

地下水科学与工程专业（中加合作办学）培养方案

专业名称：地下水科学与工程

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、实践能力、良好科学作风的水文地质、环境与生物学交叉的国际复合型人才，50%以上的毕业生出国深造或在知名企业任职，学生毕业后能在水利、能源、交通、建筑、环境保护及生物科学等领域从事工程设计、教育、科研、技术研发和管理等工作。

专业毕业要求：

本专业学生主要学习地下水科学、环境及生物学的基本理论和专业知识，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，培养环境科学和生物科学方面的科学素养，具有应用所学专业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. 基础知识：掌握数学、物理、化学、水文地质、环境、生物学等方面基础理论知识，具有扎实的自然科学基础；能够将数学、自然科学、工程基础和专业知用于解决复杂工程问题。

2. 问题分析：掌握水文地质、地下水、环境及生物学有关的基础理论、基础知识和分析、设计方法；能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析复杂工程问题，以获得有效结论。

3. 设计/开发解决方案：具有本专业必需的调查、测试、调研、评价、制图、设计计算等基本技能，具有综合分析和解决实际问题的能力；能够设计针对复杂工程问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

4. 研究：掌握水资源及水环境（尤其是地下水及其环境）、水科学、生物学方面的专业基础知识和专业理论，能从事地表水、地下水资源及水环境保护的勘测、规划设计、预测、评价与管理等方面的研究和开发；具备设计和实施工程实验的能力，并能够对实验结果进行分析；能够基于科学原理并采用科学方法对复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

5. 使用现代工具：能够针对水文与水资源专业问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。

6. 专业与社会：了解与本专业相关的职业和行业的生产、设计、研究与开发、环境保护和可持续发展等方面的方针、政策和法律法规；能正确认识工程对于客观世界和社会的影响，发扬“艰苦朴素、求真务实”的校训精神；能够基于工程相关背景知识进行合理分析，理解和评价针对复杂工程问题的专业工程实践对环境、健康、安全、法律、文化以及社会可持续发展的影响，并理解应承担的责任。

7. 职业规范：具有人文社会科学素养、社会责任感，具有本学科专业所应具有的职业技能、职业行为、职业作风和职业意识；具备较高的综合素质，包括身体素质、心理素质、文化素质和专业素质，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

8. 个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色，履行职责，促进发展。

9. 管理与沟通：理解并掌握相关管理与决策方法，能够就本学科专业问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令；具备一定的国际视野，较强的英语综合运用能力，能熟练阅读本专业的英文技术文献，能够在跨文化背景下进行沟通和交流。具有良好的沟通能力、组织管理能力和团队合作精神，能够开展管理协调、技术洽谈工作。

10. 终身学习：树立终身学习思想；掌握文献检索、资料查询及运用现代信息技术获取相关信息的基本方法；具有较强的自我获取知识的能力，具备不断拓展自身知识面和终身获取新知识的能力，有不断学习和适应发展的能力。

毕业要求实现及途径：

序号	毕业要求	实现途径（教学过程）
1	掌握数学、物理、化学、水文地质、环境、生物学等方面基础理论知识	① 课堂教学 ：高等数学 B、大学物理 C、大学化学 C、线性代数 C、地球化学、地球科学导论、有机和进化生态学、微生物导论、环境科学导论等。 ② 课外学习 ：物理实验 B、化学实验、地球科学导论实验、微生物实验、环境科学导论实验等。
2	掌握水文地质、水环境、生物学有关的基础理论、基础知识和分析、设计方法	① 课堂教学 ：水文地质学概论、地下水污染与防治、生态系统生态学、应用湿地科学、环境微生物等。 ② 课外学习 ：水文地质学课程设计，水文学野外实验等。
3	具有本专业必需的调查、测试、调研、评价、制图、设计计算等基本技能	① 课堂教学 ：地球科学导论实验等。 ② 课外学习 ：周口店地质实习，三峡专业实习等。
4	能从事地表水、地下水资源及水环境保护的勘测、规划设计、预测、评价与管理等方面的研究和开发	① 课堂教学 ：应用水文地质学、水生生态学、环境同位素原理与技术、环境水文学等。 ② 课外学习 ：应用水文地质学实验、生态统计与实验设计、水生生态学方法等。
5	选择与使用恰当的技术、资源、现代工程工具和信息技术工具	① 课堂教学 ：Python 语言程序设计、地形学与 GIS 应用等。 ② 课外学习 ：计算机课程设计、GIS 计算机教学等。

