

华北电力大学 (留学生) 英语授课

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

电气工程一级学科博士学位研究生培养方案

Training Program for Doctoral Students in First-level Discipline of Electrical Engineering

(学科代码: 0808 授予工学博士学位)

(Discipline Code: 0808, Degree: Doctoral Degree of Engineering)

一、学科简介

I. Brief Introduction to the Discipline

电气工程学科始建于 20 世纪 50 年代, 1978 年获我国第一批硕士学位授予权, 1986 年获电力系统及其自动化学科博士学位授予权, 1998 年获电气工程一级学科博士学位授予权, 2001 年建立博士后流动站。2001 年起电力系统及其自动化学科被评为国家重点学科, 2008 年电气工程一级学科被批准为北京市重点学科。2011 年主要依托本学科建设的“电力科学与工程”列入国家“985 工程优势学科创新平台”, 同年立项建设“新能源电力系统”国家重点实验室, 并于 2014 年通过正式验收。2017 年教育部第四轮学科评估中, 电气工程学科被评定为 A, 并入选国家“双一流”学科建设。

The discipline of electrical engineering was founded in 1950s. Our school acquired the right to grant the master's degree for the first batch in China in 1978, the right to grant the doctoral degree in power system and automation in 1986 and the right to grant the doctoral degree in first-level discipline of electrical engineering in 1998, and established post-doctoral research program in 2001. Since 2001, the discipline of power system and automation in our school has been rated as a national key discipline, and the first-level discipline of electrical engineering has been approved as a key discipline in Beijing in 2008. In 2011, "Electric Power Science and Engineering", mainly relied on the construction of this discipline, was listed in the national "985 Project Innovation Platform". In the same year, a project was established to build the State Key Laboratory of "New Energy Power System", which passed formal acceptance in 2014. In the fourth round of discipline evaluation of the Ministry of Education in 2017, the discipline of electrical engineering was rated as A and was selected into the national "Double First-class" discipline construction.

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. 在电气工程学科内掌握坚实宽广的基础理论和系统深入的专门知识，了解本学科专业的前沿动态，具有独立从事科学研究工作的能力，并要初步具有主持较大型科研、技术开发项目，或解决和探索经济、社会发展问题的能力，在科学或专门技术上做出创造性的成果，能够胜任本学科或相近学科的科研、教学和管理工作的。

2. Cultivate students to master solid and broad basic theories along with in-depth and systematic knowledge of Electrical Engineering, to understand the professional and cutting-edge trends of this discipline; to equip students with the capacity of doing independent research and having a preliminary ability of conducting the relatively large-scale scientific research and technology development projects or the ability to solve and explore economics and social development issues, to make creative achievements in science or expertise, and to be qualified to undertake the scientific research, teaching and management of this discipline or related areas.

3. 身心健康。

3. Keep physical and mental health.

三、研究方向

III. Research Direction

电气工程一级学科包含电机与电器、电力系统及其自动化、高电压与绝缘技术、电力电子与电力传动、电工理论与新技术、电气信息技术（自设）6个二级学科，其中，电力系统及其自动化学科为国家重点学科，电气工程一级学科为北京市重点学科。

The first-level discipline of Electrical Engineering includes 6 second-level disciplines, Motor and Electrical Appliances, Power System and Automation, High Voltage and Insulation Technology, Power Electronics and Power Transmission, Electrical Theory and New Technology, Electrical Information Technology (self-designed), among which, the Power System and Automation is a national key discipline and the first-level discipline of Electrical Engineering is a key discipline in Beijing.

