

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 081404T

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的应用能力,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水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才。

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。接受野外测绘、调查、测试等方面的基本训练并掌握相关专业的基本技能,具有应用所学专业知识和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个方面的知识和能力

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。

毕业要求及实现途径

序号	毕业要求	实现途径(教学过程)
1	掌握地质基础理论、技能和工作方法	①课堂教学:普通地质学、构造地质学 B、矿物岩石学、地貌学及第四纪地质学 ②课外学习:地质认识实习(北戴河)、地质教学实习(周口店)B、地下水井流试验设计与实践、测量教学实习 A
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	①课堂教学:水力学、水文地质学基础 A、地下水动力学 A、水文地球化学/附水分析、包气带水文地质学、环境同位素原理与技术 ②课外学习:通过开展教学实验,引导学生思考问题,增强学生动手能力,深化专业知识的理解,掌握基本的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	①课堂教学:水资源开发与保护、水文地质工程地质勘察方法、水文地质学基础 A、地下水动力学 A、GIS 原理与应用、钻探与成井工艺、工程物探 ②课外学习:水资源开发与保护课程设计、专业教学实习(三峡)、地下水数值模拟基础课程设计

序号	毕业要求	实现途径(教学过程)
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	①课堂教学:水资源开发与保护、地下水动力学 A、地下水数值模拟基础、地下水环境影响评价方法、地下水污染防治、土壤污染和防治、水污染控制工程 ②课外学习:专业教学实习(三峡)、水资源开发与保护课程设计、地下水井流试验设计与实践、地下水数值模拟基础课程设计
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	①课堂教学:地下水防治方法与技术、环境地质学 A、地质灾害防治工程、地下水数值模拟基础、GIS 原理与应用、工程地质学、岩体力学、土力学等 ②课外学习:引导大学生参加大学生科研立项、大学生科技论文报告会等活动
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	①课堂教学:环境法规、地下水环境影响评价方法、注册岩土工程师职业技能培训、工程招标投标与概预算 ②课外学习:引导关注社会环境问题及国家相关法律政策,鼓励学生参加职业技能培训及资格考试
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	课外学习:测量学教学实习、地质认识实习、地质教学实习、专业教学实习、专业课程设计、毕业生产实习、毕业设计等