序号	毕业要求	实现途径（教学过程）
6	了解与本专业相关的方针、政策和法律法规	① 课堂教学 ：地质对人类健康影响、环境与可持续评价、形式与政策、专业技能培训。 ② 课外学习 ：引导关注水资源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	能够在工程实践中理解并遵守工程职业道德和规范	① 课堂教学 ：思想道德修养与法律基础、生涯规划与就业指导等。 ② 课外学习 ：引导学生树立正确的职业观、鼓励学生参与大学生职业规划大赛、求职方法讲座等活动。
8	能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色	① 课堂教学 ：构造地质学 B、地貌学及第四纪地质学等。 ② 课外学习 ：社会调查、地质教学实习（周口店）、专业教学实习（三峡）等。
9	能够就本学科专业问题与业界同行及社会公众进行有效沟通和交流	① 课堂教学 ：英语、文献信息检索等 ② 课外学习 ：鼓励学生参与英语演讲大赛、文献翻译大赛、科技论文报告会等活动，组织国际交流夏令营等。
10	具有较强的自我获取知识的能力，具备不断拓展自身知识面和终身获取新知识的能力	① 课堂教学 ：心理学与自我成长 ② 课外学习 ：引导学生树立终身学习观念，鼓励学生参与学科竞赛、地质技能大赛等活动。

主干学科：水文地质、环境工程，生物科学。

核心课程：地球科学导论、构造地质学、地貌学及第四纪地质学、水文地质学概论、地球化学、地下水污染与防治、环境水文学、有机和进化生态学、环境微生物、应用微生物学、生态系统生态学、水生生态学等。

