

华北电力大学（留学生）英语授课

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

可再生能源与清洁能源学科硕士学位研究生培养方案
Training Program for Postgraduates in Discipline of
Renewable Energy and Clean Energy

（学科代码：0808J1 授予工学硕士学位）

(Discipline Code: 0808J1, Degree: Master Degree of Engineering)

一、学科简介

I. Brief Introduction to the Discipline

“可再生能源与清洁能源”是华北电力大学新能源学院在“电气工程”与“动力工程及工程热物理”两个一级博士学位点下，自主设立的二级交叉学科博士学位授权点。

"Renewable Energy and Clean Energy" is a second-level interdisciplinary doctoral program independently established by the School of New Energy of North China Electric Power University under the two first-level doctoral programs of "Electrical Engineering" and "Power Engineering and Engineering Thermophysics".

本学位授权点聚焦可再生能源领域的重大战略需求，为我国乃至世界培养高水平专业技术人才和科学研究人才，开展应用基础研究及关键技术研发，推动可再生能源行业技术进步。以风能、太阳能、生物质能等可再生能源为主要研究对象，揭示可再生能源发电中能量转化、传递及储存的机理、规律及现象，研究可再生能源发电侧抑制波动与智能控制的理论、技术和方法，开展新能源器件装备研制，为大规模可再生能源并网提供理论和技术基础。从可再生能源发电侧与电网侧相互影响和耦合为出发点，重点研究和突破可再生能源与清洁能源发电过程中的共性规律、现象、及应用，并开展可再生能源的储能技术研究，丰富电气工程、动力工程与工程热物理这两个一级学科的内涵和外延，为大规模可再生能源

与清洁能源发电及利用奠定科学基础，培养高端研发及管理人才。

This program focuses on the major strategic needs in the field of renewable energy, trains high-level professionals and scientific research personnel for our country and the world, and conducts basic research for application and key technology research and development to promote technological progress in the renewable energy industry. It mainly studies wind energy, solar energy, biomass energy and other renewable energies, reveals the mechanism, laws and phenomena of energy conversion, transfer and storage in renewable energy power generation, studies the theory, technology and method of restraining fluctuation and intelligent control on the generation side of renewable energy, develops new energy device and equipment, and provides the theoretical and technical basis for grid connection of large-scale renewable energies. Starting from the mutual influence and coupling between the generation side and the grid side of renewable energies, it focuses on the research and breakthrough of the common laws, phenomena and applications in the power generation process of renewable and clean energies, carries out research on storage technology of renewable energies, and enriches the connotation and denotation of the two first-level disciplines of Electrical Engineering, Power Engineering and Engineering Thermophysics, in order to lay a scientific foundation for power generation and utilization of large-scale renewable and clean energies, and train high-end R&D and management personnel.

本学科以多学科交叉为基础，以立德树人为根本，已成为我国可再生能源高级人才培养基地。具有“清洁能源学”北京市高精尖学科。现拥有 60 人的专业师资队伍，现拥有专任教师 51 人，其中教授 15 人，副教授 28 人，其中：国家“万人计划”入选者 4 人，长江学者特聘教授 1 人，国家“百千万工程人才”第一层次 1 人，教育部“新世纪优秀人才支持计划” 6 人，科技部重点领域创新团队 1 个，北京市教学名师 1 人。本学科拥有“新能源电力系统国家重点实验室”、“生物质发电成套设备国家工程实验室”和“能源的安全与清洁利用”北京市重点实验室。

Based on interdisciplinary training and moral education, the discipline has become a training base for advanced renewable energy talents in China. The

discipline of "Clean Energy Science" has been rated as a "High-level and Cutting-edge Discipline in Beijing". At present, it has a professional teaching team of 60 people, with 51 full-time teachers, consisting of 15 professors and 28 associate professors, including 4 selected members of the "Ten Thousand Talents Program" of China, 1 distinguished professor being awarded the title of the "Yangtze River Scholar", 1 person at the first level of the national "Hundred, Thousand and Ten Thousand Talent Project", 6 people supported by the "Program for New Century Excellent Talents in University" of the Ministry of Education, 1 innovation team in key areas of the Ministry of Science and Technology, and 1 excellent teacher in Beijing. This discipline has the "State Key Laboratory of New Energy Power System", the "National Engineering Laboratory of Complete Equipment for Biomass Power Generation" and the "Beijing Key Laboratory of Energy Safety and Clean Utilization".

