

中国地质大学（武汉）
地球物理与空间信息学院

2023 版培养方案

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国家地球物理学拔尖学生培养基地(珠峰班) 培养方案

专业名称与代码：地球物理学 070801

专业培养目标：

地球物理学(珠峰班)培养具备家国情怀、良好人文素养、扎实数理基础并有坚实地球物理学、空间科学与技术等方面知识，拥有优秀的组织领导、交流表达和可持续发展能力，具有野外工作技能，有潜力能在高校、科研院所等单位持续从事科学研究的地球物理学学术卓越人才。

专业毕业要求：

1. 基础知识：掌握数学、物理学、地球物理学等方面的基本理论、基本知识；
2. 问题分析：掌握重力学、地磁学、地电学、地震学等固体地球物理学基本理论及等离子体物理、电离层物理与电波传播等空间物理基础理论和数据处理与解释方法/技术；能够应用这些方法/技术，识别、表达、并通过文献研究分析相关学科专业问题，获得有效结论；
3. 设计/开发解决方案：能够设计/开发本学科专业问题的解决方案，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：能够基于本学科专业所掌握的原理、技术、方法对相关问题进行研究，并通过信息综合得到合理有效的结论；
5. 使用现代工具：能够针对本学科专业问题，选择与使用恰当的现代技术工具，包括对问题的预测与模拟，并能够理解其局限性；
6. 专业与社会：能够基于学科专业相关背景知识进行合理分析，评价问题解决方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响，并理解应承担的责任；
7. 职业规范：具有本学科专业所应具有的职业道德和规范；
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；
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，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流；
10. 终身学习：具有自主学习和终身学习的意识，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	基础知识： 掌握思政、数学、物理学、地质学、地球物理学等方面的基本理论、基本知识	① 课堂教学：马克思主义基本原理概论、毛泽东思想和中国特色社会主义理论体系概论、习近平新时代中国特色社会主义思想概论、中国近现代史纲要、思想道德修养与法律基础、形势与政策、体育，大学英语、军事理论、大学语文 B、逻辑学导论、地球与空间科学导论 A、B、高等数学 A、概率论与数理统计 A、力学、热学、光学、电磁学、原子物理、地质学基础、数学物理方程、线性代数与矢量分析、场论、固体地球物理学基础、空间物理学基础 ② 课外学习：秭归地质教学实习、军事训练、C 语言课程设计
2	问题分析： 掌握地震学、重力学、地磁学、地电学等地球物理学基本理论及等离子体物理、电离层物理与电波传播等空间物理基础理论和地球物理数据的处理与解释方法/技术；能够应用这些方法/技术，识别、表达、并通过文献研究分析相关学科专业问题，以获得有效结论	① 课堂教学：应用地球物理学基础、地球物理信号处理、连续介质力学、地磁学、地电学、地球动力学、地震学、地球重力学、电动力学、热力学与统计物理、流体力学、等离子体物理、空间探测原理与方法、行星科学导论、空间大地测量技术 ② 课外学习：重磁观测实习、地电场与电磁场观测实习、地震学观测实习、固体地球物理学野外实习、空间探测资料处理与解释、空间探测教学实习、地球物理大地测量学教学实习、行星物理综合实习、毕业实习、毕业论文、科研能力拓展
3	设计/开发解决方案： 能够设计/开发本学科专业问题的解决方案，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	① 课堂教学：分方向专业选修课、Matlab 语言及应用、地球物理数据处理中的 Python 应用 ② 课外学习：重磁观测实习、地电场与电磁场观测实习、地震学观测实习、固体地球物理学野外实习、空间探测资料处理与解释、空间探测教学实习、地球物理大地测量学教学实习、行星物理综合实习、毕业实习、毕业论文、专题讲座、科研能力拓展

序号	毕业要求	实现途径（教学过程）
4	研究： 能够基于本学科专业所掌握的原理、技术、方法对相关问题进行研究，并通过信息综合得到合理有效的结论	①课堂教学：地磁学、地电学、地球动力学、地震学、地球重力学、热力学与统计物理、流体力学、等离子体物理、空间探测原理与方法、行星科学导论、电离层物理与电波传播 ②课外学习：重磁观测实习、地电场与电磁场观测实习、地震学观测实习、固体地球物理学野外实习、空间探测资料处理与解释、空间探测教学实习、地球物理大地测量学教学实习、行星物理综合实习、毕业实习、毕业论文、专题讲座、科研能力拓展
5	使用现代工具： 能够针对本学科专业问题，选择与使用恰当的现代技术工具，包括对问题的预测与模拟，并能够理解其局限性	①课堂教学：地磁学、地电学、地球动力学、地震学、重力学、量子力学、热力学与统计物理、流体力学、等离子体物理、空间探测原理与方法、行星科学导论、电离层物理与电波传播、C 语言程序设计、地球物理数字信号处理、地球物理数值分析 ②课外学习：C 语言课程设计实习、重磁观测实习、地电场与电磁场观测实习、地震学观测实习、固体地球物理学野外实习、空间探测资料处理与解释、空间探测教学实习、地球物理大地测量学教学实习、行星物理综合实习、毕业实习、毕业论文、科研能力拓展
6	专业与社会： 能够基于学科专业相关背景知识进行合理分析，评价问题解决方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响，并理解应承担的责任	①课堂教学：毛泽东思想与中国特色社会主义理论体系概论、习近平新时代中国特色社会主义思想概论、思想道德修养与法律基础、马克思主义基本原理、地球与空间科学导论、固体地球物理学基础、空间物理学基础、应用地球物理学基础、地震学发展史、劳动教育 ②课外学习：毕业实习、毕业论文、专题讲座、科研能力拓展、劳动实践、社会调查
7	职业规范： 具有本学科专业所应具有的职业道德和规范	①课堂教学：习近平新时代中国特色社会主义思想概论、地球与空间科学导论、固体地球物理学概论、空间物理学概论、应用地球物理学概论 ②课外学习：、固体地球物理学野外实习、空间探测教学实习、专题讲座