主要专业实验：地球科学导论实验、环境科学导论实验、水文地质学实验、水文学野外实验、微生物基础实验等。

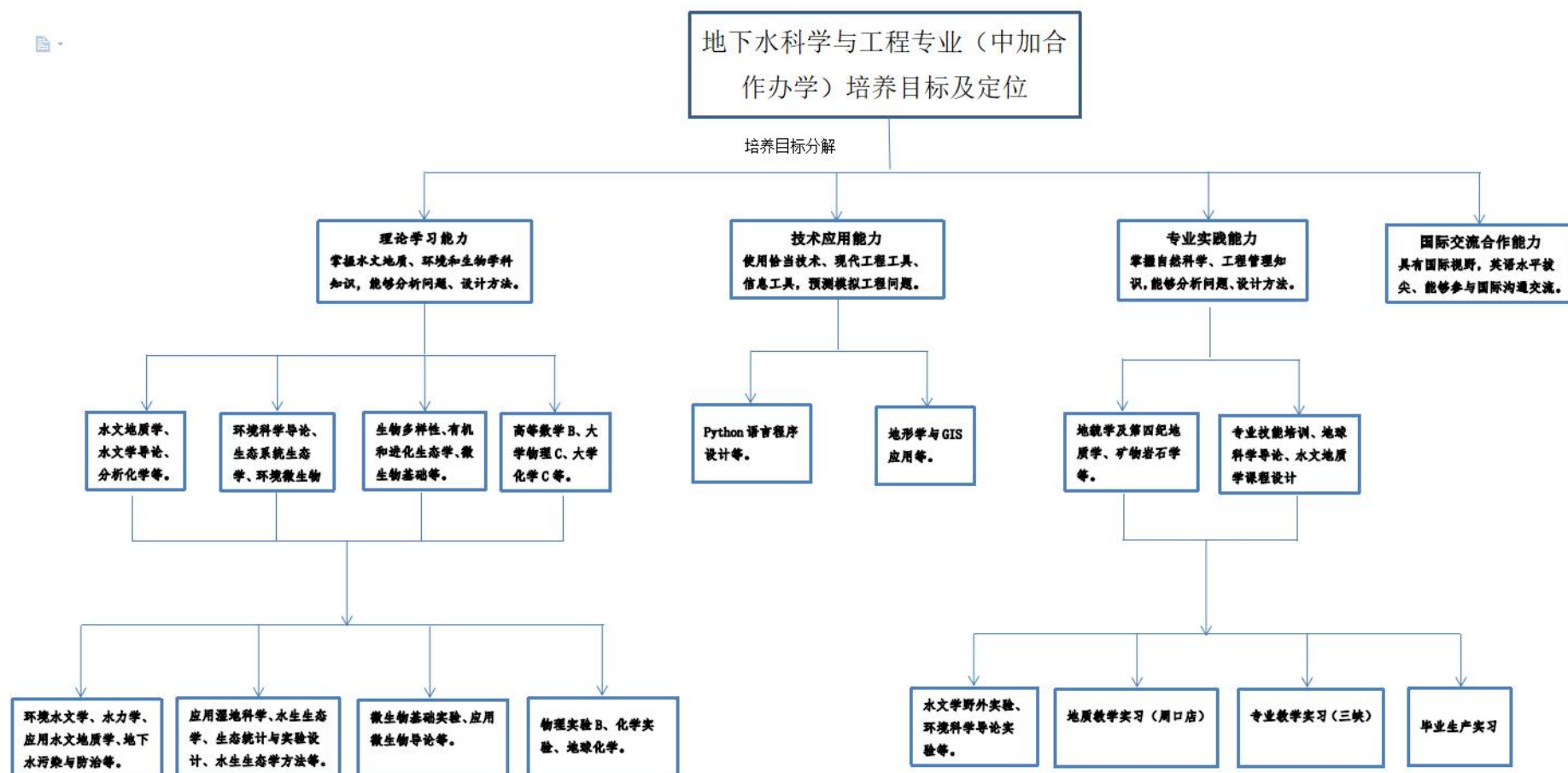
主要实践性教学环节：周口店地质教学实习，三峡专业教学实习、计算机语言编程课程设计、专业课程设计、毕业实习与毕业设计等约 27~28 周。

学制与学位：4-6 年。

中国地质大学（武汉）地下水科学与工程专业工学学士学位证书

滑铁卢大学环境科学（水专业）理学学士学位。

培养方式：与滑铁卢大学采用“2+1+1”模式联合培养



Program for Groundwater Science and Engineering

(Sino-Canadian Joint Education Program)

Specialty: Groundwater Science and Engineering

Education Objectives:

This program aims at cultivate international talents with all-round development of solid knowledge of natural sciences, innovation awareness, application abilities, good scientific ethics and interdisciplinary backgrounds in Hydrogeology, Ecology and Biology. Fifty percent of the graduates are expected to either continue their education in overseas countries or be employed by famous enterprises. Graduates are expected to have career competence in engineering design, education, scientific research, technological R&D, and management in the fields of water conservancy, energy, transportation, architecture, environmental protection, bioscience, etc.

Graduation Requirements:

