

华北电力大学(留学生)

North China Electric Power University (International Student)

核科学与技术一级学科博士研究生培养方案

Training Program for Doctoral Students in First-level Discipline of Nuclear Science and
Technology

(专业代码: 0827 授予工学博士学位)

(Major Code: 0807, Degree: Doctoral Degree of Engineering)

一、学科简介

I. Brief Introduction to the Discipline

本学科于 2011 年获得“核科学与技术”一级学科硕士学位授予权, 2012 年自设“核电与动力工程”二级学科博士学位授予权, 2018 年获得“核科学与技术”一级学科博士学位授予权。目前拥有“非能动核能安全技术”北京市重点实验室、“核电软件”国家能源重点实验室、“核动力工程全范围虚拟仿真”国家级实验教学中心、国家级“核电工程实践教学中心”。本学科现有一支 40 人的“博士化、工程化、国际化”师资队伍, 其中双聘院士 1 人, 博士生导师 8 人, 教授 10 人, 副教授 13 人, 其专业面覆盖“核科学与技术”一级学科的所有学科方向。本学科承担了众多国家级科研项目, 近五年主持或参与了“大型先进压水堆”国家科技重大专项、国家重点研发计划、国家自然科学基金等重大项目 60 余项, 企业委托研究项目 50 余项, 科研经费总额近 1 亿元; 发表 SCI 论文 200 余篇, EI 论文 300 余篇; 授权发明专利 60 余项, 软件著作权 50 余项。为国家累计培养各类核电技术人才 2000 多人, 为“一带一路”国家培养研究生 57 人, 被列为国家第三批特色专业建设点。

In 2011, the discipline was authorized to award the master degree of the first-level discipline of Nuclear Science and Technology; in 2012, the discipline was authorized to award the doctoral degree of the second-level discipline of Nuclear Power and Power Engineering (self-established); in 2018, the discipline was authorized to award the doctoral degree of the first-level discipline of Nuclear Science and Technology. At present, it has the Beijing Key Laboratory of "Passive Safety Technology for Nuclear Energy", State Key Energy Laboratory of "Nuclear Power Software", National Experimental Teaching Center of "Nuclear Power Engineering Full Range Virtual Simulation", and National "Nuclear Power Engineering Practice Education Center". At present, the discipline has a teaching team consisting of 40 "doctoral, engineering and international" teaching staff, including 1 double-employed academician, 8 doctoral supervisors, 10 professors and 13 associate professors, with its majors covering all orientations of the first-level discipline of Nuclear Science and Technology. The discipline has undertaken numerous state-level scientific

research projects, and in the past five years, presided over or participated in more than 60 major projects such as the National Science and Technology Major Project of "Large Advanced Pressurized Water Reactor", the National Key R&D Program of China, and the NSFC projects, and more than 50 major projects entrusted by enterprises, with a total scientific research funding of nearly RMB 100 million; more than 200 SCI papers and 300 EI papers have been published; more than 60 invention patents and 50 software copyrights have been granted. It has cumulatively trained more than 2,000 nuclear power technical talents for the country and 57 postgraduate students for the Belt and Road Initiative, and has been listed as the third batch of construction sites of characteristic specialty in China.

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. 应具有核科学与技术学科宽广而扎实的基础理论和系统深入的专门知识，深入了解本学科的发展方向及学术研究前沿。具有独立地和创造性地从事科学研究工作的能力，初步具有主持较大型科研、技术开发项目，或探索解决经济、社会发展问题的能力。

2. Cultivate students to master solid and broad basic theories along with in-depth and systematic knowledge of Nuclear Science and Technology, to understand the development direction of the discipline and the forefront of academic research. Equip students with the ability to engage in scientific research independently and creatively, and have the primary ability to preside over large-scale scientific research and technological development projects, or to explore and solve the problems of China's economic and social development.