序号	毕业要求	实现途径（教学过程）
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	①课堂教学： 中国近代史纲要、毛泽东思想与中国特色社会主义理论体系概论、马克思主义基本原理、军事理论、思想道德修养与法律基础、科研立项、 ②课外学习： 军事训练、秭归地质教学实习、科研能力拓展
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，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流	①课堂教学： 大学英语、地球物理专业英语、思想道德修养与法律基础 ②课外学习： 毕业论文（设计）、毕业实习、固体地球物理学野外实习、重磁观测实习、地电场与电磁场观测实习、地震学观测实习、、空间探测资料处理与解释、空间探测教学实习、地球物理大地测量学教学实习、行星物理综合实习、科研能力拓展
10	终身学习： 具有自主学习和终身学习的意识，有不断学习和适应发展的能力	①课堂教学： 思想道德修养与法律基础、大学英语、大学语文 B、逻辑学导论、形式与政策、专业选修课 ②课外学习： 秭归地质教学实习、专题讲座、科研能力拓展

主干学科：地球物理学

专业核心课程：地震学、地球重力学、地磁学、地电学、地球动力学、等离子体物理、空间探测原理与方法、行星科学导论、空间大地测量技术

主要实践性教学环节：重磁观测实习、地电场与电磁场观测实习、地震学观测实习、固体地球物理学野外实习、空间探测资料处理与解释、空间探测教学实习、地球物理大地测量学教学实习、行星物理综合实习、固体地球物理学野外实习等。

毕业学分要求：168

学制与学位：四年，理学学士。

本专业学生可以辅修的其他专业：不限

相近专业：空间科学与技术（070802）、勘查技术与工程（081402）

Program for Geophysics (Distinguished)

Specialty and Code: Geophysics 070801

Education Objectives:

Geophysical distinguished class is going to train outstanding innovative students that have solid geophysics, space physics, earth science and other knowledge, with excellent organization and leadership, communication and expression and sustainable development ability, and can be engaged in scientific research in universities, research institutes.

Graduation Requirements:

1. Basic Knowledge: Master basic theories and knowledge of mathematics, physics, geology, information science, geophysics, etc.
2. Problem Analysis: Master basic theories of seismology, gravity, geomagnetism, and geoelectric, as well as the geophysical data processing and interpretation methods/techniques; These methods/techniques can be applied to identify, express and analyze the relevant discipline and professional issues through literature research, so as to obtain effective conclusions.
3. Design/Develop Solutions: Able to design/develop solutions to professional problems in this discipline, and to reflect innovative consciousness in the design process, taking into account social, health, safety, legal, cultural and environmental factors.
4. Research: Can study the related problems based on the principles, techniques, and methods mastered by the specialty, and get reasonable and effective conclusions through information synthesis.
5. Employ Modern Tools: Aiming at the professional problems of this discipline, able to select and use appropriate modern technical tools, including problem prediction and simulation, and to understand the limitations of the subject.
6. Discipline and Society: Able to conduct a rational analysis based on the relevant background knowledge of disciplines and specialties, to evaluate the impact of problem solutions on society, environment, health, safety, law, culture, and sustainable development, and to understand the responsibilities to be undertaken.
7. Professional Norms: Having the professional ethics and norms that the discipline should possess.
8. Individual and Team: Able to assume the roles of individuals, team members and leaders in a multidisciplinary team.
9. Management and Communication: Understanding and mastering the relevant management and decision-making methods, can effectively communicate with colleagues and the public on professional issues of this discipline, and have a certain international perspective, and can

communicate in a cross-cultural context.

10. Lifelong Learning: has the consciousness of independent learning and lifelong learning, and can constantly learn and adapt to development.

Graduation Requirements and Pathways :

No.	Graduation Requirements	Pathways (Teaching Process)
1	Basic Knowledge: Master basic theories and knowledge of mathematics, physics, geology, information science, geophysics, etc.	① Classroom Teaching: Liberal Education Courses (Compulsory and Elective classes), Fundamental Courses, Disciplinary Fundamental Courses ② Extracurricular Learning: Military Training, Labor practice, C Language Programming (A)
2	Problem Analysis: Master basic theories of seismology, gravity, geomagnetism, and geoelectric, as well as the geophysical data processing and interpretation methods/techniques; These methods/techniques can be applied to identify, express and analyze the relevant discipline and professional issues through literature research, to obtain effective conclusions.	① Classroom Teaching: Main Specialty Courses (Solid and Space Geophysics) ② Extracurricular Learning: Practical works, Scientific Research Project, Practice for Graduation, Thesis for Graduation
3	Design/Develop Solutions: Able to design/develop solutions to professional problems in this discipline, and to reflect innovative consciousness in the design process, taking into account social, health, safety, legal, cultural and environmental factors.	① Classroom Teaching: Specialty Elective Courses (Solid or Space Geophysics), Matlab Programming and Application, Python Application in Geophysical Data Processing ② Extracurricular Learning: Practical works, Scientific Research Project, Practice for Graduation, Thesis for Graduation, Specialized Lecture
4	Research: Can study the related problems based on the principles, techniques, and methods mastered by the specialty, and get reasonable and effective conclusions through information synthesis.	① Classroom Teaching: Main Specialty Courses (Solid and Space Geophysics) ② Extracurricular Learning: Practical works, Scientific Research Project, Practice for Graduation, Thesis for Graduation, Specialized Lecture