Students are expected to

1. **Basic Knowledge:** master the basic theoretical knowledge in mathematics, physics, chemistry, hydrogeology, environment, biology, etc., lay solid foundation of natural science, and apply professional knowledge in mathematics, natural science, and engineering to solve complex engineering problems.
2. **Analysis of Problems:** master the basic theories and knowledge as well as the analysis and design methods related to hydrogeology, groundwater, environment and biology; apply the basic principles of mathematics, natural science and engineering science to identify, express, and analyse complex engineering problems through literature research with the purpose of obtaining a valid conclusion.
3. **Solution Design/Development:** have the basic skills for investigation, testing, research, evaluation, drawing, design calculation, etc.; possess the ability to comprehensively analyse and solve practical problems of engineering. Students are also expected to conduct systematic engineering practice and design solutions to engineering problems, and design systems, units (components) or processes that meet specific needs, while embodying innovation in the design process and taking social, health, safety, legal, cultural and environmental factors into account.
4. **Research:** master the basic knowledge and professional theories of water resources and water environment (especially groundwater and its environment), hydrology and biology; be capable of engaging in the research and development of survey, planning, design, prediction, evaluation and management of surface water, groundwater resources and water environmental

protection. Students are also expected to design and implement engineering experiments, analyse experimental results, study complex engineering problems based on scientific principles and methods, including experiment design, analysis and interpretation of data, and therefore attain reasonable and effective conclusions through information synthesis.

5. Modern Tool Application: develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for specialized problems of hydrology and water resources, including predictions and simulations of complex engineering problems, and comprehending the limitations of these tools and methods.

6. Specialty and Society: understand the policies, laws and regulations on production, design, research, development, environmental protection and sustainable development of occupations and industries related to the profession; understand the impact of engineering on the world and society, carrying forward the spirit of "hardworking, plain-living, truth-seeking, being pragmatic". Students are also expected to conduct reasonable analysis based on engineering-related background knowledge, evaluate the impact of professional engineering practice for complex engineering problems on environment, health, safety, law, culture and sustainable development, and understand the relevant social responsibility.

7. Professional Norms: have literacy on humanities and social science, social responsibility, the professional skills, professional conduct, professional ethics and professional awareness of this major; have an all-round development of physical, psychological, cultural and professional quality; understand the responsibility and abide by engineering ethics and norms in engineering practice.

8. Individuals and Teamwork: take the roles of individuals, team members, and leaders in a multidisciplinary team, fulfil the responsibility to be undertaken, and promote the development.

9. Management and Communication: master engineering management principles and economic decision-making methods; effectively communicate with industry peers and the public on professional issues, including reports composition and design, statements presentation, instructions giving and responding. Students are also expected to be proficient in English and competent in reading English research literature concerning this major with an international vision; show competence in communication, management, teamwork, coordination and negotiation.

10. Lifelong Learning: have the awareness of lifelong learning; master the basic methods of literature research, data inquiry and application of modern information technology to obtain relevant information, and be capable of self-acquisition, expanding and acquiring new knowledge with constant learning and adaptation.

Graduation Requirements and Pathways:

No.	Graduation Requirements:	Pathways (Teaching Process)
1	To master the basic theoretical knowledge in mathematics, physics, chemistry, hydraulics, hydrology, etc.	① Classroom Teaching : Higher Mathematics B, College Physics C, College Chemistry C, linear algebra C, Geochemistry, Introductory Earth Sciences, Organismal and Evolutionary Ecology, Introduction to Microbiology, Introduction to Environmental Science, etc. ② Experiments: Physical experiment B, Chemical experiment, Introduction to Microbiology experiment, Introduction to Environmental Science experiment, etc.
2	To master the basic theories and knowledge as well as the analysis and design and methods in hydrogeology, water environment, and biology.	① Classroom Teaching: Introduction to Hydrogeology, Groundwater pollution and prevention, Ecosystem Ecology, Applied Wetland Science, Environmental Biology, etc. ② Extracurricular Learning : Curriculum design of Hydrogeology, Field Methods in Hydrology, etc.
3	To have the basic skills for investigation, testing, research, evaluation, drawing, design calculation, etc. required by this discipline.	① Classroom Teaching : Introductory Earth Sciences, etc. ② Extracurricular Learning : geological teaching practice (Zhoukoudian), professional teaching practice (The Three Gorges), etc.
4	To be capable of engaging in the research and development of survey, planning, design, prediction, evaluation and management of surface water, groundwater resources and water environmental protection.	① Classroom Teaching : Applied Hydrogeology, Aquatic Ecology, Environmental Isotope Principles, Environmental Hydrology, etc. ② Extracurricular Learning: Applied Hydrogeology experiment, Biostatistics and Experimental Design, Methods of Aquatic Ecology, etc.
5	To select and use appropriate technologies, resources, modern engineering tools and information technology tools.	① Classroom Teaching : Python language programming, Geomorphology and GIS applications, etc. ② Extracurricular Learning : Computer course design, GIS computer teaching, etc.
6	To understand the policies, laws and regulations related to this profession.	① Classroom Teaching : Geological Impacts on Human Health, Environmental and Sustainability Assessment, Situation and policy, Vocational skills training. ② Extracurricular Learning: Guide students to pay attention to water resources and environmental issues and relevant national laws and policies, and encourage them to participate in vocational skills training and qualification examinations.
7	To understand the responsibility and abide by engineering ethics and norms in engineering practice	① Classroom Teaching : Ideological and moral cultivation and legal basis, career planning and employment guidance. ② Extracurricular Learning : Guide students to establish a correct career outlook, and encourage them to participate in college career planning competitions, job search methods and other activities.

