



technology in the research field. Have the consciousness of innovation and the ability to engage in scientific research independently or undertake specialized technical work independently.

### 三、研究方向

#### III. Research Direction

(一) 本学科为一级学科学位授予权专业, 包括岩土工程、结构工程、市政工程、供热、供燃气、通风及空调工程、防灾减灾工程及防护工程和桥梁与隧道工程六个二级学科。

(I) This discipline is a first-level discipline with degree granting right, including six second-level disciplines: Geotechnical Engineering, Structural Engineering, Municipal Engineering, Heating, Gas Supply, Ventilation and Air Conditioning Engineering, Disaster Prevention and Mitigation Engineering and Protective Engineering, and Bridge and Tunnel Engineering.

(二) 研究方向

#### (II) Research direction

##### 1. 结构工程

##### 1. Structural Engineering

##### 2. 岩土与环境工程

##### 2. Geotechnical and Environmental Engineering

##### 3. 地下工程与隧道工程

##### 3. Underground Engineering and Tunnel Engineering

##### 4. 城市废弃物高质化利用

##### 4. High-quality Utilization of Urban Wastes

##### 5. 建筑给水排水理论与技术

##### 5. Theory and Technology of Building Water Supply and Drainage

##### 6. 室内环境控制与暖通空调系统优化

##### 6. Indoor Environmental Control and Optimization of HVAC System

##### 7. 建筑节能与可再生能源利用技术

##### 7. Building Energy Saving and Renewable Energy Utilization Technology

##### 8. 工程结构可靠性与安全评估

##### 8. Reliability and Safety Assessment of Engineering Structure

### 四、培养方式

#### IV. Training Method

1. 硕士生的培养方式为导师负责制, 提倡按二级学科组成导师指导小组集体培养, 导师是研究生培养第一责任人, 要了解掌握研究生的日常生活状况, 将专业教育与日常生活教育有机融合, 严格要求学生遵守科学道德和学术规范。对跨学科或交叉学科以及与有关研究

单位联合培养研究生时,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 of postgraduates implements supervisor responsibility system, and advocates composing the supervisor steering group for collective cultivation according to the second-level disciplines. 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, and strictly require students to abide by scientific ethics and academic norms. For interdisciplinary or cross-disciplinary training or training in conjunction with relevant research units, 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 student's 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 master candidates according to the requirement of the training scheme, based on which to formulate a training plan for individual graduate student and supervise the implementation according to the plan.

3. 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。

3. 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 technique 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 the 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 the 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

全日制硕士研究生学制为 3 年，学习年限 2-4 年。

The educational system of full-time postgraduates 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，要求学位课不少于 22 学分，总学分应不少于 32 学分。具体要求如下：

The course study of postgraduates shall implement the credit system, requiring no less than 22 credits for degree courses and no less than 32 credits for the total credits. 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：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.

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。

Basic courses and specialized courses of disciplines can be arranged as a whole, requiring the sum of the credits of the two no less than 8 credits.

学位课程均为考试课程。学位课必须采用课堂授课的方式进行；学位课应全部在课程学习阶段完成。

Degree courses are all examination courses. Degree courses must be conducted in the classroom; all degree courses should be completed at the course learning stage.

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/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 dissertation. 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 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 产单位参加调研和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, departments and supervisors should arrange postgraduates to participate in practice, such as teaching some chapters of undergraduate courses, and participate in guiding curriculum design, internship, experiment, supervising and answering questions, 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, 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 32 学分。

Students can take specialized courses of other disciplines and courses in the catalogue of postgraduate courses according to their own situation, and the total credits shall not be less than 32 credits.

### 4. 补修课:

#### **4. Supplementary courses:**

学士阶段非本学科的硕士生应补修本专业本科生的必修课程, 补修课不记学分, 但有科目和成绩要求, 应补修而未补修或者补修成绩不合格者不能参加学位论文答辩。补修课程不计入总学分。对跨学科专业考取的研究生的, 是否需补修相关课程由导师决定。

Postgraduates who are not in this discipline at the bachelor stage should take compulsory courses for undergraduates majoring in this major. No credit is recorded for supplementary courses, but there are subject and score requirements for supplementary courses, and the students who should have taken the supplementary courses but have not taken the courses or whose scores are not up to standard cannot participate in the thesis defense. Supplementary courses are not included in the total credit. For postgraduate who is admitted with interdisciplinary majors, it is decided by the supervisor whether it needs to take the supplementary courses or not.

5. 硕士研究生的课程学习一般在第一学年内完成。具体课程设置见附表。

5. Course learning for postgraduates is usually completed in the first academic year. 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的能力, 使研究 生的综合业务素质在系统的科学研究或工程实际训练中得到全面提高。

Scientific research and degree thesis work are important part of postgraduate training, which is to cultivate postgraduates' independent thinking, innovative spirit and the ability to engage in scientific research or undertake specialized technical work, so that the comprehensive professional quality of postgraduates can be improved in an all-round way in systematic scientific research or practical engineering training.

## 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 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 this discipline, and the selection of applied topics meeting the needs of national economic and social development is encouraged. When determining the content and workload of the degree thesis work, the supervisor should fully consider the knowledge structure, work abilities and training duration of postgraduates.