No.	Graduation Requirements	Pathways (Teaching Process)
5	Employ Modern Tools: Aiming at the professional problems of this discipline, able to select and use appropriate modern technical tools, including problem prediction and simulation, and to understand the limitations of the subject.	①Classroom Teaching: Main Specialty Courses (Solid and Space Geophysics) ②Extracurricular Learning: Practical works, Scientific Research Project, Practice for Graduation, Thesis for Graduation
6	Discipline and Society : Able to conduct a rational analysis based on the relevant background knowledge of disciplines and specialties, to evaluate the impact of problem solutions on society, environment, health, safety, law, culture, and sustainable development, and to understand the responsibilities to be undertaken.	①Classroom Teaching: Liberal Education Courses, Disciplinary Fundamental Courses, History of seismology ② Extracurricular Learning: Scientific Research Project, Practice for Graduation, Thesis for Graduation, Specialized Lecture, Labor practice, Social Investigation
7	Professional Norms: Having the professional ethics and norms that the discipline should possess.	①Classroom Teaching: Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, Introduction to Solid and Space Geophysics, Earth system sciences ② Extracurricular Learning: Specialized Lecture, Geophysical Field exercises, Space Exploration Practice
8	Individual and Team: Able to assume the roles of individuals, team members and leaders in a multidisciplinary team.	①Classroom Teaching: Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, Military Theory, Ideological morality and rule of law ② Extracurricular Learning : Military Training, Scientific Research Project, Geological Field Training in Zhigui
9	Management and Communication: Understanding and mastering the relevant management and decision-making methods, can effectively communicate with colleagues and the	①Classroom Teaching: College English, Specialized English of Geophysics, Ideological morality and rule of law ② Extracurricular Learning: Practice for Graduation, Thesis for Graduation, Labor

No.	Graduation Requirements	Pathways (Teaching Process)
	public on professional issues of this discipline, and have a certain international perspective, and can communicate in a cross-cultural context.	practice, Scientific Research Project, Practice works
10	Lifelong Learning: Has the consciousness of independent learning and lifelong learning, and can constantly learn and adapt to development.	① Classroom Teaching: Ideological morality and rule of law, College English, Introduction to Science of Logic, Situation and Policy, Specialized English of Geophysics, Specialty Elective Courses (Solid or Space Geophysics) ② Extracurricular Learning: Geological Field Training in Zhigui, Scientific Research Project, Specialized Lecture

Major Disciplines: Geophysics

Core Courses: Geomagnetism, Geoelectrical methods, Geodynamics, Seismology, Earth gravity, Plasma Physics, Principles and Methods of Space Exploration, Introduction to Planetary Science and Astrophysics, Space Geodesy

Practical Work: Gravity and Magnetic Measurements, Geoelectrical and Electromagnetic field measurements, Seismic observation, Geophysical Field exercises, Processing and Interpretation of Space Exploration, Space Exploration Practice, Space Geodesy Practice, Planetary Physics Practice

Required Credits for Graduation: 168

Duration & Degree Granted: Four years, Bachelor of Sciences

Recommended Minors: No limitation

Related Specialties: Exploration Technology and Engineering (081402), Space Science and Technology (070802)

地球物理学(珠峰班)课程教学计划表
Course Descriptions of Geophysics (Distinguished)

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	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 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 College English	9	144	144				48		3	3	3					
		14300300	军事理论 Military Theory	2	36	36						2							
		12008200	劳动教育 Labor Education	1	16	16						1							
		21624800	大学语文 B College Chinese B	2	32	32							2						
		20123000	逻辑学导论 Introduction to Science of Logic	2	32	32						2							
		206278*0	地球与空间科学导论 Introduction to Solid and Space Geophysics	3	48	48						1.5	1.5						

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	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									
选修 Elective		包括美育、心理健康教育课程（各不少于 2 学分）总计 12 学分，跨学科选修课不低于 4 学分	12	192														
		小计 Sum	50	692+192	692				48		16.5	9.5	4	6			2	
理科基础 Fundamental Courses	21220910	高等数学及地学应用 Advanced Mathematics and its Application in Geosciences	11.5	184	184						5	6.5						
	21220600	概率论与数理统计及地学应用 Probability Theory and Mathematical Statistics and its Application in Geosciences	3.5	56	56								3.5					
	21221300	力学 Mechanics	4	64	64							4						
	21205000	热学 Thermology	3	48	48							3						
	21221400	光学 Optics	3	48	48								3					
	21221500	电磁学 Electromagnetism	3	48	48							3						
	21208600	原子物理学 Atomic physics	3	48	48									3				
	21947600	C 语言程序设计 C Programming Language	2	32	32		8		8		2							
	20119700	地质学基础 Foundations of Geology	4	64	56	8	4	2	2			4						
	21206400	数学物理方程 Mathematical Physics	3	48	48							3						
	21212801	线性代数 A Linear Algebra Analysis A	3.5	56	56								3.5					
	21200700	场论 Field Theory	3.5	56	56									3.5				
	20628100	地球物理数值分析 Numerical analysis in Geophysics	3	48	48									3				
		小计 Sum		50	800	792	8	12	2	10		7	23.5	10	9.5			

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	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									
学科基础课 Disciplinary Fundamental Courses	20632200	固体地球物理学基础 Fundamentals of Solid-earth Geophysics	2	32	32								2					
	20632300	空间物理学基础 Fundamentals of Space Physics	2	32	32								2					
	20628200	地球物理信号处理 Digital Signal Processing	2.5	40	40									2.5				
	20634700	地球系统科学 Earth system sciences	1.5	24	24											1.5		
	小计 Sum		8	128	128								4	2.5		1.5		
专业主干课 Main Specialty Courses	固体地球物理方向																	
	20608200	连续介质力学 Continuum Mechanics	3	48	48									3				
	20632800	地磁学 Geomagnetism	3	48	40	8		4	4						3			
	20632900	地电学 Geoelectrical methods	3	48	40	8									3			
	20621600	地球动力学* Geodynamics	2.5	40	40			4	4							2.5		
	20602800	地震学 Seismology	4	64	64					连续介质力学							4	
	20633000	地球重力学 Earth gravity	2.5	40	40		4	4							2.5			
	20632400	应用地球物理学基础 Fundamentals of Applied Geophysics	2	32	32									2				
	206337*0	专题讲座 Specialized Lecture	2	32		32									0.5	0.5	0.5	0.5
	小计 Sum		22	352	304	48	4	12	8					5	9	7	0.5	0.5
	空间物理方向																	
	20632500	电动力学 Electrodynamics	3	48	48									3				
	20633100	热力学与统计物理 Thermodynamics and Statistical Physics	3	48	48										3			
	20632600	流体力学 Hydromechanics	3	48	48									3				
	20633800	等离子体物理 Plasma Physics	3	48	48										3			
	20633200	空间探测原理与方法 Principles and Methods of Space Exploration	3	48	48					等离子体物理						3		

