 1 credit.

实践环节包括实验教学、专业生产实践以及教学实践等。在第二、第三学期，学院及导师应安排研究生参加实践，如参与指导课程设计、毕业设计、实习、实验、辅导答疑、课堂讨论等教学环节；或结合科研课题到生产单位参加调研或项目研发等实践工作；或依托本学科重点实验室、实践教学基地等开设具有特定主题的系列实验课或以实验为主的专题课；或参与学科应用技术相关的硬件、软件设计或系统设计；或在本学科重点实验室、实践教学基地等进行工程设计、实验设备安装调试或协助实验室教师指导本科生完成实验教学等实验工作。总工作量应达到 80 学时或 10 个工作日。

The practice links include experimental teaching, professional production practice and teaching practice, etc. In the second and third semesters, the college and supervisors should arrange postgraduates to participate in practice. For example, guide curriculum design, graduation design, practice, experiment, supervise and answer questions, and participate in classroom discussion and other teaching links; or participate in practical work such as research or project research and development in the production unit in combination with scientific research tasks, or rely on the key laboratory of the discipline, practical teaching bases, etc., to set up a series of experimental courses with specific topics or special courses based on experiments; or participate in the hardware, software design or system design related to the applied technology of the discipline; or carry out engineering design, installation and debugging of experimental equipment in the key laboratory and practical teaching bases of the discipline, or assist laboratory teachers to guide undergraduates to complete experimental teaching and other experimental work. The total workload should reach 80 class hours or 10 working days.

(4) 学术活动：1 学分，要求硕士生至少参加 6 次学术报告。

(4) Academic Activities: 1 credit, postgraduates are required to participate in at least 6 academic reports.

(5) 文献综述与开题报告：1 学分。

(5) Literature Review and Thesis Proposal: 1 credit.

(6) 论文中期检查：1 学分。

(6) Mid-term Review of the Thesis: 1 credit.

3．非学位选修课

3．Non-degree optional courses

学生可根据本人情况，选修研究生课程目录中其他学科的专业基础课、专业课，使总学

分不少于 31 学分。

Postgraduates can take specialized basic courses and specialized courses of other disciplines in the catalogue of postgraduate optional courses according to their own situation, and the total credits should not be less than 31 credits.

学士阶段非本学科的硕士生应补修由导师指定的若干本学科学士阶段主干课程。补修课程不计入总学分。

Postgraduates who are not in their own disciplines at the bachelor stage should take several major courses of bachelor stage of the disciplines designated by their supervisors. Supplementary courses are not included in the total credit.

具体课程设置见附表。

For the specific curriculum, please refer to the Schedule.

七、科学研究与学位论文要求

VII. Requirements for Scientific Research and Degree Thesis

科学研究与学位论文工作是研究生培养的重要组成部分，是培养硕士研究生独立思考、勇于创新的精神和从事科学研究或担负专门技术工作能力的重要手段。硕士研究生应在导师指导下独立完成硕士学位论文工作。

Scientific research and degree thesis are important parts of postgraduate training, and important ways to cultivate postgraduates' independent thinking, innovative spirit and the ability to undertake scientific research or specialized technical work. Postgraduates should independently complete the master dissertation under the guidance of their supervisors.

1．文献综述与开题报告

1．Literature review and thesis proposal

硕士生入学后应在导师指导下，查阅文献资料，了解学科现状和动态，尽早确定课题方向，完成论文选题。学位论文的选题一般应结合本学科的研究方向和科研项目，鼓励面向国民经济和社会发展的需求选择应用型课题。确定学位论文工作的内容和工作量时应全面考虑硕士研究生的知识结构、工作能力和培养年限等。硕士开题由研究所统一组织，一般要求在第二学期末完成，开题时间距离答辩日期一般不少于 1 学年。

After the enrollment, postgraduates should consult the literature, understand the current situation and trends of the discipline, determine the research direction as soon as possible, and complete the topic selection of the thesis under the guidance of their supervisors. The topic selection of degree thesis should generally be combined with the research direction and scientific research projects of the discipline and the selection of applied topics meeting the needs of national economic and social development are encouraged. When determining the content and workload of degree thesis work, the supervisor should fully consider the knowledge structure, work abilities and training duration of postgraduates. The thesis proposal is uniformly organized by the Institute.