No.	Graduation Requirements:	Pathways (Teaching Process)
8	To take the roles of individuals, team members, and leaders in a multidisciplinary team.	① Classroom Teaching : Structural Geology B, Geomorphology and Quaternary geology. ② Extracurricular Learning : Social survey, geological teaching practice (Zhou Koudian), professional teaching practice (The Three Gorges), etc.
9	To effectively communicate with industry peers and the public on professional issues.	① Classroom Teaching : English as a Second Language, literature information retrieval, etc. ② Extracurricular Learning : Encourage students to participate in English speech contests, document translation contests, scientific paper conferences and other activities, and organize international exchange summer camps and so on.
10	To be capable of self-acquisition, expanding and acquiring new knowledge with constant learning and adaptation.	① Classroom Teaching : Psychology and self-growth. ② Extracurricular Learning : Guide students to establish a lifelong learning concept and encourage them to participate in academic competitions, geological skills competitions and other activities.

Major Disciplines: Hydrogeology, Environmental Engineering and Bioscience.

Core Courses: Earth System Science, General Geology, Tectonics, Hydraulics, Hydrogeology, Geochemistry, Groundwater pollution and Prevention, Ecology, Applied Microbiology, Environgeology, Applied Hydrogeology, etc.

Practical Work: Engineering Survey Practice, Instructive Practice in Geology (at Zhoukoudian), Instructed Practice for Major (at the Three Gorges), Computer Program Design Practice, Course Projects, Graduation Practice and Design. (27~ 28 weeks in total).

Duration: 4-6 years.

Degree Granted: Bachelor of engineering degree in groundwater science and engineering, China University of Geosciences (Wuhan), Bachelor of Science Degree in Environmental Science (Water Science), University of Waterloo.

Training Mode: Joint training with University of Waterloo by adopting "2+1+1" mode.

地下水科学与工程专业（中加合作办学）课程教学计划表
Course Descriptions of Groundwater Sciences and Engineering
(Sino-Canadian Educational Joint Program)