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	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										
	20632700	行星科学导论 Introduction to Planetary Science and Astrophysics	1.5	24	24									1.5					
	20633300	空间大地测量技术 Space Geodesy	3	48	48										3				
	206337*0	专题讲座 Specialized Lecture	2	32		32									0.5	0.5	0.5	0.5	
	小计 Sum		21.5	344	312	32								7.5	9.5	3.5	0.5	0.5	
专业选修课 Specialty Elective Courses		可按方向设课，具体见专业选修课列表（固体地球物理方向最低选修 9.5 学分，空间物理方向最低 12 学分）																	
合计（专选学分放第 7 学期统计，不含通选） Sub-total																			
固体地球物理方向			130	2316	1916	56	16	14	66		23.5	33	18	23	9	7	11.5	2.5	
空间物理方向			129.5	2156	1924	40	12	2	58		23.5	33	18	25.5	9.5	3.5	14	2.5	
实践环节 Practical Work	44300400	军事训练 Military Training	2	2 周							2								
	42008300	劳动实践 Labor practice	1	4 周												1			
	41947700	C 语言课程设计 C Language Programming	1.5	1.5 周							1.5								
	40115702	地质教学实习（秭归） B Geological Field Training in Zhigui	2	2 周								2							
	40635100	毕业生产实习 Practice for Graduation	4	8 周														4	
	40635200	毕业论文（设计） Thesis for Graduation	4	8 周														4	
	固体地球物理方向																		
	40621800	重磁观测实习 Gravity and Magnetic Measurements	3	3 周												3			
	40633400	地电场与电磁场观测实习 Geoelectrical and Electromagnetic field measurements	2	2 周												2			
	40633900	地震学观测实习 Seismic observation	2	2 周													2		
	40634000	固体地球物理学野外实习 Geophysical Field exercises	2	2 周													2		
	小计 Sum		23.5	34.5 周								3.5	2			5	5		8
	空间物理方向																		

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	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									
	40634100	空间探测资料处理与解释 Processing and Interpretation of Space Exploration	3	3 周												3		
	40614700	空间探测教学实习 Space Exploration Practice	1	1 周												1		
	40634200	地球物理大地测量学教学实习 Geophysical GeodesyPractice	2	2 周						卫星导航定位原理与应用						2		
	40634300	行星物理综合实习 Planetary Physics Practice	1	1 周												1		
	小计 Sum		21.5	32.5 周							3.5	2				8		8
	创新创业自主学习 Freedom study	ZZ35000S	社会调查 Social Investigation	2	32											2		
		科研能力拓展 Scientific Research Project	3	3 周													3	
小计 Sum			5	3 周											2		3	
总计 Total		固体地球物理方向	168	2348+37.5 周	1916	56	16	14	66		27	35	18	23	16	12	14.5	10.5
		空间物理方向	168	2348+35.5 周	1924	40	12	2	58		27	35	18	25.5	11.5	11.5	17	10.5
可开出专业选修课列表 Specialty Elective Courses	两个方向均可选																	
	20609300	地球物理专业英语 Specialized English of Geophysics	2	32	32										2			
	20629600	地球物理数据处理中的 Python 应用 Python Application in Geophysical Data Processing	2	32	24	8											2	
	20629100	卫星导航定位原理与应用 The Principle and Application of Navigation Satellite and Positioning	2	32	32											2		
	20615700	Matlab 语言及应用 Matlab Programming and Application	2	32	24									2				
	固体地球物理方向																	
	20617700	地震大地测量学 Earthquakes and Geodesy	2	32	32											2		
	20623500	重磁数据分析与解释 Processing and Interpretation of Gravity and Magnetic Data	2	32	16	16										2		
	20622300	地球科学绘图基础 Basic Drawing in Earth Science	1.5	24	12	12										1.5		

课程 类别 Classi- fication	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 e 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	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									
	20628900	地震观测与数据库 Seismic Observation and Database	1.5	24	20	4									1.5			
	20621400	岩石物理学 Rock physics	2.5	40	32	8			8						2.5			
	20634800	地震学发展史 History of seismology	1	16	16											1		
	20622500	地震学编程与应用 Programming in Seismology and Applications	2	32	16	16				地震学							2	
	20622600	国际重磁数据库及应用 International Gravity and Magnetic Database and Applications	2	32	16	16											2	
	20629500	地震勘探原理与应用 The Principle and Application of Seismic Exploration	2	32	32												2	
	20622800	区域地球物理调查方法 Regional geophysical surveying method	1.5	24	24				8	8							1.5	
	20601400	地球物理反演概论 Introduction of Geophysical Inversion	2.5	40	32	8											2.5	
空间物理方向																		
	20633500	大气物理概论 Introduction to atmospheric physics	2	32	32										2			
	20628500	地球空间电磁现象 Electromagnetic phenomena in the earth's space	2	32	32										2			
	20633600	磁层物理学 Magnetospheric Physics	2	32	32					地球空间电磁现象						2		
	20634400	大气资料处理 Atmospheric data processing	1	16	4	12										1		
	20634500	电离层物理与电波传播 Ionospheric Physics and Radio Wave Propagation	2	32	32											2		
	20634600	地球科学中的资料同化 Data Assimilation in Earth Sciences	1.5	24	24											1.5		
	20634900	深空探测任务设计 Deep Space Exploration Mission Design	2	32	32												2	
	20629700	太空天气学 Space weather science	2	32	32												2	
	20635000	天体物理前沿 Frontiers of Astrophysics	1.5	24	24												1.5	