三、研究方向

III. Research Direction

核科学与技术是一门由基础科学、技术科学及工程科学组成的综合性很强的尖端学科。博士研究生主要研究方向：

Nuclear Science and Technology is a comprehensive and advanced discipline composed of basic science, technical science and engineering science. Main research directions of doctoral students:

1、核反应堆热工水力与安全

1. Thermal Hydraulics and Safety of Nuclear Reactors

2、核电厂系统与设备

2. Systems and Equipment of Nuclear Power Plant

3、核反应堆中子物理与屏蔽

3. Neutron Physics and Shielding of Nuclear Reactors

4、核工程材料

4. Materials for Nuclear Engineering

5、高能物理与粒子物理

5. High Energy Physics and Particle Physics

6、先进辐射探测技术

6. Advanced Radiation Detection Technology

7、核设施环境影响评价

7. Environmental Impact Assessment of Nuclear Facilities

8、环境辐射污染修复

8. Remediation of Environmental Radiation Pollution

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。导师是研究生培养第一责任人，要了解掌握研究生的思想状况，将专业教育与日常生活教育有机融合，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. The supervisor is the person of primary responsibility for postgraduate training. The supervisor shall understand and master the ideological situation of postgraduates and organically integrate professional education with daily life 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. 我校培养来华留学博士生，采用全日制培养方式，即整个培养过程均在我校完成。

3. Our university trains international doctoral students in full-time manner. That is, the whole training process is completed in our university.

4. 对于在我国获得硕士或学士学位，再次申请来我校攻读博士学位者，要求具有使用汉语生活用语和阅读本专业汉语资料的能力；对于在他国（含派遣国，下同）获得相当于我国硕士学位学术水平的学历证书者，要求具有使用汉语生活用语和阅读本专业汉语资料的初步能力。《汉语》和《中国概况》为我校来华留学博士生的必修课。

4. Those who have obtained master's or bachelor's degrees in China and apply for doctoral or master's degrees in our university are required to have the ability to use Chinese daily language and read the Chinese materials of their majors; those who have obtained academic certificates in another country (including sending states, the same below) equivalent to the academic level of master's degrees in China are required to have the primary ability to use Chinese daily language and read the Chinese materials of their majors. *Chinese* and *Introduction to China* are compulsory courses for international doctoral students in our university.

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。

The educational system is 4 years, and the duration of the program is 3-8 years.

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。攻读博士学位留学生在在校期间，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 core courses of major. During school, doctoral students shall have the minimum 20 credits, among which 14 credits are degree courses and 6 credits are required links. The specific requirements are as follows:

1. 学位课（14学分），其中：

1. Degree courses (14 credits), of which:

公共课：

Public courses:

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);

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 professional 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), 包括:

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 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 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 get 1 credit upon completion;

3. 任选课与补修课程

3. Optional courses and supplementary courses

硕士阶段非本学科的博士生应补修由导师指定的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、科学研究与学位论文要求

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，博士生的资格考核、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 important supporting evidence which measures the quality of the cultivation outcomes and academic levels of the research. The doctoral qualification examination, topic selection report, mid-term review, pre-defense of dissertation, 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

博士生应在了解本研究领域国内外的现状、发展动态的基础上确定博士学位论文题目，选题要体现学科领域的前沿性和先进性。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 4 学期，开题时间距离申请答辩日期不少于 18 个月。

Doctoral students should determine the title of doctoral dissertation on the basis of understanding the current situation and development trends in this research field at home and abroad, and thesis proposal should reflect the frontier and advanced nature of the discipline field. The time for submitting the thesis proposal shall be determined by the supervisor according to doctoral students' progress. Generally, it shall be no later than the 4th semester after admission and no less than 18 months before the application of thesis defense.

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）。选题报告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 doctoral dissertation thesis proposal 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 thesis proposal of the dissertation. 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 doctoral supervisors as the main body. The thesis proposal 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 should be carried out once again to ensure the frontier and innovation of the topic.

博士生进行论文开题报告之前，应在指导教师的指导下，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。

Before carrying out the thesis proposal, doctoral students should, under the guidance of their supervisors, 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.

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。学位论文中期检查应在开题一年后进行，考

查小组应由 3-5 名教授（或具备副高职称的博导）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 shall be conducted one year after the report of the thesis proposal. The review team shall be composed of three to five professors (or doctoral supervisors with the deputy senior title), and examine the comprehensive abilities of the postgraduate students and the progress of the paper work comprehensively.

