

ECUT Doctoral Program for IAEA

Doctoral Program in Geological Resources and Geological Engineering

(First-level Discipline Code: 0818)

1. Discipline Introduction

Geological Resources and Geological Engineering originated from the major of radioactive geological surveys and exploration, radioactive geophysical exploration, and undergraduate programs in radioactive hydrogeology which are the earliest domestic programs in 1956. It successively became a key discipline for the Ministry of Nuclear Industry, the Commission of Science, Technology, and Industry for National Defense, and a key discipline in Jiangxi Province. It is recognized as a national defense specialty and stands as a top discipline in Jiangxi Province. Since 1985, it has enrolled Master's students, and established a center for post-doctoral studies in 2014. In 2021, it was approved as a primary discipline for conferring doctoral degrees, covering four secondary disciplines: Mineral Survey and Exploration (081801), Exploration Geophysics (081802), Hydrogeology and Engineering Geology (0818Z1), and Geoinformation Technology (081804).

The aims of the discipline is to meet the strategic needs of national nuclear and development, as well as the requirements for local economic and social development. It focuses on the exploration and development of uranium and non-ferrous metal resources, forming four research directions: mineral survey and exploration, exploration geophysics, hydrogeology and engineering geology, and geoinformation technology. Within fields such as uranium metallogeny theory and exploration technology, 3D geological modeling, and microbial leaching uranium, it has

developed China's most distinctive technological innovation and talent cultivation system in nuclear geology. It possesses teaching and research platforms such as the State Key Laboratory of Nuclear Resources and Environment, the Defense Key Discipline Laboratory of Radioactive Geology and Exploration Technology, the International Atomic Energy Agency (IAEA) Uranium Geology Training Center, and the National Experimental Teaching Demonstration Center of Radioactive Geology. The school was honored national-level outstanding teams in teaching and research field. The Resource Survey Engineering and Exploration Technology discipline, along with Exploration Technology and Engineering, are internationally accredited for engineering education and have been approved as national and provincial first-class professional construction discipline.

2. Discipline Directions

The doctoral program in Geological Resources and Geological Engineering covers four secondary disciplines:

(1) Mineral Survey and Exploration: Mainly focus on the metallogenic laws, theories, and predictive modeling of endogenic and exogenic uranium polymetallic deposits. Focuses on scientific and technical issues related to uranium polymetallic resource exploration and evaluation.

(2) Exploration Geophysics: Focus on the researches methods and technologies for probing the deep structure of the Earth, mineral resource detection, and geological hazard detection. Explores forward and inverse modeling theories, imaging, and instrument development related to these scientific and technical issues.

(3) Hydrogeology and Engineering Geology: Mainly delves into scientific, technical, and engineering issues concerning radioactive hydrogeology, uranium polymetallic ore mining and metallurgy methods, environmental assessment, and restoration of uranium polymetallic mines, as well as geological disposal of nuclear waste.

(4) Geoinformation Technology: Explores scientific and technical issues regarding the mining and processing of geoscience big data, as well as

three-dimensional geological surveying and modeling.

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, which includes uranium mineralization theory and mineralization prediction model, uranium ore collection and mine environmental standards, nuclear resources exploration methods and techniques, and nuclear waste treatment. Doctoral students should have the ability to independently engage in scientific research work and undertake specialized technical work.

4. Schooling Length and Credit Requirements

The doctoral program adopts a flexible curriculum, with a basic duration of 4 years and a maximum cumulative study period of 6 years(including suspension). Integrated Master's and Doctoral students have a basic study period of 6 years, with a maximum duration not exceeding 8 years (including suspension).

The total credits should not be less than 20, including 16 credits for coursework (8 credits for degree course, 4 credits for mandatory courses, and 4 credits for elective courses) and 4 credits for compulsory components.

5. Education 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	Hour	Credit	Term	Remarks
Degree program	Common basic course	Basic Chinese language	48	3	1	All courses required, total 8 credits
		Overview of Chinese Culture	32	2	1	
	Specialized basic course	Frontiers in geological resources and geological engineering	16	1	1	
		Geological resources and scientific methodology of geological engineering	32	2	1	
Non-degree program	Specialized compulsory course	Geological resource exploration and evaluation	32	2	1	2 courses in each direction for a total of 4 credits
		Remote sensing technology and its application(Previously optional)	32	2	1	
		Geophysical Data Processing and Interpretation(new)	32	2	1	
		Modern Geophysical Exploration	32	2	1	
		Advanced geological engineering	32	2	1	
	specialized	Metalotectonic	32	2	2	Take 2-3
	optional	Uranium Geology	32	2	2	

	course	3D geological survey and visualization technology of ore field	32	2	2	courses according to the research direction. At least 4 credits in total required.
		Frontiers of Geophysical Inversion and Imaging	32	2	2	
		Geophysics of deep resource exploration	32	2	2	
		Applied hydrogeochemistry	32	2	2	
		Technology and Safety of Uranium Mining, Beneficiation and Metallurgy	32	2	2	
	Compulsory Education Components	Literature review		1		4 credits are required
		Thesis proposal		1		
		Mid-term assessment		1		
		Academic activity		1		
		Social practice, orientation education, academic norms, and ethics education, preliminary defense, etc.				
Total		20 Credits				

7. Compulsory Education Components

Compulsory components of doctoral student education include literature review reports, thesis proposal presentations, mid-term assessments, research, 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*.