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。

地球物理学(珠峰班)课程分类统计

Course Classifications and Statistics of Geophysics (Distinguished class)

课程 类别 统 计	通识教育课程 Liberal Education Courses		理科 基础课 Science Fundamental 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	创新创业 自主学习 Freedom	学时 总计 Total	学分 总计 Total Credits
	必修	选修								
固体地球 物理方向 学时/学分	692/38	192/12	800/50	128/8	352/22	152/9.5	34.5 周 /23.5	32 学时 +3 周/5	2348+ 37.5 周	168
	884/50									
学分比例	29.76%		29.76%	4.76%	13.10%	5.65%	13.99%	2.98%		100%
空间物理 方向 学时/学分	692/38	192/12	800/50	128/8	344/21.5	192/12	32.5 周 /21.5	32 学时 +3 周/5	2380+ 35.5 周	168
	884/50									
学分比例	29.76%		29.76%	4.76%	12.80%	7.14%	12.80%	2.98%		100%

地球物理学专业培养方案

专业名称与代码：地球物理学 070801

专业培养目标：培养具备扎实的数理基础和较系统的地球物理学基本理论、基本知识与基本技能，具有较好的科学素养、创新精神和国际视野，在资源、环境、灾害、空间探测及国民经济其他相关领域从事科研、教学、技术开发与管理工作的的高素质人才。

专业毕业要求：

1. 基础知识：掌握数学、物理学、地质学、信息科学、地球物理学等方面的基本理论、基本知识；
2. 问题分析：掌握地震学、重力学、地磁学、地电学等地球物理学基本理论及地球物理数据处理与解释方法/技术；能够应用这些方法/技术，识别、表达、并通过文献研究分析相关学科专业问题，获得有效结论；
3. 设计/开发解决方案：能够设计/开发本学科专业问题的解决方案，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：能够基于本学科专业所掌握的原理、技术、方法对相关问题进行研究，并通过信息综合得到合理有效的结论；
5. 使用现代工具：能够针对本学科专业问题，选择与使用恰当的现代技术工具，包括对问题的预测与模拟，并能够理解其局限性；
6. 专业与社会：能够基于学科专业相关背景知识进行合理分析，评价问题解决方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响，并理解应承担的责任；
7. 职业规范：具有本学科专业所应具有的职业道德和规范；
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；
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，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流；
10. 终身学习：具有自主学习和终身学习的意识，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	基础知识： 掌握数学、物理学、地质学、信息科学、地球物理学等方面的基本理论、基本知识	①课堂教学：马克思主义基本原理概论，毛泽东思想和中国特色社会主义理论体系概论，习近平新时代中国特色社会主义思想概论，中国近现代史纲要，思想道德与法治，形势与政策，体育，大学英语，军事理论，劳动教育，地球物理与空间信息导论，高等数学 A，线性代数 A，概率论与数理统计 B，大学物理 A，物理实验 A，地质学基础，测量学 A，C 语言程序设计，数学物理方程，场论，地球物理数值分析，地球物理数字信号处理 ②课外学习：测量学教学实习 A、地球物理学类专业野外地质实习、劳动实践、军事训练、C 语言课程设计
2	问题分析： 掌握地震学、重力学、地磁学、地电学等地球物理学基本理论及地球物理数据的处理与解释方法/技术；能够应用这些方法/技术，识别、表达、并通过文献研究分析分析相关学科专业问题，以获得有效结论	①课堂教学：连续介质力学；岩石物理学；重力学；地电地磁学理论；地球物理大地测量学；地球动力学；地震学；空间物理概论 ②课外学习：地震学实习、重磁观测实习、地球物理大地测量教学实习、空间探测教学实习、地球物理学专业教学实习、毕业实习、毕业论文（设计）
3	设计/开发解决方案： 能够设计/开发本学科专业问题的解决方案，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	①课堂教学：地震观测与数据库、地球科学绘图基础、地震勘探原理与应用、重磁数据分析与解释、地震学编程与应用、国际重磁数据库及应用、时序分析理论及应用、地热学、区域地球物理调查方法、地震大地测量学、卫星导航定位原理与应用、地球物理专业英语、地球物理反演概论、地球物理数据处理中的 Python 应用、②课外学习：地震学实习、重磁观测实习、地球物理大地测量教学实习、空间探测教学实习、地球物理学专业教学实习、毕业实习、毕业论文（设计）
4	研究： 能够基于本学科专业所掌握的原理、技术、方法对相关问题进行研究，并通过信息综合得到合理有效的结论	①课堂教学：连续介质力学、岩石物理学、重力学、地电地磁学理论、地球物理大地测量学、空间物理概论、地球动力学、地震学、地球物理与空间信息导论