3. 科研成果要求

3. Requirements for scientific research achievements

博士学位论文的主要创新成果应在国内外重要学术刊物上公开发表。博士生在申请学位论文答辩前学术论文发表或科研成果的要求具体规定如下：

The main innovative findings of doctoral dissertation shall be published in important academic journals at home and abroad. The requirements for doctoral students to publish academic papers or obtain scientific research achievements before applying for thesis defense are specified as follows:

(1) 我校攻读博士学位的来华留学研究生，在完成培养计划要求的博士学位课程考试和学位论文工作的同时，博士学位论文的主要创新成果应在国内外重要学术期刊或国际会议上公开发表。来华留学博士研究生在申请学位论文答辩前以第一作者（或导师为第一作者、研究生为第二作者）且以华北电力大学的名义在所在学科顶级或权威期刊（以所在学科指定列表为准）上发表 2 篇高水平学术论文，或至少在中文核心期刊、国际期刊或国际会议（以所在学科指定列表为准）上发表 3 篇及以上与所研究领域相关的学术论文；或作为项目主研人完成的科研成果通过省、部级以上鉴定，结论为我国先进或国际先进水平；之后，方有资格申请博士学位论文答辩。

(1) While completing the doctoral examinations and thesis work required by the training program, the international doctoral students in our university shall have their main innovative results of doctoral dissertation be published in important academic journals or international conferences at home and abroad. The international doctoral students in our university shall, before applying for the thesis defense, publish two high-level academic papers in the top or authoritative journals of their disciplines (subject to the designated list of their disciplines) in the name of the first author (or the supervisor as the first author and the postgraduate student as the second author) and in the name of North China Electric Power University, or at least publish 3 or more academic papers related to the research field in Chinese core journals, international journals or international conferences (subject to the designated list of their disciplines), or have the scientific research results completed as the project lead researcher and passed the appraisal at or above the provincial

or ministerial level, with the conclusion of advanced in China or internationally; after that, they are eligible to apply for the doctoral dissertation defense.

(2) 博士生所发表的学术论文必须是学位论文研究工作的重要组成部分，并以华北电力大学为第一发表单位。

(2) The academic papers published by doctoral students must be an important part of the research work of their dissertation, and the first publication affiliation shall be North China Electric Power University.

凡不符合上述要求体现的成果，在学位申请时将一律不予考虑。

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

硕博连读学生在硕士期间发表的论文及取得的科研成果按以上规定同等对待。

The papers published and scientific research achievements obtained by the MD-PhD students of continuous academic program during the master stage shall be treated equally in accordance with the above provisions.

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》。博士学位论文可以是系统完整的学术论文，也可以是若干相对独立、且又相互关联的学术论文的结合体。来华留学博士生撰写学位论文可用汉语或英语撰写，但摘要部分须用汉语和英语详细书写。

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*. Doctoral dissertation can be systematic and complete academic paper, or a combination of several relatively independent and interrelated academic papers. The international doctoral students in China can write their

dissertations in Chinese or English, but the abstract part must be written in both Chinese and English in detail.

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. Basic application conditions of doctoral students' dissertation submission are as below:

(1) 修完所规定的学分要求；

(1) To meet the credit requirements;

(2) 通过博士资格考核；

(2) To pass the doctoral qualification examination;

(3) 完成论文开题查新报告与论文选题报告；

(3) To complete the reports on novelty search and the topic selection;

(4) 完成论文中期检查；

(4) To complete the mid-term review of dissertation;

(5) 满足学术论文发表与科研成果要求；

(5) To meet the requirements of academic thesis publication and scientific research achievements;

(6) 通过学位论文的预答辩；

(6) To pass the pre-defense of the dissertation;

(7) 完成学位论文的撰写并通过学位论文撰写规范审查。

(7) 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

学位申请者的博士学位论文的评审和答辩按照《华北电力大学学位授予工作细则》中有关条款的规定进行,答辩用汉语或英语。对论文答辩通过者,经论文答辩委员会主席签字后,交学位评定分委员会讨论审定,通过之后报送学校学位评定委员会批准授予博士学位;对论文答辩未通过、要求重新答辩者,经论文答辩委员会同意,可在 18 个月内修改论文,重新申请答辩一次。