主要研究方向：

Main research directions:

01 先进电工材料及其电磁特性

01 Advanced Electrical Engineering Materials and Electromagnetic Property

02 电能转换与高效利用

02 Conversion and Efficient Utilization of Electrical Energy

03 先进输变电技术

- 03 Advanced Transmission and Conversion Technology
- 04 电气设备智能化
- 04 Electrical Equipment Intellectualization
- 05 新能源电力系统分析与控制
- 05 Analysis and Control of New Energy Power System
- 06 新能源电力系统保护与安全
- 06 Protection and Security of New Energy Power System
- 07 综合能源系统与智能配用电
- 07 Integrated Energy System and Intelligent Distribution and Utilization of Power
- 08 能源电力经济
- 08 Energy and Electricity Economy
- 09 电力系统信息与通信技术
- 09 Power System Information and Communication Technology
- 10 能源互联网（交叉学科）
- 10 Energy Internet (Interdisciplinary Research)

四、培养方式

IV. Training Method

1. 博士生培养实行导师负责制，必要时可设副导师或组成指导小组，跨学科或交叉学科培养博士生时，应从相关学科中聘请副导师协助指导。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，既作学业导师，又作人生导师，严格要求学生遵守科学道德和学术规范。

1. The training of doctoral students implements supervisor responsibility system, if necessary, a secondary-supervisor or a steering group may be introduced. When it comes to interdisciplinary training of doctoral students, a secondary-supervisor from the relevant disciplines is required to assist in guiding the students. The supervisor is the person of primary responsibility for postgraduate training who shall understand and master the specific condition of postgraduates, 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.

2. 博士生的培养以科学研究工作为主，重点是培养独立从事科学研究工作和进行创造性研究工作的能力；并根据研究需要继续深入学习一些课程，在拓宽基础、加深专业、掌握学科发展前沿的基础上学会进行创造性研究工作的方法和培养严谨的科学作风。

2. The training of doctoral students is mainly on scientific research work, with emphasis on cultivating the ability to independently engage in scientific research work and creative research

work. Doctoral students should continue to study some courses in depth according to the needs of the research; moreover, they should learn the methods of creative research work and cultivate a rigorous scientific style on the basis of broadening the foundation, deepening the specialty and grasping the forefront of discipline development.

3. 博士生采用全日制培养方式，可在校内进行，也可由国内、国际的高校以及科研院所联合培养。

3. The doctoral students shall conduct their training program in full-time manner. The training of doctoral students can be carried out in the campus of the university as well as in other universities and colleges and the joint academic institutes at home or abroad.

五、学制与学习年限

V. Educational System and Duration of the Program

学制 4 年，学习年限 3-8 年。因特殊情况需要延长学习年限的，应提前半年由博士生提出申请，经导师同意、学院领导审核、报国际教育学院批准、研究生院备案。

The educational system is 4 years, and the duration of the program is 3-8 years. The doctoral students shall apply in half a year in advance if they require an extension for the study due to some special circumstances, and the application shall be approved by their supervisors, reviewed by the leaders of the school, submitted to the International Education Institute for approval and the Graduate School for the record.

中国政府奖学金学生如要继续享受奖学金需提前向所属国家驻华大使馆和国家留学基金管理委员会申请，获得批准后，才能继续享受奖学金待遇，否则需自费完成学业。

The students who are supported by the Chinese government scholarship need to apply for continuing scholarship from both their home country embassy in China and China Scholarship Council. Otherwise, they will have to complete their studies at their own expense.

六、课程设置与学分要求

VI. Curriculum and Credit Requirements

博士生的课程设置分学位课、必修环节和任选课三大类。学位课分公共课、基础理论课、专业核心课。博士研究生在校期间，应修最低学分为 20 学分，其中学位课 14 学分，必修环节 6 学分。具体要求如下：

The curriculum for doctoral students consists of three categories: degree courses, required links and optional courses. Degree courses are divided into public courses, basic theoretical courses and specialized core courses. During the period of doctoral students in school, the minimum credit requirement is 20 credits, including 14 credits for degree courses and 6 credits for required links. The specific requirements are as follows:

1. 学位课（不少于 14 学分），其中：

1. Degree courses (no less than 14 credits), of which:

公共课：汉语综合(1)：4 学分

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

基础理论课：2 学分

Basic theoretical courses: 2 credits

专业核心课：2 学分

Specialized core courses: 2 credits.