序号	毕业要求	实现途径（教学过程）
		② 课外学习 ：地震学实习、重磁观测实习、地球物理大地测量学教学实习、空间探测教学实习、地球物理学专业教学实习、毕业实习、毕业论文（设计）、专业选修课程、创新创业自主学习
5	使用现代工具 ：能够针对本学科专业问题，选择与使用恰当的现代技术工具，包括对问题的预测与模拟，并能够理解其局限性	① 课堂教学 ：连续介质力学；岩石物理学；重力学；地电地磁学理论；地震学；地球物理大地测量学；空间物理概论；地球动力学；C 语言程序设计、地球物理数字信号处理 ② 课外学习 ：C 语言课程设计、地震学实习、重磁观测实习、地球物理大地测量学教学实习、空间探测教学实习、专业选修课程、创新创业自主学习
6	专业与社会 ：能够基于学科专业相关背景知识进行合理分析，评价问题解决方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响，并理解应承担的责任	① 课堂教学 ：毛泽东思想与中国特色社会主义理论体系概论、思想道德与法治、马克思主义基本原理、习近平新时代中国特色社会主义思想概论，劳动教育，美育课程 ② 课外学习 ：地震学实习、重磁观测实习、地球物理大地测量学教学实习、空间探测教学实习、地球物理学专业教学实习、社会调查、毕业论文（设计）。
7	职业规范 ：具有本学科专业所应具有的职业道德和规范	① 课堂教学 ：地球物理与空间信息导论 ② 课外学习 ：地球物理学类专业野外地质实习、地球物理学专业教学实习。
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	① 课堂教学 ：中国近代史纲要、毛泽东思想与中国特色社会主义理论体系概论、马克思主义基本原理、习近平新时代中国特色社会主义思想概论、劳动教育、美育课程、军事理论、地球物理与空间信息导论、思想道德与法治 ② 课外学习 ：军事训练、劳动实践、地球物理学类专业野外地质实习、地球物理学专业教学实习、创新创业
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，并具备一定的国际	① 课堂教学 ：大学英语、思想道德与法治、马克思主义基本原理 ② 课外学习 ：毕业论文（设计）、毕业实习、

序号	毕业要求	实现途径（教学过程）
	视野，能够在跨文化背景下进行沟通和交流	地球物理学专业教学实习、地震学实习、重磁观测实习、地球物理大地测量学教学实习、空间探测教学实习
10	终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力	①课堂教学：思想道德与法治、地球物理与空间信息导论、大学英语、C 语言程序设计；专业选修课 ②课外学习：地球物理学专业教学实习、C 语言课程设计

主干学科：地球物理学、物理学、地质学。

专业核心课程：连续介质力学、岩石物理学、重力学、地电地磁学理论、地震学、地球物理大地测量学、空间物理概论、地球动力学。

主要专业实验：地球物理观测技术、实验地球物理。

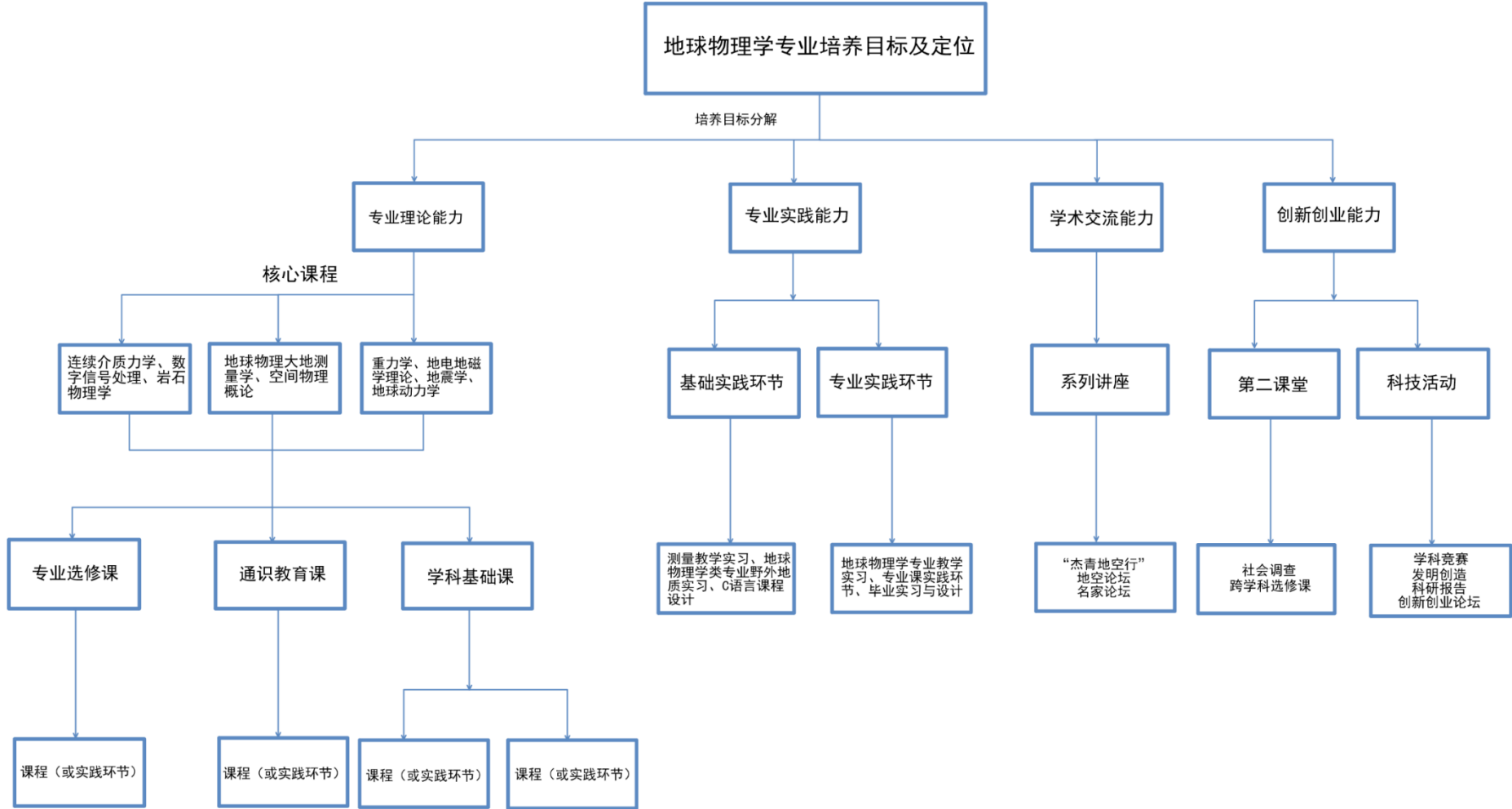
主要实践性教学环节：地震学实习、重磁观测实习、地球物理大地测量学教学实习、空间探测教学实习、地球物理学专业教学实习、毕业实习和毕业论文（设计）等。

毕业学分要求：四年总学分 170 学分。

学制与学位：四年，理学学士。

本专业学生可以辅修的其他专业：不限。

相近专业：空间科学与技术（070802）、勘查技术与工程（081402）



Program for Geophysics

Specialty and Code: Geophysics 070801

Education Objectives: The students are expected to master the fundamental theory of Geosciences, and systematic geophysical expertise with good ideology and morality, and to become high-quality personnel engaged in geophysical observation and basic research. At the same time, we should enhance students' ability of innovation and entrepreneurship, organization and leadership, communication and presentation, as well as promote their competitiveness in sustainable development, employment and self-employment.