It is generally required to be completed at the end of the second semester and at least one academic year before the thesis defense.

对文献综述与开题报告工作的具体要求见《华北电力大学学术学位硕士研究生必修环节实施细则》。

For the specific requirements of literature review and thesis proposal, please refer to the Detailed Rules for the Implementation of Required Links for Postgraduates with Academic Degrees in North China Electric Power University.

2．论文中期检查

2．Mid-term review of the thesis

论文中期检查一般在第四学期末完成，其中申请 2 年毕业的研究生要求在第四学期的前三周完成。中期检查由研究所负责组织，考核小组由 3-5 人组成，负责对研究生的论文工作内容、主要进展、存在的问题、论文按时完成的可能性等进行全方位的考查。对学位论文工作中期检查的具体要求见《华北电力大学学术学位硕士研究生必修环节实施细则》。

The mid-term review of the thesis is usually completed at the end of the fourth semester, and postgraduates applying for graduation after two-year study are required to complete it in the first three weeks of the fourth semester. The mid-term review is organized by the Institute, and the assessment team is composed of 3-5 people, responsible for the omni-directional examination of the content, main progress, existing problems and the possibility of completing the thesis on time. For the specific requirements for the mid-term review of degree thesis work, please refer to the Detailed Rules for the Implementation of Required Links for Postgraduates with Academic Degrees in North China Electric Power University.

3．科研成果要求

3．Requirements for scientific research achievements

研究生攻读硕士学位期间，鼓励其公开发表与研究工作相关的学术论文。

During the period of studying for a master's degree, postgraduates are encouraged to publish academic papers related to their research work.

4．学位论文要求

4．Degree thesis requirements

硕士学位论文是硕士生科学研究工作的全面总结，是描述其研究成果、反映其研究水平的重要学术文献资料，是申请和授予硕士学位的基本依据。学位论文撰写是硕士生培养过程的基本训练之一，必须按照规范认真执行，具体要求见《华北电力大学学术硕士学位论文撰写规范及范例》。

Master's dissertation is a comprehensive summary of postgraduates' scientific research work, is an important academic literature that describes their research results and reflects their research

level, and is the basis for applying for and awarding master's degrees. Degree thesis writing is one of the basic trainings in the training process of postgraduates, which must be carried out conscientiously in accordance with the norms. For specific requirements, please refer to Norms and Examples for the Writing of Academic Master Dissertation in North China Electric Power University.

5．学位论文评审与答辩

5．Review and defense of degree thesis

学校集中进行硕士研究生论文的评审与答辩工作。研究生在论文工作完成后，须向所在院系提交论文答辩申请，相关部门要对研究生的答辩资格进行审查，审查通过方可进入论文评审与答辩程序。未通过答辩资格审查的硕士生不得进行论文答辩。

The review and defense of master dissertation shall be conducted in an intensive manner. Postgraduates should submit the application for thesis defense to their departments after the completion of the thesis work, and the relevant departments shall examine the postgraduates' defense qualification and they are allowed to enter the thesis review and defense procedure only after they pass the examination. Postgraduates who fail to pass the examination of their qualification for defense shall not defense to their theses.