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. To cultivate students to 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. 培养学术及技术骨干，掌握本学科坚实的基础理论和系统的专门知识，具有从事科学研究工作或独立承担专门技术工作的能力。

2. To cultivate the academic and technical backbones who master solid basic theories and systematic knowledge of the discipline, with the ability to engage in scientific research work or to independently undertake specialized technical work.

三、研究方向

III. Research Direction

1. 风力发电系统理论与技术
1. Theory and Technology of Wind Turbine System
2. 太阳能发电理论与技术
2. Theory and Technology of Solar Power Generation
3. 生物质能发电理论与技术
3. Theory and Technology of Biomass Power Generation
4. 新能源材料与器件技术
4. New Energy Material and Device Technology
5. 其它新能源理论与技术
5. Theory and Technology of Other New Energy Sources

四、培养方式

IV. Training Method

1. 全英文授课(汉语综合课除外)。
1. Taught in English (except for Chinese Comprehension course).
2. 实行导师负责制，或组成指导小组集体培养。充分发挥导师、学术群体指导研究生的作用。可跨学科专业或与有关研究部门、企业联合培养。跨学科或交叉学科培养硕士生时，应从相关学科中聘请具有高级职称的有关人员协助指导。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。
2. The training implements the supervisor responsibility system, or composes the steering group for collective cultivation. It should give full play to the role of supervisors and academic groups to guide postgraduates. Joint training of cross-disciplinary majors with related research institutes and enterprises can also be applied, for training postgraduates of interdisciplinary or cross disciplines, relevant personnel with senior titles should be employed from corresponding disciplines to offer guidance. The supervisor steering group is responsible to inspect the student's completion status of the literature review and thesis proposal, mid-term review and pre-defense of dissertation.

3. 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。

3. The supervisor should acknowledge the knowledge structure, academic skills, research interests, and abilities of the master candidates according to the requirement of the training scheme, based on which to formulate personalized-training plan for postgraduates and supervise the implementation according to the plan.

4. 学术型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，又要培养研究生科学研究或独立担负技术、管理等方面工作的能力。

4. The cultivation of academic postgraduates adopts the way of attaching equal importance to course learning and scientific research. It is necessary to make postgraduates master solid basic theories and systematic professional knowledge and cultivate postgraduates' ability to undertake scientific research or technology and management work independently.

5. 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。

5. 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 dissertation, carefully review the dissertation, 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。

The educational system is 3 years, and the duration of the program is 2-4 years.

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 28 学分，其中学位课不少于 22 学分。课程体系框架如下：

The course study of postgraduates implements credit system. The total credits shall be no less than 28 credits, including no less than 22 credits for degree courses.

The curriculum framework is as follows:

1. 学位课（不少于 22 学分），其中：

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

(1) 公共课：10 学分。

(1) Public courses: 10 credits.

汉语综合(1)：4 学分(64 学时)

Chinese Comprehension (1): 4 credits (64 class hours);

汉语综合(2)：4 学分(64 学时)

Chinese Comprehension (2): 4 credits (64 class hours);

中国概况(英文)：2 学分(32 学时)

Introduction to China (English): 2 credits (32 class hours);

(2) 数学基础课或基础理论课：不少于二门课程，4 学分。

(2) Basic mathematics courses or basic theoretical courses: No less than 2 courses, 4 credits.

(3) 学科基础课：按一级学科设置，不少于 4 学分。

(3) Basic courses of disciplines: Set up according to the first-level discipline, no less than 4 credits.

(4) 学科专业课：按一级或二级学科设置，不少于 4 学分。

(4) Specialized courses of disciplines: Set up according to the first-level or second-level discipline, no less than 4 credits.

各学科可以将学科基础课与学科专业课统筹设置，要求两项之和不少于 8 学分。

Each discipline shall have an overall planning of basic courses and specialized courses, and require that the total credits of the two shall be no less than 8 credits.

2. 必修课程与必修环节（6 学分），其中：

2. **Compulsory courses and 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/seminar 课程：1 学分

(2) Program Course/Seminar Course: 1 credit

专题课程/seminar 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。

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

专题课程在研究生学位论文阶段完成。

The program course should be completed in the process of master discussion.