Graduation Requirements:

1. Basic Knowledge: Master basic theories and knowledge of mathematics, physics, geology, information science, geophysics, etc.
2. Problem Analysis: Master basic theories of seismology, gravity, geomagnetism, and geoelectric, as well as the geophysical data processing and interpretation methods/techniques; These methods/techniques can be applied to identify, express and analyze the relevant discipline and professional issues through literature research, so as to obtain effective conclusions.
3. Design/Develop Solutions: Able to design/develop solutions to professional problems in this discipline, and to reflect innovative consciousness in the design process, taking into account social, health, safety, legal, cultural and environmental factors.
4. Research: Can study the related problems based on the principles, techniques, and methods mastered by the specialty, and get reasonable and effective conclusions through information synthesis.
5. Employ Modern Tools: Aiming at the professional problems of this discipline, able to select and use appropriate modern technical tools, including problem prediction and simulation, and to understand the limitations of the subject.
6. Discipline and Society: Able to conduct a rational analysis based on the relevant background knowledge of disciplines and specialties, to evaluate the impact of problem solutions on society, environment, health, safety, law, culture, and sustainable development, and to understand the responsibilities to be undertaken.
7. Professional Norms: Having the professional ethics and norms that the discipline should possess.
8. Individual and Team: Able to assume the roles of individuals, team members and leaders in a multidisciplinary team.
9. Management and Communication: Understanding and mastering the relevant management and decision-making methods, can effectively communicate with colleagues and the public on professional issues of this discipline, and have a certain international perspective, and can

communicate in a cross-cultural context.

10. Lifelong Learning: has the consciousness of independent learning and lifelong learning, and can constantly learn and adapt to development.

Graduation Requirements and Pathways :

No.	Graduation Requirements	Pathways (Teaching Process)
1	Basic Knowledge: Master basic theories and knowledge of mathematics, physics, geology, information science, geophysics, etc.	①Classroom Teaching: Principles of Marxism, Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics, Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, The Essentials of Modern Chinese History, Ideological morality and rule of law, Situation and Policy, Physical Education, College English, Military Theory, Introduction to Geophysics and Geoinformatics, Advanced Mathematics A, Linear Algebra and Vector Analysis, Probability and Statistics B, College Physics A, College Physics Experiments A, , Surveying A, C Language Programming, Mathematical Physics, Field Theory, Numerical analysis in Geophysics, Geophysical Signal Processing ② Extracurricular Learning: Surveying Practice (A), Field geological practice of Geophysics, Labor practice, Military Training, Course Design for C Language
2	Problem Analysis: Master basic theories of seismology, gravity, geomagnetism, and geoelectric, as well as the geophysical data processing and interpretation methods/techniques; These methods/techniques can be applied to identify, express and analyze the relevant discipline and professional issues through literature research, to obtain effective conclusions.	①Classroom Teaching: Continuum Mechanics, Rock Physics, Gravity, Geoelectricity and Geomagnetism, Geophysical Geodesy, Geodynamics, Seismology, Introduction to Seismology Geophysics; ② Extracurricular Learning: Seismological practice; Observation Practice of Gravity and Geomagnetic Fields; Practice of Geophysical Geodesy; Space exploration observation and practice; Geophysical Major Teaching Practice; Practice for Graduation; Bachelor Thesis (Design)
3	Design/Develop Solutions: Able to design/develop solutions to professional problems in this discipline, and to reflect innovative consciousness in the design process, taking into account	① Classroom Teaching : Seismic Observation and Database; Basic Drawing in Earth Science; The Principle and Application of Seismic Exploration; Processing and Interpretation of Gravity and Magnetic Data; Programming in Seismology and Applications; International Gravity and Magnetic Database and Applications; Theory and application of time -

No.	Graduation Requirements	Pathways (Teaching Process)
	social, health, safety, legal, cultural and environmental factors.	frequency analyses; Geothermics; Regional geophysical surveying method; Earthquakes and Geodesy; The Principle and Application of Navigation Satellite and Positioning A; Specialized English of Geophysics; Introduction of Geophysical Inversion; Python Application in Geophysical Data Processing; ② Extracurricular Learning: Seismological practice; Observation Practice of Gravity and Geomagnetic Fields; Practice of Geophysical Geodesy; Space exploration observation and practice; Geophysical Major Teaching Practice Practice for Graduation; Bachelor Thesis (Design)
4	Research: Can study the related problems based on the principles, techniques, and methods mastered by the specialty, and get reasonable and effective conclusions through information synthesis.	①Classroom Teaching: Continuum Mechanics; Rock physics; Gravity; Geoelectricity and Geomagnetism; Geophysical Geodesy; Introduction to Space Physics; Geodynamics; Seismology; Introduction to Geophysics and Geoinformatics ② Extracurricular Learning: Seismological practice; Observation Practice of Gravity and Geomagnetic Fields; Practice of Satellite Navigation and Positioning; Space exploration observation and practice; Geophysical Major Teaching Practice Practice for Graduation; Bachelor Thesis (Design); Specialty elective courses; Start-up, Contest, Invention, Innovation and Research Presentation
5	Employ Modern Tools: Aiming at the professional problems of this discipline, able to select and use appropriate modern technical tools, including problem prediction and simulation, and to understand the limitations of the subject.	①Classroom Teaching: Continuum Mechanics; Rock physics; Gravity; Geoelectricity and Geomagnetism; Geophysical Geodesy; Introduction to Space Physics; Geodynamics; Seismology; Introduction to Geophysics and Geoinformatics ② Extracurricular Learning: Course Design for C Language; Seismological practice; Observation Practice of Gravity and Geomagnetic Fields; Practice of Physical Geodesy; Space exploration observation and practice; Specialty elective courses; Start-up, Contest, Invention, Innovation and Research Presentation
6	Discipline and Society: Able to conduct a rational analysis based on the relevant background knowledge of disciplines and specialties, to	①Classroom Teaching: Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics; Ideological morality and rule of law; Principles of Marxism; Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a