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。

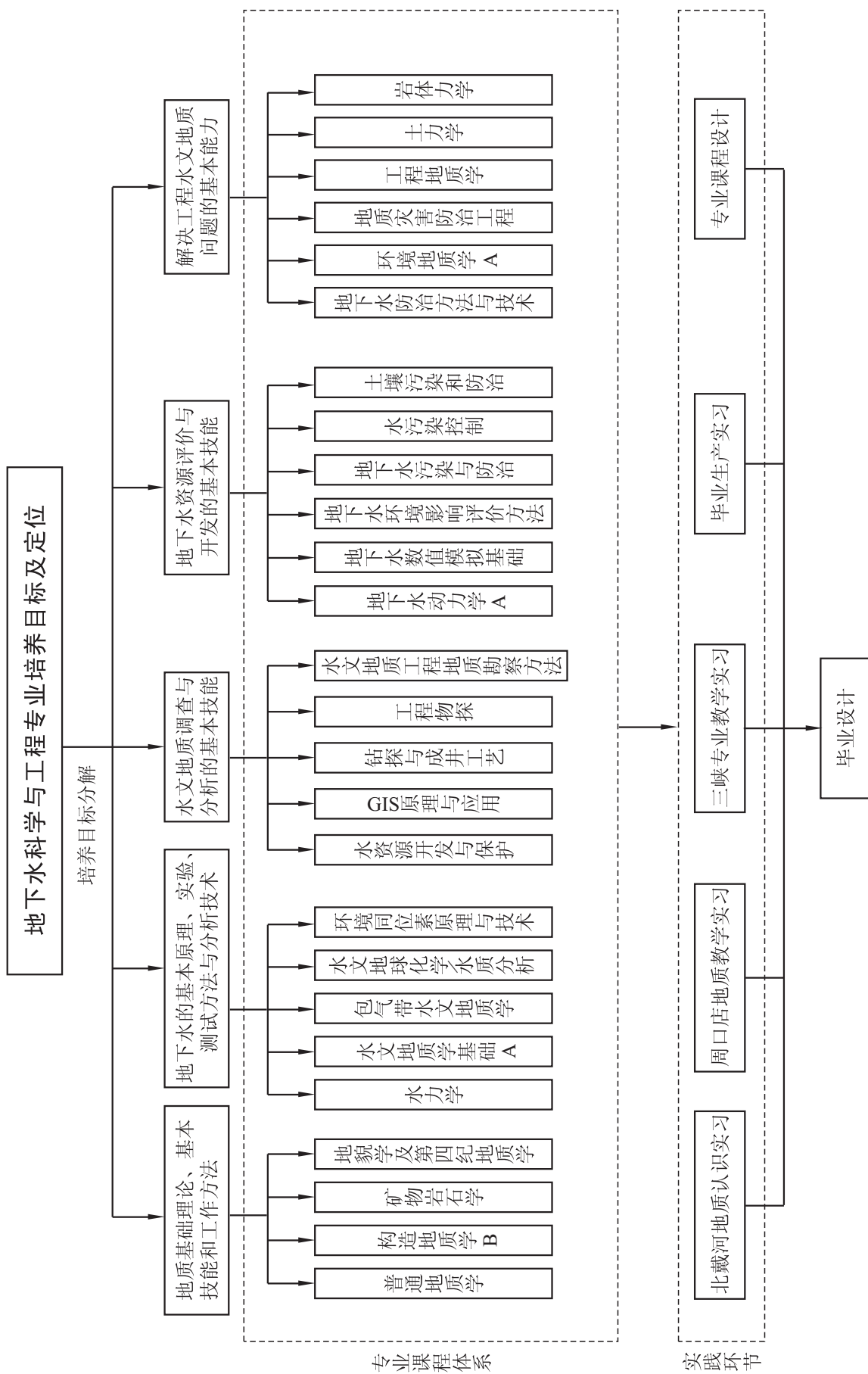
主要专业实验:水力学实验;水文地质学基础系列实验、水动力学实验;水化学分析实验;土质土力学实验等。

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 081404T

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 and 3S, and they can investigate, evaluate, study and solve the problems in the fields of hydrogeology and engineering geology by applications of advanced technology in engineering.

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 resources 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 solve problems in engineering practice and scientific research.

Graduates Are Required

1. To have basic theoretical knowledge and skills pertaining to geosciences.
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 laws of movement.
4. To have basic ability in evaluation and exploitation of groundwater resources.
5. To have the ability to solve basic problems caused by groundwater engineering.
6. To be familiar with policies and regulations about water resources, and sufficient knowledge and ability of management.
7. To master the basic methods of literature search and information collection, possess the essential ability of understanding, organizing, analyzing interpreting and processing of information.

Graduation Requirements and Ways to Achieve

No.	Graduation Requirements	Ways to Achieve(Teaching Process)
1	To have basic theoretical knowledge and skills pertaining to geosciences	①Classroom Teaching: Physical Geology, Structural Geology B, Mineralogy and Petrology, Geomorphology and Quaternary Geology ②Out-of-Class Learning: Primary Field Practice(Beidaihe), Instructed Practice in Geology(Zhoukoudian)B, Design and Practice of Groundwater Well Tests, Surveying Practice A