硕士开题由院系统一组织, 全日制学术型硕士研究生的文献综述与开题报告会一般要求在第二学期期末前完成, 开题时间距离答辩日期一般不少于一学年。按专业方向组织考核小组(3-5 人组成)对研究生的文献综述和开题内容进行考查。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。文献综述与开题报告的基本要求为: 字数应在 5000 字以上; 阅读的主要参考文献在 20 篇以上, 其中外文文献不少于 10 篇。对文献综述与开题报告工作的具体要求见《华北电力大学硕士研究生必修环节实施细则》。开题报告通过者给予 1 学分。

The thesis proposal is uniformly organized by the departments. The literature review and thesis proposal of full-time academic postgraduates are generally required to be completed before the end of the second semester, and the time for thesis proposal is generally at least one academic year before the date of defense. Organize an assessment team (composed of 3-5 members) according to the professional direction to inspect the literature review and thesis proposal of postgraduates. The main contents include the origin of the topic and the research background and significance, the research in this direction at home and abroad and the development situation

analysis, the main research content of the thesis, the research program and schedule, and the expected goals, the available conditions and required funds for the completion of the research task, the difficulties and problems that may be encountered in the research process and the measures to be taken to solve them and the main references. The basic requirements of literature review and thesis proposal are as follows: the number of words should be more than 5,000 words, and there must be more than 20 main references, of which at least 10 references are in foreign languages. 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. Those whose thesis proposals meet the requirements will be given 1 credit.

## 2. 论文中期检查

### 2. Mid-term review of the thesis

全日制学术型硕士研究生的学位论文中期检查一般在第四学期末完成, 2 年毕业的全日制学术型研究生要求在第四学期的前三周内完成, 按专业方向组织考核小组 (3-5 人组成) 对研究生的论文研究内容进行考查。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《华北电力大学学术型硕士研究生必修环节实施细则》。

The mid-term review of full-time academic postgraduates' degree thesis is generally completed at the end of the fourth semester, and the mid-term review of degree thesis is required to be completed within the first three weeks of the fourth semester for full-time academic postgraduates graduating in 2 years. The assessment team (composed of 3-5 members) is organized based on the professional direction to inspect the research contents of postgraduates' theses. The main contents of the mid-term review are: whether the thesis work is carried out according to the scheduled content and progress of the thesis proposal; the completed research content and results; the existing or expected problems; the possibility of completing the thesis on time. For the specific requirements for the mid-term review of degree thesis work, refer to the Detailed Rules for the Implementation of Required Links for Academic 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 dissertation shall be given 1 credit.

## 3. 科研成果要求

### 3. Requirements for scientific research achievements

鼓励留学生公开发表与研究工作相关的学术论文。

International students are encouraged to publish academic papers related to their research work.

#### 4. 学位论文撰写

#### 4. Degree thesis writing

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《华北电力大学研究生学位论文撰写规范》。

Master dissertation is a comprehensive summary of the scientific research work of the postgraduate, and it is the important academic literature describing its research results and reflecting its research level. It is the basis for applying for and awarding master's degree. 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, refer to the Norms for the Master Dissertation Writing of North China Electric Power University.

#### 5. 学位论文评审与答辩

#### 5. Review and defense of degree thesis

硕士研究生学位论文的实际工作时间不少于 1.5 年。

The actual working time of master dissertation should not be less than 1.5 years.

学位论文应能体现硕士生具有宽广的理论基础和较强的独立工作能力，应对所研究的课题应当有新的见解，论文工作应采用先进的实验手段、科学的研究方法，使硕士生在科研方面受到较全面的训练。硕士生应按照硕士学位论文写作的有关规定和要求，进行学位论文的撰写。

The degree thesis should reflect that the postgraduates have a broad theoretical basis and strong ability to work independently, they should have new views on the topics studied, and advanced experimental means and scientific research methods should be adopted in the thesis work, so that postgraduates can receive more comprehensive training in scientific research. Postgraduates should write their master dissertation in accordance with the relevant regulations and requirements of master dissertation writing.

硕士学位论文应在导师指导下由硕士生独立完成，与他人合作或在前人基础上继续进行的课题，必须在论文中明确指出本人所做的工作。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 master dissertation should be completed by the postgraduate independently under the guidance of the supervisor. For the topic studied together with others or continued on the basis of predecessors, the work that the postgraduate has done must be clearly pointed out in the

dissertation. 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》等相关规定执行。毕业生的答 辩时间一般安排在 6 月之前，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 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 for Degree Awarding of North China Electric Power University. The defense time for postgraduates is generally arranged before 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**

硕士研究生学业优秀者可以申请 2 年毕业，必须符合以下条件：

Particularly outstanding postgraduates can apply for graduation after 2 years of study on the basis of meeting the following conditions:

正式发表 2 篇 SCI 期刊（不含开源期刊）或一级学报论文（以第一作者身份，或导师第一作者、本人第二作者；华北电力大学为第一单位），并学位论文质量达 到答辩要求。国际或国内一级学会大会优秀论文奖论文，或研究生的学位论文工作成 果（署名华北电力大学）获得省部级三等及以上奖励一项（本人排在前 5 名），或获 得国内外发明专利授权 1 项，至多可相当于前述论文 1 篇。