要求博士生在基础理论方面，应进一步掌握现代数学等高层次的宽厚的基础理论，为研究方法的创新提供坚实的理论基础；在专业核心课程的设置中以研究型的专业基础课程为基础，以加强博士研究生的学术理论训练为主，使学生把握本学科发展的前沿动态，培养学生发现问题、提出问题、分析问题的批判性思维能力和创新思维能力以及解决实际问题的能力。

Doctoral students are required to further master the high-level and broad basic theories such as Modern Mathematics, so as to provide a solid theoretical basis for the innovation of research methods. The setting of the specialized core courses is based on the research-oriented specialized basic courses, focusing on strengthening the academic theory training of doctoral students, so as to enable students to grasp the frontier trends of the development of this discipline, cultivate students' critical thinking ability and innovative thinking ability of discovering, raising and analyzing problems as well as the ability to solve practical questions.

2. 必修环节（6 学分），其中：

2. Required links (6 credits), including:

研究生科学道德与学术规范 1 学分；

Scientific Ethics and Academic Norms for Postgraduates: 1 credit;

研读专业经典名著 1 学分：博士生在学习期间，须在导师的要求与指导下，研读本专业至少 1 本经典名著，完成后记 1 学分；

Professional Classics Studying (1 credit): During the study of doctoral students, they must, under the requirements and guidance of their supervisors, study at least one classic masterpiece of this major, and they shall get 1 credit upon completion;

文献综述与选题报告 2 学分；

Literature Review and Thesis Proposal: 2 credits;

前沿讲座与专题研讨 1 学分：参加前沿讲座与专题研讨是培养博士生综合能力和进入学

科前沿的重要环节。博士生在学习期间，应在导师确定的专题领域，至少参加 8 次前沿讲座与专题研讨，完成后记 1 学分；

Cutting-edge Lectures and Seminars (1 credit): Participating in cutting-edge lectures and seminars is an important link to cultivate the comprehensive ability of doctoral students and help them to enter the forefront of the discipline. During the period of study, doctoral students should participate in at least 8 cutting-edge lectures and seminars in the special areas determined by their supervisors, and they shall get 1 credit upon completion;

博士论坛 1 学分：要求博士生至少做 2 次学术报告，完成后记 1 学分。

Doctoral Forum (1 credit): Doctoral students are required to make at least 2 academic reports, and they shall get 1 credit upon completion;

3. 任选课：

3. Optional courses:

第二外国语：2 学分。第一外语及母语均非英语者，必须选修英语为第二外语，且要达到具有阅读本学科外文资料的初步能力；第一外语或母语为英语，第二外语可以免修。

Second Foreign Language: 2 credits. For those whose first foreign language and native language are not English, they must choose English as the second foreign language and have the preliminary ability to read foreign language materials of their own disciplines; for those whose first foreign language or native language is English, they can be exempted from taking a second foreign language course.

硕士阶段非本学科的博士生应补修若干本学科硕士阶段主干课程。补修课程不计入总学分。

Doctoral student who are not in their own disciplines at the postgraduate stage should take several major courses of postgraduate stage of this discipline 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、科学研究及学位论文要求

VII. Requirements for Scientific Research and Degree Thesis

进行科学研究与撰写学位论文，是对博士研究生进行科学研究训练、培养创新能力的主要途径，也是衡量研究生能否获得博士学位的重要依据之一。博士生在学期间一般要用 2 年的时间完成学位论文。博士学位论文是综合衡量博士生培养质量和学术水平的重要标志，博士生的学位论文选题报告、论文中期检查、学位论文预答辩、论文答辩资格审查等是博士生培养工作的重要环节，本学科的相关具体安排与要求如下：