No.	Graduation Requirements	Ways to Achieve(Teaching Process)
2	To have proficiency in basic experimental techniques, measurement methodology and analytical technology on groundwater resources	① Classroom Teaching: Hydraulics, Fundamental Hydrogeology A, Groundwater Dynamics A, Hydrogeochemical Analysis, Vadose Hydrogeology, Environmental Isotope Principles and Technology ② Out-of-class Learning: Experiments for Basic Testing Methods and Analysis Techniques
3	To have basic and scientific analytical abilities to assess groundwater formation, embedding, distribution and laws of movement	① Classroom Teaching: Water Resources Exploitation and Protection, Investigation and Survey Skills for Groundwater and Geoengineering, Fundamental hydrogeology A, Groundwater Dynamics A, Principles and Applications of GIS, Drilling and Well Completion Technology, Engineering Geophysical Exploration ② Out-of-class Learning: Curriculum Design of Water Resources Exploitation and Protection, Instructed Practice for Major(the Three Gorges), Curriculum Design of Groundwater Numerical Simulation
4	To have basic ability in evaluation and exploitation of groundwater resources	① Classroom Teaching: Water Resources Exploitation and Protection, Groundwater Dynamics A, Groundwater Numerical Simulation, Environmental Assessment of Groundwater, Groundwater Pollution and Prevention, Soil Pollution and Prevention, Water Pollution Control Engineering ② Out-of-class Learning: Instructed Practice for Major(the Three Gorges), Curriculum Design of Water Resources Exploitation and Protection, Design and Practice of Groundwater Well Test, Curriculum Design of Groundwater Numerical Simulation
5	To have the ability to solve basic problems caused by groundwater engineering	① Classroom Teaching: Methods and Technology of Groundwater Prevention and Control, Environmental Geology A, Prevention and Treatment Engineering on Geological Disaster, Groundwater Numerical Simulation, Principles and Applications of GIS, Engineering Geology, Soil Mechanics, Rock Mechanics, etc ② Out-of-class Learning: Research Projects, Academic Presentations
6	To be familiar with policies and regulations about water resources, and sufficient knowledge and ability of management	① Classroom Teaching: Environmental Legislation, Assessment Methods on Groundwater Environment Impact, Vocational Skills Training on Registered Geotechnical Engineer, Engineering Bidding and Budget ② Out-of-class Learning: Vocational Skills Trainings, Qualification Examinations

No.	Graduation Requirements	Ways to Achieve(Teaching Process)
7	To master the basic methods of literature search and information collection, possess the essential ability of understanding, organizing, analyzing interpreting and processing of information	Out-of-class Learning: Surveying Practice, Primary Field Practice, Instructive Practice in Geology, Instructed Practice for Major, Course Projects, Graduation Practice and Design, etc

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

Main Courses: Physical Geology, Structural Geology, Hydraulics, Hydrogeology, Groundwater Hydrodynamics, Hydro-geochemistry, Soil Mechanics, Rock Mechanics, Engineering Geology, Water Resources Exploitation and Protection, Engineering Hydrogeology, Environmental Geology, Investigation and Survey Skills for Groundwater and Geo-engineering.

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, Primary Field Practice (Beidaihe), Instructive Practice in Geology (Zhoukoudian), Instructed Practice for Major (the Three Gorges), Computer Program Design Practice, Course Projects, Graduation Practice and Design(33~34 weeks in total).

Duration: four years.

Degree Granted: Bachelor of Engineering.

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

地下水科学与工程专业培养方案

Program for Groundwater Science and Engineering

课程类别 Course Classification	课程编号 Course Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite Courses	学期学分分配 Semester Credits									
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 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 Introduction to Mao Tse-tung Thought and 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 Fun- damentals of Law	3	48	48				1.5	1.5							
	113076 * 0	体育 Physical Education	4	144	144				1	1	1	1					
	109116 * 0	大学英语 College English	12	192	192				3	3	3	3					
	11918901	C 语言程序设计 A C Language Programming A	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								
	总计 12 学分,含创新创业选修课学分,跨 学科选修课不低于 6 学分。“形势与政 策”课程作为限选课,由马克思主义学院 实施		12	192													
	小计 Sum		46.5	824	616	16		11.5	9	8	6	0	0	0	0	0	
学科基础课 Disciplinary Fundamental Courses	212127 * 2	高等数学 B Advanced Mathematics B	10	160	160			4	6								
	21213100	大学物理基础 The Foundation of College Physics	3.5	56	56				3.5								
	21213202	物理实验 B Physical Experiments B	2	32		32			2								
	20302403	大学化学 C College Chemistry C	4	64	50	14				4							
	21212803	线性代数 C Linear Algebra C	2	32	32					2							

