

地下水科学与工程专业培养方案

专业名称与代码： 地下水科学与工程 080109S (081404M)

专业培养目标： 本专业培养具有扎实自然科学知识、创新意识、良好科学作风，在德、智、体全面发展的地下水科学与工程领域的高级专门人才。毕业生不仅具有坚实的地质学基础和水资源方面的专业基础知识，同时具备计算机仿真技术、3S 技术、现代分析测试技术和外语等方面应用能力，能够运用先进工程技术手段从事地下水资源开发与保护，以及针对人类活动诱发的人文地质工程地质问题，进行勘察、评价及治理的高级工程技术人员。

专业培养要求： 本专业学生具有扎实的自然基础科学知识，具有较好的外语水平和计算机运用能力。在牢固掌握数学、物理、化学、地质学、外语、计算机知识的基础上，学习水文地质工程地质的基本原理，掌握水文地质工程地质调查、地下水渗流模拟、地下水资源勘察、评价及开发保护、地下防排水工程等技术与方法。受到野外测绘、调查、测试等方面基本训练并掌握相关专业的基本技能，具有应用所学专业基础知识从事科学研究和分析解决实际问题的初步能力。

毕业生应获得以下几方面的知识和能力：

1. 掌握地质基础理论、技能和工作方法；
2. 初步掌握地下水有关的基本原理、主要的实验、测试方法和分析技术；
3. 具备对地下水形成、埋藏、分布和运移规律等进行调查、评价和综合分析的基本能力；
4. 具备对地下水资源进行综合评价和开发设计方面的基本能力；
5. 具备解决因地下水所引起有关地质工程问题的基本能力；
6. 熟悉国家有关水资源的方针、政策和法规；具有一定的管理知识和能力；
7. 掌握资料查询以及获取信息的基本方法，具有资料归纳、整理和综合分析并加以正确表达的能力。

主干学科： 地质工程、土木工程、水利工程、环境工程。

核心课程： 普通地质学、构造地质学、水力学、水文地质学基础、地下水动力学、水文地球化学、土力学、岩体力学、工程地质学基础、水资源开发与保护、工程水文地质学、环境地质学、水文地质工程地质勘察方法等。

主要专业实验： 水力学实验；水文地质学基础系列实验、水动力学实验；水化学分析实验；土质土力学实验等。

主要实践性教学环节： 工程测量实习、北戴河地质认识实习、周口店地质教学实习，三峡专业教学实习、计算机语言编程课程设计、大型专业课程设计、毕业实习与毕业设计等约 33~34 周。

修业年限： 四年。

授予学位： 工学学士。

相近专业： 环境工程、地质工程、土木工程。

Program For Groundwater Science and Engineering

Specialty and Code: Groundwater Science and Engineering 080109S (081404M)

Education Objective: The program aims at cultivating engineers and specialists with knowledge of natural sciences, groundwater science and engineering. The graduates will possess not only the specialized knowledge in geological and water resources engineering, but also the technology of groundwater simulation '3S' a foreign language, and through the use of advanced technology in engineering they can investigate, evaluate, study and solve the problems in the fields of hydrogeology and engineering geology.

Education Requirements: Students must attain knowledge of natural science, a foreign language and computer applications. Based on mathematics, physics, chemistry, a foreign language, computer studies, the students will master the required knowledge and technology for investigation in hydrogeology and engineering geology, the simulation of groundwater osmosis, groundwater resource prospecting, evaluation and protection of water resources, underground drainage technology. They will obtain a basic knowledge in field surveying, investigation, measurement and other related skills through field training, possessing primary skills and related knowledge in order to resolve problems in engineering practice and scientific research.

Graduates Are Required:

1. To have basic theoretical knowledge and skills pertaining to geological science.
2. To have proficiency in basic experimental techniques, measurement methodology and analytical technology on groundwater resources.
3. To have basic and scientific analytical abilities to assess groundwater formation, embedding, distribution and movement regimes.
4. To have basic ability in scientific design evaluation and exploitation of groundwater resources.
5. To have the ability to resolve basic problems caused by groundwater reserves.
6. To be proficiency with policies and regulations about water resources, and the knowledge and ability of management.
7. To master the basic methods of literature search and information acquisition, possess the essential understanding of conclusion, organization, scientific analysis and correct expression.

Major Disciplines: Geotechnical Engineering, Civil Draulic, Hydraulic Engineering and Environmental Engineering.

Main Courses: Hydraulics, Hydrogeology, Groundwater Hydrodynamics, Hydro-geochemistry, Soil Mechanics, Rock Mechanics, Engineering Geology, Water Resources Exploitation and Protection, Engineering Hydrogeology, Environmental Geology

and Investigation and Survey Skills for Groundwater and Geoengineering.