课程类别 Classification		课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits								
						课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	六 6th	七 7th	八 8th
						讲课 Lec.	课内实验 Lab	实验/ 科研 实践 Lab/ Res.	研讨 Dis	素质拓展 Exp										
通识教育课 Liberal Education Courses	必修 Compulsory	12007800	马克思主义基本原理概论 Principles of Marxism	3	48	48								3						
		12008100	毛泽东思想和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	2	32	32									2					
		12008000	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3	48	48									3					
		11711800	中国近现代史纲要 The Essentials of Modern Chinese History	2	32	32									2					
		12007900	思想道德与法治 Ideological morality and rule of law	3	48	48								3						
		12005300	形势与政策 Situation and Policy	2	32	32						每学期平均分配								
		113076*0	体育 Physical Education	4	144	144						1	1	1	1					
		109234*0	大学英语（外教授课*） College English	12	192	192				96		4	4	2	2					
		14300300	军事理论 Military Theory	2	36	36						2								
		12008200	劳动教育 Labor Education	1	16	16						1								
	选修 Elective	包括美育、心理健康教育课程（各不少于2学分）、滑铁卢大学 EFAS 课程 6 学分。		10	160	160														
		小计 Sum		44	788	788	0		0	96	0	8	5	6	13	0	0	0	0	0
学科基础课 Fundamental Courses	212127*2	高等数学 B Advanced Mathematics B --> (Math 127 Calculus for the sciences)	10	160	160						4	6								
	21212802	线性代数 B Linear Algebra B	2.5	40	40								2.5							
	21213502	概率论与数理统计 B Probability and Statistics B	2.5	40	40									2.5						

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits								
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/ 科研 实践 Lab/ Res.	研讨 Dis	素质拓展 Exp										
	212130*3	大学物理 College Physics C	6	96	96							3.5	2.5						
	21220802	物理实验 B Physical Experiments B	1	32	4	28						1							
	20326903	大学化学 C College Chemistry C (Chemistry 123+120)	3	48	48						3								
	20327003	大学化学实验 C College Chemistry Experiment C (Chemistry 123L+120L)	1	24		24					1								
	21947400	Python 语言程序设计 Python Language Programming	2.5	40	40		16				2.5								
	20451000	地球科学导论（外教授课*） Introductory Earth Sciences	2.5	40	40							2.5							
	20119800	构造地质学 B Structural Geology B	2	32	32		16					2							
	20101600	地貌学及第四纪地质学 Geomorphology and Quaternary Geology	2.5	40	36	4							2.5						
	20327102	分析化学 B Analytical Chemistry B	1.5	24	24								1.5						
	20439900	科技英语（外教授课*） English for science and technology	2	32	32												2		
	小计 Sum		39	648	592	56	32	0	0	0	10.5	15	9	2.5	0	0	2	0	0
专业主干课 Main Specialty Courses	20451300	水文地质学 Hydrogeology	4	64	64		16						4						
	20439400	有机和进化生态学（外教授课*） Organismal and Evolutionary Ecology	2.5	40	40						2.5								
	20439500	生物多样性（外教授课*） Diversity of Life	2.5	40	40						2.5								
	20451100	环境科学导论（外教授课*） Introduction to Environmental Science	2.5	40	40							2.5							
	20430800	水文学导论（外教授课*） Introductory Hydrology	2.5	40	40								2.5						
	20432200	应用微生物学导论（外教授课*） Introduction to Applied Microbiology	3	48	48									3					
	20432300	生态系统生态学（外教授课*） Ecosystem Ecology	2.5	40	40									2.5					
	20440000	应用湿地科学（外教授课*） Applied Wetland Science	2	32	32										2				
	20440100	地形学与 GIS 应用（外教授课*） Geomorphology and GIS applications	2	32	32										2				

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits								
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研 实践 Lab/Res.	研讨 Dis	素质拓展 Exp										
	20441600	城市用水与废水系统（外教授课*） Urban Water and Waste Water Systems	1.5	24	24										1.5				
	20440900	河流地貌学（外教授课*） Fluvial Geomorphology	2	32	32										2				
	20440300	城市雨水管理（外教授课*） Urban Storm water Management	2	32	32										2				
	20440400	水生生态学（外教授课*） Aquatic Ecology	2	32	32											2			
	20450500	数据-决策（外教授课*） Water: Data to Decisions	2	32	32											2			
	20450600	水文地质学移数值方法（外教授课*） Numerical Methods in Hydrogeology	2	32	32												2		
	20451400	岩石力学（外教授课*） Rock Mechanics	2	32	32												2		
	20440700	环境水文学（外教授课*） Environmental Hydrology	2	32	32												2		
	20440800	环境毒理学（外教授课*） Environmental Toxicology	3.5	56	56													3.5	
	小计 Sum		42.5	680	680	0	16	0	0	0	5	2.5	6.5	5.5	9.5	10	3.5	0	0
专业选修课 Specialty Elective Courses		可按方向设课，具体见专业选修课列表	18.5	312	276														
合计 Sub-total			144	2428	2336	56	48	0	96	0	23.5	23.5	21.5	21	9.5	10	5.5	0	0
实践环节 Practical Work	44300400	军事训练 Military Training	2	2 周							2								
	41947500	Python 语言课程设计 A Course Design for Python Language A	1.5	1.5 周							1.5								
	40429400	地球科学导论实验 Introductory Earth Sciences Lab	2	32								2							
	40429600	环境科学导论实验 Experiments on Introduction to Environmental Science	2	32								2							
	40451200	微生物基础实验 Experiments on Introduction to Microbiology	2	32									2						