Officially publish two theses in SCI journals (excluding open access journals) or first-class academic journal theses (the student as the first author, or the supervisor as the first author and the student as the second author; North China Electric Power University as the first unit), and the quality of the degree thesis meets the defense requirements. The thesis is granted with Excellent Thesis Award of first-class international or domestic association conference, or the work achievements of master dissertation (with North China Electric Power University as the author affiliation) win a provincial-and-ministerial-level third-class or above award (the postgraduate is in the top 5), or the postgraduate obtains a patent for invention at home and abroad, which can be equivalent to at most one of the above-mentioned theses.

附表：土木工程一级学科学术学位硕士研究生培养方案（留学生）课程设置表（英语授课）

**Schedule:Curriculum (Taught in English) of Training Program for Postgraduates  
(International Student) in First-level Discipline of Civil Engineering**

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 Public courses (10 学分) (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 (不少于 4 学分) (No less than 4 credits)		矩阵论 Matrix Theory	32	2	考试 Exam	1	
			数理方程 Equations of Mathematical Physics	32	2	考试 Exam	1	
			模糊数学 Fuzzy Mathematics	32	2	考试 Exam	1	
			小波分析及其应用 Wavelet Analysis and Its Application	32	2	考试 Exam	2	
			非线性数值分析 Nonlinear Numerical Analysis	32	2	考试 Exam	1	
			数值分析 Numerical Analysis	32	2	考试 Exam	1	
			规划数学 Mathematics for Programming	32	2	考试 Exam	1	
	学科基础课 Basic courses of disciplines (不少于 4 学分) (No less than 4 credits)		弹塑性力学 Elastoplastic Mechanics	32	2	考试 Exam	2	可以将学科基础课与学科专业课统筹设置, 要求不少于 8 学分。 Basic course s and special ized course s of
			结构动力学 Structural Dynamics	32	2	考试 Exam	1	
			有限单元法及程序开发 Finite Element Method and Program Development	32	2	考试 Exam	2	
			高等岩土力学 Advanced Geotechnical Mechanics	32	2	考试 Exam	2	
			高等工程热力学 Advanced Engineering Thermodynamics	32	2	考试 Exam	1	
			高等工程流体力学 Advanced Engineering Fluid Mechanics	32	2	考试 Exam	1	
			高等传热学 Advanced Heat Transfer	32	2	考试 Exam	1	

学科专业课 Specialized courses of disciplines (不少于 4 学分) (No less than 4 credits)	专业英语 Specialty English	16	1	考试 Exam	1	disciplines can be arranged as a whole, requiring the sum of the credits of the two no less than 8 credits.	
	岩土工程测试技术 Testing Technology of Geotechnical Engineering	32	2	考试 Exam	2		
	土动力学 Soil Dynamics	32	2	考试 Exam	2		
	结构分析程序设计 Structural Analysis Program Design	32	2	考试 Exam	2		
	检测理论与应用 Detection Theory and Application	32	2	考试 Exam	1		
	建筑给水排水理论 Building Water Supply and Drainage Theory	32	2	考试 Exam	2		
	水处理技术与原理 Technology and Principle of Water Treatment	32	2	考试 Exam	2		
	优化理论与优化控制 Optimization Theory and Optimal Control	32	2	考试 Exam	2		
	建筑热模拟 Building Thermal Simulation	32	2	考试 Exam	2		
	建筑高效供能技术 Efficient Energy Supply Technology for Building	32	2	考试 Exam	2		
	室内环境及控制 Indoor Environment and Control	32	2	考试 Exam	2		
	暖通空调系统分析与评价 Analysis and Evaluation of HVAC System	32	2	考试 Exam	2		
		暖通空调新技术 New Technology of HVAC	32	2	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	考查 Review of performance	1	
		专题课程/seminar 课程 Program Course/Seminar Course	16	1	考查 Review of performance	2	
		实践环节 (实验、实践) Practice Links (Experiment, Practice)		1	考查 Review of performance	答辩前 Before thesis defense	
		学术活动 Academic Activities		1	考查 Review of performance	答辩前 Before thesis defense	
		文献综述与选题报告 Literature Review and Thesis Proposal		1	考查 Review of performance	3	
		论文中期检查 Mid-term Review of the Thesis		1	考查 Review of performance	4	

	选修课 Optional courses	科技信息检索与论文写作专题讲座（必选） Special Lecture on Sci-tech Information Retrieval and Thesis Writing (Required)	16	1	考查 Review of performance	1	
		可选修其它学科专业课程和“研究生课程目录”上课程 Postgraduates can take specialized courses of other disciplines and courses in the catalogue of postgraduate courses					
补修课 Supplementary courses		暖通空调 Heating Ventilating and Air Conditioning (HVAC)					
		建筑给排水 Building Water Supply and Drainage					
		钢筋混凝土 Reinforced Concrete					
		制冷技术 Refrigeration Technology					