Conducting scientific research and writing degree thesis is the main way to train doctoral students in scientific research and innovative ability, and it is also one of the important bases to measure whether a postgraduate can obtain a doctoral degree or not. Doctoral students usually take 2 years to complete their dissertations during the period of study. The doctoral dissertation is an important supporting evidence which measures the quality of the cultivation outcomes and academic levels of the research. The thesis proposal, mid-term review, pre-defense of dissertation, examination of the qualification of thesis defense, etc. are important parts for the doctoral training. The specific arrangements and requirements of this discipline are as follows:

1. 文献综述与选题报告

1. Literature review and thesis proposal

博士生选题报告时间由博士生导师根据博士生工作进度情况确定，博士开题时间一般最迟不超过博士入学后第3学期，开题时间距离申请答辩日期不少于18个月。

The thesis proposal time of doctoral students shall be determined by the supervisor according to doctoral students' progress. Generally, it shall be given no later than the 3rd semester after the enrollment of doctoral students at the latest and shall be no less than 18 months before the date of application for defense.

博士学位论文选题要体现学科领域的前沿性和先进性，课题来源原则上应为省部级及以上科技项目或企业委托重大项目。博士生进行论文开题报告之前，应在教育部认定的科技查新工作站进行论文开题查新工作，以保证博士学位论文选题的创新性。博士论文选题报告内容应包含文献综述、论文选题及其意义、主要研究内容、技术路线、预期成果及可能的创新点等。博士生在论文开题时须针对论文选题单独提交一份全面详细的文献综述报告（不少于1万字）。

The topics of doctoral dissertation shall reflect the cutting-edge and advance of the discipline. In principle, the origin of the topic shall be science and technology projects at provincial and ministerial level or above or major projects entrusted by enterprises. Before carrying out the thesis proposal, doctoral students should conduct the thesis novelty search work at the scientific and technological novelty search station recognized by the Ministry of Education, so as to ensure the innovation of doctoral dissertation topic. The doctoral dissertation topic selection report shall include literature review, topic selection and its significance, main research content, technical route, expected results and possible innovative points, etc. At the beginning of the thesis proposal, doctoral students are required to submit a comprehensive and detailed literature review report (no less than 10,000 words) for the selected topic of the dissertation.

选题报告应在二级学科范围内相对集中、公开地进行，并由以博士生导师为主体组成的3-5人考核小组进行评审。选题报告会应吸收有关导师和研究生参加，跨学科的论文选题应聘请相关学科的导师参加。若学位论文课题有重大变动，应重做选题报告，以保证课题的前

沿性和创新性。

The thesis proposal is carried out in a relatively intensive and open manner within the scope of the second-level discipline, and reviewed by the assessment team composed of 3-5 doctoral supervisors as the main body. The topic selection meeting should be attended by relevant supervisors and postgraduates, and supervisors of relevant disciplines should be invited to participate in the meeting for topic selection of interdisciplinary theses. If there is a major change in the topic of the degree thesis, the thesis proposal report should be carried out once again to ensure the frontier and innovation of the topic.

2. 论文中期检查

2. Mid-term review of the thesis

学位论文实行中期检查制度。中期考核是检查研究生学位论文进展状况、帮助学生把握学位论文方向、提高学位论文质量的必要环节。学位论文中期检查时间最迟不超过博士入学后第 5 学期，中期检查时间距离申请答辩日期不少于 6 个月。考查小组应由 3-5 名教授（或具有副高职称的博导）组成，对研究生的综合能力、论文进展情况等进行全面考查。

A mid-term review system is adopted for degree thesis. The mid-term review is a necessary process to check the progress of master dissertation, keep students in the right direction and improve the quality of their dissertation. The mid-term review of degree thesis shall not exceed the 5th semester after the enrollment of doctoral students at the latest, and shall be no less than 6 months before the date of application for defense. The review team shall be composed of three to five professors (or doctoral students' supervisors with the deputy senior title), and examine the abilities of the doctoral students and the progress of the paper work comprehensively.