课程类别 Course Classification	课程编号 Course Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite Courses	学期学分分配 Semester Credits																			
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th												
					学科基础课 Disciplinary Fundamental Courses											21213503	概率论与数理统计 C Probability and Mathematics Statistics C	2	32	32				2			
21120801	测量学 A Surveying A	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							
20114900	普通地质学 Physical Geology	3	48	48															3								
20113100	矿物岩石学 A Mineralogy and Lithology A	3	48	48																	3						
20104002	构造地质学 B Structural 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				
小计 Sum			46	736												670	66			7	14	14.5	10.5	0	0	0	0
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	52	12							4				
											20408800	水文地球化学/附水分析 Hydro-Geochemistry	3	48	36	12									3		
											20520302	土力学 B Soil Mechanics B	3	48	40	8							3				
											20508400	工程地质学基础 B Principles of Engineering Geology B	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 Geo-engineering	2.5	40	40										2.5		
											20414200	水资源开发与保护 Water Resources Exploitation and Protection	1.5	24	24										1.5		
											20401400	地下水数值模拟基础及应用 Groundwater Modeling	2	32	20	12											2

课程类别 Course Classification	课程编号 Course Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite Courses	学期学分分配 Semester Credits							
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
专业主干课 Main Specialty Courses	20517100	岩体力学 B Rock Mechanics B	2.5	40	32	8							2.5		
	20403400	环境地质学 B Environmental Geology B	2	32	32									2	
	20414500	地下水污染与防治 Groundwater Contamination & Prevention	3	48	28	20									3
	21100700	GIS 原理与应用 Principles & Applications of GIS	2.5	40	30	10									2.5
	20401000	地下水防治方法与技术 Methods and Technology of Groundwater Prevention and Control	1.5	24	24										1.5
	小计 Sum			36.5	584	470	114		0	0	2.5	4	9.5	9.5	11
专业选修课 Specialty Elective Courses		具体见专业选修课列表	16	256											
合计 Sub-total			145	2400	1756	196		18.5	23	25	20.5	9.5	9.5	11	0
实践环节 Practical Work	44300200	军事训练 Military Training	2	2周				2							
	41919001	C 语言课程设计 A Course Design for C Language A	1.5	1.5周					1.5						
	41120901	测量教学实习 A Surveying Practice A	1	1周					1						
	40115200	地质认识实习(北戴河) Primary Field Training(Beidaihe)	2	2周					2						
	40115600	地质教学实习(周口店) B Geological Field Training (Zhoukoudian) B	4	4周							4				
	40421400	专业教学实习(三峡,含地下水井流试验设计与实践) Professional Teaching Practice(the Three Gorges, including Design and Practice of Groundwater Well Tests)	5	5周										5	
	40421500	水资源开发与保护课程设计 Course Design for Water Resources Exploitation and Protecting	2	2周											2

课程类别 Course Classification	课程编号 Course Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite Courses	学期学分分配 Semester Credits								
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th	
					实践环节 Practical Work	40421900		地下水防治方法与技术课程 设计 Course Design for Methods and Technology of Groundwater Prevention and Control	1.5	1.5 周						
40421600	毕业实习 Practice for Graduation	8	8周													8
40421700	毕业设计 Design for Graduation	8	8周													8
小计 Sum		35	35 周					2	4.5	0	4	0	7	1.5	16	
创新创业自主学习 Autonomous Learning	ZZ35000S	社会调查 Social Investigation	2													
		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		5													
总计 Total			185	2400 + 35 周	1756	196			20.5	27.5	25	24.5	9.5	16.5	12.5	16
可开出专业选修课列表 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
	20414700	包气带水文地质学 Vadose Zone Hydrogeology	1.5	24											1.5	
	20422100	专业技能培训 Professional Skill Training	2	32											2	