Lab Experiments: Hydraulic Testing, Hydrodynamics Testing, Hydrochemistry Testing, Soil Mechanics Testing, Phreatic Water and Confined Water Simulation, Groundwater Flow Net Simulation.

Practical Work: Engineering Survey Practice, Cognitive Geological Field Practice (at Beidaihe), Instructive Practice in Geology (at Zhoukoudian), Instructive Practice for Major (at the Three Gorges), Computer Program Design Practice, Course Project, Graduation Practice and Design. All the above field practice will require 33~ 34 weeks.

Duration: Four years.

Degree Granted: Bachelor of Science.

Related Specialties: Environmental Engineering, Geotechnical Engineering, and Civil Engineering.

地下水科学与工程专业课程教学计划表
Course Descriptions of Groundwater Sciences and Engineering

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		学期学分分配 Semester Credits											
					讲课 Lec.	实验 Lab.	一	二	三	四	五	六	七	八				
							1st	2nd	3rd	4th	5th	6th	7th	8th				
通识教育课 Liberal Education Courses	必修 Compulsory	11706200	马克思主义基本原理 Principles of Marxism	3	48	48		3										
		11706500	毛泽东思想与中国特色社会主义理论体系概论 Mao Tse-tung Thought and Introduction to the Theoretical System of Socialism with Chinese Characteristics	4	64	64				4								
		11711800	中国近现代史纲要 The Essentials of Modern Chinese History	2	32	32					2							
		120002*0	思想道德修养与法律基础 Morality Education and Fundamentals of Law	3	48	48			1.5	1.5								
		113027*0	体育 Physical Education	6	96	96			1.5	1.5	1.5	1.5						
		109005*0	大学英语 College English	12	192	192			2.5	2.5	3.5	3.5						
		11904100	计算机高级语言程序设计 (C) Computer High-level Language (C)	3.5	56	40	16			3.5								
		20413200	水资源与环境专业导论 Introduction to Groundwater and Environmental Sciences	1	16	16			1									
		14300100	军事理论 Military Theory	2	32	32			2									
	选修 Elective	TX35000Z	自然科学类 Natural Science	2	32	32												
		TX35000G	工程技术类 Engineering	2	32	32												
		TX35000S	社会科学类 Social Science	2	32	32												
		TX35000R	人文艺术类 Humanities & Arts	2	32	32												
		TX35000J	经济管理类 Economy & Management	2	32	32												
		其他类 Other Courses	2	32	32													
		小计 Sum		48.5	776	760	16	11.5	9	9	7							

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		学期学分分配 Semester Credits								
					讲课 Lec.	实验 Lab.	一	二	三	四	五	六	七	八	
							1st	2nd	3rd	4th	5th	6th	7th	8th	
学科基础课 Disciplinary Fundamental Courses	212028*2	高等数学 B Advanced Mathematics B	11	176	176		4.5	6.5							
	21206300	数学实验 Mathematics Experiments	1	16		16		1							
	212093*0	大学物理 C College Physics C	7	112	112			3.5	3.5						
	212092*2	物理实验 B Physical Experiments B	3.5	56		56		2	1.5						
	20302403	大学化学 C College Chemistry C	4	64	50	14			4						
	21208803	线性代数 C Linear Algebra C	2.5	40	40			2.5							
	21209602	概率论与数理统计 B Probability and Mathematics Statistics B	3	48	48				3						
	21114302	测量学 B Surveying B	2.5	40	40		2.5								
	20508002	工程力学 B Engineering Mechanics B	5	80	72	8				5					
	20714600	建筑制图 Architecture Drawing	3.5	56	44	12				3.5					
	20105300	普通地质学 Physical Geology	3	48	48			3							
	20105200	矿物岩石学 Mineralogy and Lithology	2.5	40	40				2.5						
	20104002	构造地质学 B Structure Geology B	3	48	48					3					
	20101600	地貌学及第四纪地质学 Geomorphology and Quaternary Geology	2.5	40	40					2.5					
	20714703	电工及电子技术 C Electrician and Electron Technology C	4	64	54	10					4				
	小计 Sum		58	928	812	116	7	18.5	14.5	14	4				
专业主干课 Main Specialty Courses	20408400	水力学 Hydraulics	2.5	40	32	8				2.5					
	20409101	水文地质学基础 A The Fundamental of Hydrogeology A	4	64	40	24					4				
	20400801	地下水动力学 A Groundwater Hydraulics A	4	64	40	24						4			
	20408800	水文地球化学/附水分析 Hydro-Geochemistry	3	48	36	12						3			
	20520301	土力学 Soil Mechanics	3.5	56	36	20					3.5				
	20508400	工程地质学 Principles of Engineering Geology	2.5	40	40						2.5				
	20414400	水文地质工程地质勘察方法 Investigation and Survey skills for groundwater and geoengineering	2.5	40	40								2.5		