3. 科研成果的要求

3. Requirements for scientific research achievements

博士生应参与省部级及以上科技项目或企业委托重大项目的课题研究，在申请学位论文答辩前完成反映学位论文工作的以下科研成果：

A doctoral student shall participate in subject research of technological projects at provincial and ministerial level or above or of major projects entrusted by enterprises, and obtain the following scientific research achievements reflecting his/her thesis work before applying for thesis defense:

(1) 作为第一作者（其导师必须是作者之一）或第二作者（其导师必须是第一作者）且以华北电力大学为第一署名单位，在本学科国际顶级期刊或权威期刊（具体可参见《电气工程学科国际顶级期刊、权威期刊列表 2020 版》）上发表 2 篇高水平学术论文，或在中文核心期刊、国际期刊和国际会议发表 4 篇及以上学术论文（其中至少 2 篇为期刊论文）。

(1) Publish 2 high-level academic papers in the international top journals or authoritative journals of their disciplines (for details, please refer to the List of International Top Journals and Authoritative Journals of Electrical Engineering Discipline (2020 Edition)), or publish 4 or more academic papers in Chinese core journals, international journals or international conferences (at least 2 of them are journal papers) in the name of the first author (the supervisor must be one of the authors) or the second author (the supervisor must be the first author), with North China Electric Power University as the first author affiliation.

(2) 博士生作为主要完成人之一, 其学位论文工作成果获得省部级及以上奖励 1 项(以科研院认证目录为准, 署名单位包括华北电力大学), 相当于权威期刊论文 1 篇。

(2) The doctoral student, as one of the main contributors, have won 1 award at provincial and ministerial level or above for the achievements of his/her dissertation work (subject to the certification catalogue of the scientific research institutes, and the North China Electric Power University shall be one of the author affiliations), which is equivalent to 1 authoritative journal paper.

(3) 博士生作为主研人(排名前 5)完成的科研成果在重大工程中应用, 并通过省部级及以上鉴定(结论为国内领先及以上), 或获得国家领导人、省部级领导批示、采纳 1 项, 成果第一完成单位是华北电力大学, 相当于权威期刊论文 1 篇。

(3) The scientific research achievements completed by the doctoral student as a lead researcher (top 5) have been applied in major projects and evaluated at the provincial and ministerial level or above (with the conclusion of advanced in China or above), or obtained approval and adoption of state leaders and provincial and ministerial leaders, with the North China Electric Power University being the first contributor, which is equivalent to 1 authoritative journal paper.

凡不符合上述要求的成果, 在学位申请时一律不予考虑。

Any other achievements that do not meet the above requirements will not be considered in degree applications.

4. 学位论文要求

4. Degree thesis requirements

博士生在毕业前应提交博士学位论文。博士学位论文是博士生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, 论文应体现出博士生在所在学科领域所做出的创造性学术成果, 应能反映出博士生已经掌握了坚实宽广的基础理论和系统深入的专门知识, 并具备了独立从事科研工作的能力。

Doctoral students shall submit their doctoral dissertations before graduation. The doctoral dissertation is a summary of the systematic and complete academic research work completed independently by a doctoral student under the guidance of his/her supervisor. The dissertation

shall reflect the creative academic achievements made by the doctoral student in his/her discipline. It shall also reflect that the doctoral student has mastered solid and broad basic theories and systematic and in-depth knowledge of the major, and had the ability to engage in scientific research independently.

博士学位论文的撰写规范参照《华北电力大学博士学位论文撰写规范及范例》。

For the writing norms of doctoral dissertation, please refer to the Norms and Examples for the Doctoral Dissertation Writing of North China Electric Power University.

