

# **ECUT Doctoral Program for IAEA**

## **Doctoral Program in Nuclear Science and Technology**

### **for Graduate Students**

(First-level Discipline Code: 0827)

#### **1. Discipline Introduction**

Nuclear Science and Technology originated from the undergraduate majors of Radioactive Geophysical Exploration and Analysis of Radioactive Rocks and Minerals established in 1956. The postgraduates in Nuclear Technology and Applications were enrolled in 1993. The discipline obtained authorization to confer a master's degree in Nuclear Technology and Applications in 2000. In 2010, it was accredited as a first-level discipline to confer master's degrees in Nuclear Science and Technology, and acquired the authorization to confer doctoral degrees in this field in 2021, starting to enroll doctoral students in 2022. The discipline is a key and a high-level construction discipline in Jiangxi Province.

Focusing on the nuclear energy industry, the discipline has established three research directions: Nuclear Technology and Applications, Radiation Protection and Environmental Protection, and Nuclear Fuel Cycle and Materials. ECUT has distinctive expertise in areas of deep uranium exploration and nuclear technology surveys, nuclear electronics, radiation detection technology, high-level radioactive waste geological disposal, etc.

The program aims to collaborate with the IAEA and its member countries to cultivate professional in the fields such as Nuclear Technology and Applications, Uranium Mining and Metallurgy, Nuclear Safety, Radiation Protection, and Nuclear Waste Disposal.

#### **2. Discipline Directions**

**The doctoral program in Nuclear Science and Technology covers three secondary disciplines:**

(1) Nuclear Fuel Cycle and Materials: This area primarily focuses on deep uranium exploration technology, uranium resource extraction techniques, and integrated recovery techniques for associated valuable elements. Research in this domain includes advanced processes in the post-treatment of water-based methods and advanced technologies in glass solidification.

(2) Nuclear Technology and Applications: This field mainly delves into key technologies such as nuclear radiation detection methods, development of radiation source technology, and instrument equipment. Additionally, it conducts research in novel detector materials, advanced nuclear energy systems, and physical performance testing technologies for reactor fuels and component materials.

(3) Radiation Protection and Environmental Protection: The major research areas include environmental governance for decommissioning nuclear facilities, environmental chemical behavior of radioactive nuclides, and adsorption separation technologies. Additionally, it explores emergency response technologies and strategies for nuclear accidents and radiation incidents.

### **3. Educational Objectives**

In accordance with the requirements of the *Regulations of the People's Republic of China on Academic Degrees*, the doctoral students of the program shall be cultivated for four years to be high-level research professionals with all-round development and with strong ability of academic exchange and scientific creativity.

(1) Academic ethics and academic norms. Doctoral students are supposed to have good moral personality and abide strictly by the academic requirements and the professional ethnics.

(2) Theoretical knowledge and practical ability. Specific knowledge should be mastered such as Nuclear fuel cycle and materials, nuclear technology and

applications, nuclear waste treatment and geological disposal methods. Doctoral students should have the ability to independently engage in scientific research work and undertake specialized technical work.

#### **4. Schooling Length and Credit Requirements**

This doctoral program follows a flexible academic system, with a basic program duration of 4 years and a maximum cumulative study period of 6 years (including periods of suspension). For students pursuing a continuous master's-doctorate program, the study period is calculated from their enrollment in the master's program, with a basic program duration of 6 years and a maximum duration not exceeding 8 years (including periods of suspension).

The total credit requirement is no less than 20 credits, comprising 16 credits for coursework (8 credits for core courses, 4 credits for compulsory courses, and 4 credits for elective courses) and 4 credits for compulsory components.

#### **5. Training Methodology**

(1) This doctoral education project adopts a mentorship system, where if necessary, co-mentors or guidance committees may be established to jointly supervise. When cultivating doctoral students across different disciplines (or interdisciplinary fields), assistant mentors should be appointed from relevant disciplines to assist in guidance.

(2) The communication between the supervisor and the doctoral students should be taken regularly.

(3) Under the guidance of mentors, doctoral students shall be engaged in relevant coursework, literature review, academic exchanges, topic selection, and independent scientific research, aiming to achieve innovative research outcomes.

#### **6. Course Arrangement**

Category		Course Title	Hour	Credit	Term	Remarks
Degree Courses	Public Basic Course	Basic Chinese language	48	3	1	All courses required, with a total of 8 credits
		Overview of Chinese Culture Profile	32	2	1	
	Specialized Basic Course	Lecture on Frontiers in Nuclear Science and Technology	16	1	1	
		Particle Physics and Nuclear Physics	32	2	1	
Non-degree Courses	Specialized Optional Courses	Higher Radiation Doses and Protection	32	2	1	4 courses in each direction, a total of 8 credits required
		Advanced Nuclear Fuel Cycle Topics	32	2	1	
		Modern Nuclear Electronics and Instrumentation	32	2	1	
		Modern Radiation Detection and Analysis	32	2	1	
		Advanced Reactor Physics and Numerical Computation	32	2	2	
		Modern Nuclear Analysis Techniques and Applications	32	2	2	
	Compulsory Education Components	Literature Review		1		4 credits are required
		Thesis Proposal		1		
		Mid-term Assessment		1		
		Academic Activities		1		
<b>Total Required Credits</b>		<b>20 Credits</b>				

## 7. Compulsory Education Components

Compulsory components of doctoral student education include literature review reports, thesis proposal presentations, mid-term assessments, and academic activities, totaling no less than 4 credits in compulsory segments.

### (1) Literature Review (1 credit)

Graduate students should extensively read articles in the corresponding semester. Literature reading is assessed and recorded by an expert group organized by a discipline before the commencement of dissertation. The literature review should encompass comprehensive and representative information, considering advancements both domestically and internationally. The report should be approximately 20,000 words, referencing no fewer than 50 high-level papers which reflect the latest research achievements.

### (2) Thesis Proposal (1 credit)

The topic report should be carried out after the first step of examination of doctoral thesis is qualified. The selection of a doctoral thesis topic should stem from its research, addressing cutting-edge scientific issues or significant technological demands, demonstrating innovation and advancement. Thesis proposal reports should be completed by the end of the fourth semester. The report content requirements include:

a. Introduction of the topic's origin, objectives, significance, and global research status and development trends.

b. Major research work and plans for the thesis topic, including implementation strategies, technical routes, identified issues, etc.

c. Expected outcomes and application value of the topic.

### (3) Mid-term Assessment (1 credit)

The mid-term assessment primarily evaluates the progress of doctoral students in their thesis work, achievements made, major issues encountered, proposed solutions, future work plans, and the expected completion time of the thesis. The Postgraduates will review, analyze and evaluate the literature monographs they read or report on their research progress. The tutors and other teachers will discuss and give guidance from an academic point of view. To encourage graduate students to present their Research Report.

#### (4) Academic Activities (1 credit)

Doctoral students must participate in academic activities within their field of study, as follows:

- (1) Attendance at academic lectures is mandatory for all doctoral students.
- (2) Doctoral students must present academic reports at international, national, or regional conferences in their field of study.

### **8. Basic Degree Requirements**

Implemented in accordance with the State Council Academic Degree Committee's *Basic Requirements for Doctoral and Master's Degrees in First-Level Disciplines*, *Implementation Regulations for Degree Awarding at East China University of Technology*, and each college's *Regulations on Basic Requirements for Innovative Achievements in Graduate Degree Applications*.