(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、第三学期各院（系）及导师应安排研究生参加实践，如讲授大学本科课程的部分章节，参与指导课程设计、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，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, schools (departments) and supervisors shall arrange postgraduates to participate in practice. For example, teach some chapters of undergraduate courses, guide curriculum design, take an internship, do experiments, 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. The total workload shall reach 80 class hours or 10 working days.

学院根据各学科特点和人才培养目标，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，以提高研究生的科研实践能力。

The school shall set up a series of experimental courses or experiment-based seminars with specific topics according to the characteristics of each discipline and the goal of personnel training and relying on the key laboratories and practical teaching bases of the discipline; or set up hardware and software design or system design related to the applied technologies of the discipline; or carry out engineering design, installation and debugging of experimental equipment in key laboratories and practical teaching bases of this discipline, or assist laboratory teachers to guide undergraduates to complete experimental teaching, so as to improve the practical ability of postgraduates in scientific research.

(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：学生根据本人情况，可选修其他学科专业课和研究生课程目录上的课程，使总学分不少于 28 学分。

3. Non-degree optional courses: Students can take professional courses in other disciplines and courses in the Postgraduate Course Catalogue according to their own situation, so that the total credits are no less than 28 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。

See the Schedule for the specific curriculum.

七、科学研究与学位论文要求

VII. Requirements for Scientific Research and Degree Thesis

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要选择应用型课题。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方面的特点。

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 dissertation under the guidance of their supervisors. The topic selection of degree thesis shall 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 shall fully consider the knowledge structure, work abilities, training duration and other characteristics of postgraduates.

文献综述与开题报告，包括的主要内容：课题来源及研究背景和意义；国内外在该方向的研究和发展情况及分析；论文的主要研究内容；研究方案及进度安排，预期达到的目标；为完成课题已具备和所需的条件和经费；预计研究过程中可能遇到的困难和问题以及解决的措施；主要参考文献等。

The main contents of literature review and thesis proposal include: topic source and the background and significance of the research; the research, development and analysis in the direction at home and abroad; the main research contents of the paper; the research program and schedule, and the expected goals; the conditions and funds

that are available and necessary for the completion of the topic; the difficulties and problems that may be encountered in the research process and the measures to solve them; the main references and so on.

硕士开题由学院统一组织。全日制学术型硕士研究生的开题时间一般安排在硕士生入学后第 2 学期的期末前进行。学位论文开题不合格者，不得进入课题研究，但可以在一个月后重新开题。学位论文研究中途改题者，必须重新开题并通过评审。凡重新开题而未通过评审者，终止对其培养。

The thesis proposal is uniformly organized by the school. For full-time academic postgraduates, the time for submitting thesis proposal is generally arranged before the end of the second semester after admission. Those who fail in the thesis proposal shall not begin topic research, but submit a new thesis proposal in a month. Those who change the topic in the middle of the research must submit a new thesis proposal and pass the evaluation. For those who submit a new thesis proposal and fail to pass the evaluation, their training shall be terminated.

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 in North China Electric Power University*.

2. 论文中期检查

2. Mid-term review of the thesis

硕士研究生的学位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三学期末完成。中期检查的主要内容为：论文工作是否按开题报告预定的内容及进度进行；已完成的研究内容及结果；目前存在的或预期可能会出现的问题；论文按时完成的可能性等。对学位论文工作中期检查的具体要求见《华北电力大学硕士研究生必修环节实施细则》。

The mid-term review of master dissertation is usually completed at the end of the fourth semester, and postgraduates applying for graduation after two-year study are required to complete it at the end of the third semester. The main contents of the mid-term review: whether the thesis work is consistent with the contents and schedule

of the thesis proposal; the completed research contents and results; the existing or expected problems; the possibility of completing the dissertation on time. For the specific requirements of mid-term review of the thesis work, please refer to the *Detailed Rules for the Implementation of Required Links for Postgraduates in North China Electric Power University*.

论文中期检查通过者给予 1 学分。

Those who pass the mid-term review of the thesis shall be given 1 credit.

3. 学术论文发表与科研成果要求

3. Publication of academic papers and requirements of scientific research achievements

学术学位硕士生在学习期间应积极参加本学科的国内外学术交流活动,鼓励其公开发表学术论文。

During their school period, academic degree postgraduates shall actively participate in the academic exchange activities at home and abroad, and be encouraged to publish their academic papers.