硕士学位论文的评审与答辩按照《华北电力大学研究生学位论文评审和答辩的有关规定》、《华北电力大学学位授予工作细则》等相关规定进行。正常毕业和提前毕业的研究生论文答辩时间一般安排在 6 月，延期毕业的研究生论文答辩时间一般安排在 12 月。

The review and defense of master dissertation shall be carried out in accordance with the Relevant Provisions on the Review and Defense of Master Dissertation of North China Electric Power University and the Detailed Rules of Degree Awarding of North China Electric Power University. The defense time for master dissertation for normal graduation and early graduation is generally arranged in June, and the defense time for master dissertation for postponed graduation is generally arranged in December.

八、提前毕业条件

VIII. Conditions for Early Graduation

提前毕业的硕士生学习年限为 2 年，具体要求参见《电气与电子工程学院全日制硕士研究生提前毕业实施办法（2020 版）》。

The duration of program for postgraduates who graduate ahead of schedule is 2 years. For specific requirements, please refer to the Measures for Early Graduation of Full-time Postgraduates of the School of Electrical and Electronic Engineering (2020 Edition).

附表：电子科学与技术一级学科学术学位硕士研究生（留学生）课程设置表（英语授课）

Schedule:Curriculum (Taught in English) of Postgraduates (International Student) in First-level Discipline of Electronics Science and Technology

类别 Category		课程名称 Course name	学时 Class hour	学分 Credit	考核方式 Assessment mode	开课学期 Semester of the course	备注 Remarks
学位课 Degree courses (不少于 22 学分) (No less than 22 credits)	公共课 Public courses (10 学分) (10 credits)	汉语综合(1) Chinese Comprehension (1)	64	4.0	考试 Exam	1	
		中国概况(英文) Introduction to China (English)	32	2.0	考试 Exam	1	
		汉语综合(2) Chinese Comprehension (2)	64	4.0	考试 Exam	2	
	基础理论课 Basic theoretical courses （4 学分） (4 credits)	矩阵论 Matrix Theory	32	2.0	考试 Exam	1	
		数值分析 Numerical Analysis	32	2.0	Exam Exam	1	
	学科基础课 Basic courses of disciplines （不少于 4 学分） (no less than 4 credits)	高等半导体物理 Advanced Semiconductor Physics	32	2.0	考试 Exam	1	
		现代数字信号处理 Advanced Digital Signal Processing	32	2.0	考试 Exam	1	
		电网络理论 Electric Network Theory	32	2.0	考试 Exam	1	
		现代电力电子技术 Modern Power Electronic Technique	32	2.0	考试 Exam	1	
	学科专业课 Specialized courses of disciplines （不少于 4 学分） (no less than 4 credits)	功率电子学 Power Electronics	32	2.0	考试 Exam	2	
		无线传感器网络与物联网技术 Wireless Sensor Network and Internet of Things Technology	32	2.0	考试 Exam	2	
		高压直流输电技术 HVDC Transmission Technology	32	2.0	考试 Exam	2	
		电气设备智能感知与诊断 Intelligent Perception and Diagnosis of Electrical Equipment	32	2.0	考试 Exam	2	
非学位课 Non-degree courses	必修课程与必修环节 Compulsory courses and required links （6 学分） (6 credits)	研究生科学道德与学术规范 Scientific Ethics and Academic Norms for Postgraduates		1.0	考查 Review of performance		
		专题课程/研讨课程 Program Pourse/Seminar Course		1.0	考查 Review of performance		

		实践环节（实验、实践） Practice Links (Experiment, Practice)		1.0	考查 Review of performance		
		学术活动（报告、讲座 6 次） Academic Activities (6 Reports and Lectures)		1.0	考查 Review of performance		
		文献综述与选题报告 Literature Review and Thesis Proposal		1.0	考查 Review of performance	3	
		论文中期检查 Mid-term Review of the Thesis		1.0	考查 Review of performance	4	
	选修课 Optional courses	可选修研究生课程目录中其他学科的专业基础课、专业课，使总学分不少于 31 学分。 Postgraduates can take specialized basic courses and specialized courses of other disciplines in the catalogue of postgraduate optional courses, and the total credits should not be less than 31 credits.					