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits								
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp										
	40430900	水文学野外实验 LAB Field Methods in Hydrology	1	16									1						
	40441100	水生生物自然史（外教授课*） The Natural History of Aquatic Organisms	4	64											4				
	40115602	地质教学实习（周口店）B Geological Field Training (Zhoukoudian) B	4	4 周								4							
	40421402	专业教学实习（三峡） Professional Teaching Practice	4	4 周												4			
	40430600	水文地质学课程设计 Hydrogeology Course Design	1	1 周									1						
	40437400	毕业实习 Practice for Graduation	6	6 周												6			
	40421700	毕业设计 Design for Graduation	8	8 周													8		
	42008300	劳动实践 Labor practice	1	1 周											1				
	小计 Sum		37.5	176+ 26.5 周	0	0	0	0	0	0	3.5	8	5	0	0	0	4	9	8
创新创业自主学习 Freedom study	ZZ35000S	社会调查 Social Investigation	2												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			186.5	2604+ 26.5 周	2336	56	48	0	96	0	27	30.5	26.5	21	9.5	10	9.5	9	8
可开出专业选修课列表 Specialty Elective Courses	20431800	水力学 Hydraulics（水文）	2	40	32		8							1.5					
	20435000	应用水文地质学 Applied Hdrogeology	2.5	64	40		8	8	8								2.5		
	20446300	同位素水文学 Isotope Hydrology	2	32	28	4												2	
	20401500	地下水污染与防治 Groundwater Pollution & Prevention	3	32	32	16											2		
	20445800	环境地质学 Environmental Geology	2	32	32									2					
	20451500	科学计算导论（外教授课*）（四选一） Introduction to Scientific Calculations	2	32	32												2		

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits								
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp										
	20451600	地质对人类健康影响（外教授课*）（四选一） Geological Impacts on Human Health	2	32	32											2			
	20451700	环境与可持续评价（外教授课*）（四选一） Environmental and Sustainability Assessment I	2	32	32											2			
	20451800	实验分析与野外采样技术（外教授课*）（四选一） Lab Analysis and Field Sampling Techniques	2	32	32			16								2			
	20429700	微生物基础* Introduction to Microbiology	2	32	32								2						
	20439700	地球化学 2 * Geochemistry 2	3	48	48								3						
	20439600	环境微生物* Environmental Microbiology	2	32	32												2		

注：全英课程须在课程名称后打*标出，通识教育选修课学分未列入具体学期，学院须根据学校创新创业自主学习学分认定一览表制订实施细则。

地下水科学与工程专业（中加合作办学）专业课程分类统计

Course Classifications and Statistics of Groundwater Science and Engineering

(Sino-Canadian Educational Joint Program)

课程类别 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	创新创业 自主学习 Freedom Study	学时总计 Total Hour	学分总计 Total Credits
	必修	选修							
学时/学分	628/34	160/10	648/39	680/42.5	312/18.5	176+26.5 周 /37.5	80/5	2604 +25.5 周	186.5
学分所占比例	23.6%		20.9%	22.8%	9.9%	20.1%	2.7%	100	100%