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》。鼓励和支持留学生使用中文撰写学位论文。全英文培养的留学生,学位论文可以使用英文撰写,论文摘要应为中文。

Master 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. Dissertation writing is one of the basic training 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*.

International students are encouraged to write their dissertations in Chinese. For international students trained in English, their dissertations can be written in English, but the abstract shall be in Chinese.

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 discussion 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。毕业生的答辩时间一般安排在 6 月，延期毕业和提前毕业的研究生的答辩时间一般安排在 6 月或 12 月。

The review and defense of master discussion shall be carried out in accordance with the *Relevant Provisions on the Review and Defense of Master Discussion of North China Electric Power University* and the *Detailed Rules of Degree Awarding of North China Electric Power University*. The defense time for graduates is generally arranged in June, while that for postgraduates applying for postponed and early graduation are generally arranged in June or December.

八、提前毕业条件

VIII. Conditions for Early Graduation

特别优秀并提前完成本培养方案规定内容的硕士生最多可提前 1 年毕业。

提前毕业的全日制学术型硕士研究生要求在第二学期前八周完成文献综述与开题报告；在第三学期的末完成中期检查；论文答辩资格审查前，须以第一作者（如为第二作者，导师须为第一作者）至少公开发表（或接受）High-level journals of the field (with catalog)1 篇。其课程学分、文献综述与开题报告、中期检查、学位论文评审与答辩等培养环节的质量要求与 3 年毕业研究生相同。

Postgraduates who are particularly excellent and complete the training program ahead of schedule can apply for early graduation up to one year ahead of schedule. Full-time academic postgraduates applying for early graduation are required to complete the literature review and thesis proposal before the eighth weeks of the second semester and complete the mid-term review at the end of the third semester; publish (or receive) at least 1 paper in the high-level journals (with catalogue) of their fields in the name of the first author (or the second author, with the supervisor being the first author). The quality requirements of course credits, literature review and thesis proposal, mid-term review, dissertation review and defense and other training process are the same as those taking the 3-year training program.

附表:

Schedule:

学术学位硕士研究生课程设置表

Curriculum of Postgraduates with Academic Degrees

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(不少于22学分) Degree courses (no less than 22 credits)	公共课 (10学分) Public courses (10 credits)	汉语综合(一) Chinese Comprehension (1)	64	4	考试 Exam	1	
		中国概况(英文) Introduction to China (English)	32	2	考试 Exam	1	
		汉语综合(二) Chinese Comprehension (2)	64	4	考试 Exam	2	
	基础理论课 Basic theoretical courses	矩阵论 Matrix Theory	32	2	考试 Exam	1	
		数值分析 Numerical Analysis	32	2	考试 Exam	1	
	学科基础课 Basic courses of the discipline	传热学 Heat Transfer	32	2	考试 Exam	1	
		流体力学 Fluid Mechanics	32	2	考试 Exam	1	
	学科专业课 Specialized courses of the discipline	生物质能工程 Biomass Energy Engineering	32	2	考试 Exam	2	
		风力发电系统 Wind Turbine System	32	2	考试 Exam	2	
		光伏电站设计与测试 Design and Test of Photovoltaic Power Station	32	2	考试 Exam	2	
		新能源材料与器件 New Energy Materials and Devices	32	2	考试 Exam	2	
		固体废物管理 Solid Waste Management	32	2	考试 Exam	2	
	非学位课 Non-degree courses	研究生科学道德与学术规范 Scientific Ethics and Academic Norms for Postgraduates		1	考查 Review of performance		
		专题课程/seminar 课程 Program Course/Seminar Course		1	考查 Review of performance		

		实践环节(实验、实践) Practice Links (Experiment, Practice)		1	考查 Review of performance	
		学术活动 Academic Activities		1	考查 Review of performance	
		文献综述与选题报告 Literature Review and Thesis Proposal		1	考查 Review of performance	
		论文中期检查 Mid-term Review of the Thesis		1	考查 Review of performance	
	选修课 Optional courses	科技信息检索与论文写作专题讲座 Symposium on Sci-tech Information Search and Thesis Writing		1	考查 Review of performance	
	选修课门数及课程根据招生规模及社会需求设置 The optional courses and their numbers will be determined according to the enrollment scale and social needs.					