The evaluation and defense of doctoral dissertations of the candidates shall be conducted in accordance with relevant provisions of the *Detailed Rules for Degree Awarding of North China Electric Power University*. The defense shall be conducted in Chinese or English. Those who have passed the thesis defense shall, after being signed by the Chairman of the Thesis Defense Committee, be reported to the Academic Degree Evaluation Subcommittee for discussion and approval, and then after approval, be reported to the Academic Degree Evaluation Committee for approval for the award of doctoral degrees; those who have failed the thesis defense and required another defense, with the consent of the Thesis Defense Committee, shall revise their dissertations within 18 months and re-apply for another defense.

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 defense time for postgraduates is generally arranged in June, while that for postgraduates of postponed graduation and early graduation is 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博士生最多可提前 1 年毕业。提前毕业的留学博士研究生,在申请学位论文答辩前须以第一作者(或导师为第一作者、研究生为第二作者)且以华北电力大学的名义在所在学科顶级或权威期刊(以所在学科指定列表为准)上发表 3 篇高水平学术论文,或至少在中文核心期刊、国际期刊或国际会议(以所在学科指定列表为准)上发表 4 篇及以上与所研究领域相关的学术论文;或作为项目主研人完成的科研成果通过省、部级以上鉴定,结论为我国先进或国际先进水平;之后,方有资格申请博士学位论文答辩。

Doctoral students who are particularly excellent and complete the contents specified in the training program ahead of time can graduate at most one year in advance. The international doctoral students who graduated in advance shall, before applying for the thesis defense, publish three high-level academic papers in the top or authoritative journals of their disciplines (subject to

the designated list of their disciplines) in the name of the first author (or the supervisor as the first author and the graduate student as the second author) and in the name of North China Electric Power University, or at least publish 4 or more academic papers related to the research field in Chinese core journals, international journals or international conferences (subject to the designated list of their disciplines), or have the scientific research results completed as the project lead researcher and passed the appraisal at or above the provincial or ministerial level, with the conclusion of advanced in China or internationally; after that, they are eligible to apply for the doctoral dissertation defense.

附表：核科学与技术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 Nuclear science and technology**

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(≥10 学分) Public courses (≥10 credits)	汉语综合(1) 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(2) Chinese Comprehension (2)	64	4	考试 Exam	2	
	基础理论课 Basic theoretical courses (≥2 学分) (≥ 2 credits)	矩阵论 Matrix Theory	32	2	考试 Exam	1	
		数值分析 Numerical Analysis	32	2	考试 Exam	1	
	专业核心课 Specialized core courses (≥2 学分) (≥ 2 credits)	传热学 Heat Transfer	32	2	考试 Exam	1	
		流体力学 Fluid Mechanics	32	2	考试 Exam	1	
		核电厂系统 Nuclear Power Plant System	32	2	考试 Exam	1	
		核材料 Nuclear Material	32	2	考试 Exam	1	
		核反应堆热工水力学 Thermal Hydraulics of Nuclear Reactors	32	2	考试 Exam	1	
		高等核反应堆物理分析 Physical Analysis of Advanced Nuclear Reactors	32	2	考试 Exam	1	
		原子核物理概论 Introduction to Nuclear Physics	32	2	考试 Exam	1	
		核电站仪表与控制 Instrumentation and Control of Nuclear Power Plant	32	2	考试 Exam	1	
高等核反应堆安全分析 Safety Analysis of Advanced Nuclear Reactors		32	2	考试 Exam	1		
必修环节(6 学分) Require	无 None	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		

d links (6 credits)		研读专业经典名著 Professional Classics Studying		1	考查 Review of performan ce	
		文献综述与开题报告 Literature Review and Thesis Proposal		2	考查 Review of performan ce	
		前沿讲座 Cutting-edge Lectures	8次 times	1	考查 Review of performan ce	
		博士论坛 Doctoral Forum	2次 times	1	考查 Review of performan ce	
任选课 Optiona l courses	无 None	补修课程 Supplementary Courses				附注 Note

附注：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

Note: 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.