5. 学位论文预答辩

5. Pre-defense of dissertation

博士生在完成博士学位论文初稿，经导师审核认为符合要求的，要进行博士学位论文的预答辩。预答辩的目的在于进一步修改、完善博士学位论文。学位论文预答辩通过者，方可申请论文送审的资格审查。

If the doctoral student completes the first draft of the doctoral dissertation and the first draft is deemed to meet the requirements after review of the supervisor, the doctoral student will make a pre-defense for its doctoral dissertation. The purpose of pre-defense is to further revise and improve the doctoral dissertation. The students who pass the pre-defense can apply for the formal defense of dissertation.

6. 博士研究生申请论文送审的资格审查

6. Qualification review of the submitted dissertation applied by doctoral students

博士论文资格审查由指导教师或博士生指导小组以及学院和国际教育学院负责进行。博士研究生申请论文送审的基本条件：

The doctoral dissertation qualification review is carried out by the supervisor or the steering group, as well as their schools and the International Education Institute. Basic application conditions of doctoral students' dissertation submission are as following:

- (1) 修完所规定的学分要求；
- (1) To meet the credit requirements;
- (2) 完成论文开题查新报告与论文选题报告；
- (2) To complete the novelty search reports and the thesis proposal of dissertation;
- (3) 完成论文中期检查；
- (3) To complete the mid-term review of the dissertation;
- (4) 满足科研成果要求；
- (4) To meet the requirements for scientific research achievements;

- (5) 通过学位论文的预答辩;
- (5) To pass the pre-defense of the dissertation;
- (6) 完成学位论文的撰写并通过学位论文撰写规范审查。
- (6) To complete the dissertation and pass the review of the dissertation.

7. 博士学位论文的评审与答辩

7. Review and defense of doctoral dissertation

博士生在通过论文送审的资格审查后即可进行学位论文的送审与答辩，具体要求按照《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实施细则》等相关规定执行。毕业生的论文答辩时间一般安排在6月或12月。

Doctoral students can submit their degree theses for examination and make the theses defense after passing the qualification examination for their degree theses, which are required to be specifically carried out in accordance with the relevant provisions of the Relevant Provisions on the Review and Defense of Master Dissertation of North China Electric Power University and the Detailed Rules for Degree Awarding of North China Electric Power University. The thesis defense time for graduates is generally arranged in June or December.

附表：电气工程一级学科博士生培养方案（留学生）课程设置表（英语授课）

**Schedule: Curriculum (Taught in English) of Training Program for Doctoral Students
(International Students) in First-level Discipline of Electrical Engineering**

课程性质 Category	课程属性 Attribute	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 (14 学分) (14 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	1	
	基础理论课 Basic theoretical courses (2 学分) (2 credits)	现代数学基础与方法 Fundamentals and Methods of Modern Mathematics	32	2.0	考试 Exam	1	
	专业核心课 Specialized core courses (2 学分) (2 credits)	动态电力系统理论与方法 Theory and Method of Dynamic Power System	32	2.0	考试 Exam	1	
非学位课 Non-degree courses	必修环节 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		
		研读专业经典名著 Professional Classics Studying		1.0	考查 Review of performance		
		文献综述与选题报告 Literature Review and Thesis Proposal		2.0	考查 Review of performance		
		前沿讲座与专题研讨 Cutting-edge Lectures and Seminars	8 次 8 times	1.0	考查 Review of performance		
		博士论坛 Doctoral Forum	2 次 2 times	1.0	考查 Review of performance		
	任选课 Optional courses	第二外国语 Second Foreign Language	72	2.0			附注一 Note 1
		补修课程 Supplementary Courses					附注二 Note 2

附注一：一外或母语为非英语专业的要求必修英语二外

Note 1: For those whose first foreign language and native language are not English, they must choose English as the second foreign language.

附注二：对非本学科入学的博士生，应补修由导师指定的本学科主干硕士课程

Note 2: For the doctoral student who was not in this discipline when enrolled, he/she should make up for the main courses of this discipline in master stage designated by the supervisor.