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		学期学分分配 Semester Credits								
					讲课 Lec.	实验 Lab.	一	二	三	四	五	六	七	八	
							1st	2nd	3rd	4th	5th	6th	7th	8th	
	20414200	水资源开发与保护 Water Resources Exploitation and Protection	1.5	24	24							1.5			
	20414300	工程水文地质学 Engineering Hydrogeology	2.5	40	40							2.5			
	20517100	岩体力学 Rock Mechanics	2.5	40	32	8						2.5			
	20413900	环境地质学 A Environmental Geology A	2.5	40	40								2.5		
	20506100	地质灾害防治工程 Control Engineering for Geo-disasters	2.5	40	40								2.5		
	21100700	GIS 原理与应用 Principles & Applications of GIS (Bilingual)	2.5	40	30	10							2.5		
	小计 Sum		36	576	470	106				2.5	10	16	7.5		
专业选修课 Specialty Elective Courses		具体见专业选修课列表	15	240								6	4.5	4.5	
合计 Sub-total			157.5	2520	2042	238	18.5	27.5	23.5	23.5	20	20.5	12		
实践环节 Practical Work	40000100	劳动教育 Labor Education	1	1 周			1								
	44300200	军事训练 Military Training	2	2 周			2								
	41904300	计算机高级语言课程设计(C) Course Design for Computer High-Level Language (C)	2	1.5 周				2							
	41114401	测量教学实习 A Surveying Practice A	1.5	1 周			1.5								
	40103300	地质认识实习 (北戴河) Primary Field Training	3	2 周				3							
	40102902	地质教学实习 (周口店) B Geological Field Training B	6	4 周						6					
	40401600	专业教学实习 (三峡) Professional Teaching Practice	6	4 周									6		
	40401700	专业课程设计 Professional Course Project Design	1.5	1 周									1.5		
	40400400	毕业实习 Practice for Graduation	12	8 周											12
	40400300	毕业设计 Design for Graduation	12	8 周											12
	小计 Sum		47	32.5 周				4.5	5		6		7.5	24	

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		学期学分分配 Semester Credits								
					讲课 Lec.	实验 Lab.	一	二	三	四	五	六	七	八	
							1st	2nd	3rd	4th	5th	6th	7th	8th	
自主学习 Autonomous Learning	ZZ35S	社会调查 Social Investigation	2												
	ZZ09Y	大学英语(自主学习) College English(Autonomous Learning)	3												
		其他(学科竞赛、发明创造、科 研报告) Others (Contest, Invention, Innovation and Research Presentation)	3												
	小计 Sum		8												
总计 Total			212.5	2520+ 32.5周	2042	238	23	32.5	23.5	29.5	20	28	12	24	
专业选修课列表 Specialty Elective Courses	20517200	岩土测试技术 Rock and Soil Testing Techniques	2	32	24	8						2			
	20508800	工程建筑概论 Introduction to Construction Engineering	2	32	32									2	
	20519400	钻探与成井工艺 Drilling & Well Technology	2	32	28	4							2		
	20603500	工程物探 Engineering & Geophysical Prospecting	2	32	24	8							2		
	20509500	工程招标投标与概预算 Engineering Budget and Bidding	2.0	32	32									2	
	20401400	地下水数值模拟基础 Groundwater Modeling	2.0	32	20	12								2	
	20414700	包气带水文地质学 Vadose Zone Hydrogeology	1.5	24									1.5		
	20405700	环境同位素原理与技术 Environment Isotope Principles	2	32	32									2	
	20414500	地下水污染与防治 Groundwater Contamination & Prevention	3	48	28	20									3
	20414500	土壤污染和防治 Soil Pollution and Remediation	3	48	28	20						3			
	21704500	环境法规 Environmental Law	1.5	24	24										1.5
	20413800	水污染控制工程 Water Pollution Control Engineering	3	48	36	12						3			
	20510002	固体废物处理与处置 B Solid Waste Treatment and Disposal B	2	32	32							2			
	20405302	环境评价 B Environmental Assessment B	3	48	32	16							3		
20404901	环境监测 A Environmental Monitoring A	4	64	32	32							4			

注：通识教育选修课和自主学习学分未纳入具体学期。

地下水科学与工程专业课程分类统计

	通识教育课程 Liberal Education Courses		学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	专业选修课 Specialty Elective Courses	实践环节 Practical Work	自主学习 Autonomous Learning	学时总计 Total Hours	学分总计 Total Credits
	必修	选修							
学时/ 学分	584/36.5	192/12	928/58	576/36	240/15	32.5 周/47	8	2520+ 32.5 周	212.5
学分所 占比例	22.8%		27.3%	16.9%	7.1%	22.1%	3.8%		100%