No.	Graduation Requirements	Pathways (Teaching Process)
	evaluate the impact of problem solutions on society, environment, health, safety, law, culture, and sustainable development, and to understand the responsibilities to be undertaken.	New Era; Labor Education; Aesthetic Education ②Extracurricular Learning: Seismological practice; Observation Practice of Gravity and Geomagnetic Fields; Practice of Satellite Navigation and Positioning; Space exploration observation and practice; Geophysical Major Teaching Practice; Practice for Graduation; Social Investigation; Bachelor Thesis (Design)
7	Professional Norms: Having the professional ethics and norms that the discipline should possess.	①Classroom Teaching: Introduction to Geophysics and Geoinformatics ②Extracurricular Learning: Field geological practice of Geophysics、Geophysical Major Teaching Practice
8	Individual and Team: Able to assume the roles of individuals, team members and leaders in a multidisciplinary team.	①Classroom Teaching: The Essentials of Modern Chinese History; Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics; Principles of Marxism; Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era; Labor Education; Aesthetic Education; Military Theory; Introduction to Geophysics and Geoinformatics; Ideological morality and rule of law; ②Extracurricular Learning: Military Training; Labor practice; Field geological practice of Geophysics; Geophysical Major Teaching Practice; and Others (Start-up, Contest, Invention, Innovation and Research Presentation)
9	Management and Communication: Understanding and mastering the relevant management and decision-making methods, can effectively communicate with colleagues and the public on professional issues of this discipline, and have a certain international perspective, and can communicate in a cross-cultural context.	①Classroom Teaching: College English; Ideological morality and rule of law; Principles of Marxism; ②Extracurricular Learning: Practice for Graduation; Bachelor Thesis (Design) ; Geophysical Major Teaching Practice; Seismological practice; Observation Practice of Gravity and Geomagnetic Fields; Practice of Geophysical Geodesy; Space exploration observation and practice
10	Lifelong Learning: Has the consciousness of independent learning and lifelong learning,	①Classroom Teaching: Ideological morality and rule of law; Introduction to Geophysics and Geoinformatics; College English; C Programming Language; Specialty

No.	Graduation Requirements	Pathways (Teaching Process)
	and can constantly learn and adapt to development.	Elective Courses ② Extracurricular Learning : Geophysical Major Teaching Practice; C language Course Projects; Social Investigation and Others (Star-up, Contest, Invention, Innovation and Research Presentation)

Major Disciplines: Geophysics、 physics、 geology.

Core Courses: Continuum Mechanics、 Rock Physics、 Gravity、 Geoelectricity and Geomagnetism、 Seismology、 Geophysical Geodesy、 Introduction to Space Physics、 Geodynamics

Lab Experiments: Observational Techniques in Geophysics、 Experimental Geophysics.

Practical Work: Seismological practice、 Observation Practice of Gravity and Geomagnetic Fields、 Practice of Satellite Navigation and Positioning、 Space exploration observation and practice、 Geophysical Major Teaching Practice、 Practice for Graduation、 Bachelor Thesis (Design)

Required Credits for Graduation: Total credits in four years are 170 credits.

Duration& Degree Granted: Four years, Bachelor of Science.

Recommended Minors: Not limited.

Related Specialties: Exploration Technology and Engineering (081402) , Space Science and Technology (070802)

地球物理学专业课程教学计划表

Course Descriptions of Geophysics

课程类别 Classi- fication		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	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 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 College English	9	144	144				48		3	3	3					
		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）总计 12 学分，跨学科选修课不低于 4 学分		12	192														
		小计 Sum		43	580	580						13	6	4	6				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	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									
大类专业课 Platform Courses	20617600	地球物理与空间信息导论 Introduction to Geophysics and Geoinformatics	1.5	24	24						1.5							
	212127*1	高等数学 A Advanced Mathematics A	11.5	184	184						5	6.5						
	21212801	线性代数 A Linear Algebra and Vector Analysis	3.5	56	56								3.5					
	21213502	概率论与数理统计 B Probability and Statistics B	2.5	40	40								2.5					
	212130*1	大学物理 A College Physics A	8	128	128							4	4					
	212169*1	物理实验 A College Physics Experiments A	2	64	4	60						1	1					
	20119700	地质学基础 Fundamentals of Geology	4	64	56	8	4	2	2			4						
	21130401	测量学 A Surveying A	2	32	32		16						2					
	21947600	C 语言程序设计 C Programming Language	2	32	32		8		8				2					
	小计 Sum		37	624	556	68	28	2	10		6.5	15.5	15					
学科基础课 Disciplinary Fundamental Courses	21206400	数学物理方程 Mathematical Physics	3	48	48					高等数学				3				
	21200700	场论 Field Theory	3.5	56	56					大学物理学				3.5				
	20628100	地球物理数值分析 Numerical analysis in Geophysics	3	48	48					线性代数				3				
	20628200	地球物理信号处理 Geophysical Signal Processing	2.5	40	40									2.5				
	小计 Sum		12	192	192									9.5	2.5			
专业主干课 Main Specialty Courses	20608200	连续介质力学 Continuum Mechanics	3	48	40	8				大学物理学				3				
	20621400	岩石物理学 Rock physics	2.5	40	32	8		8		地质学基础				2.5				
	20608400	重力学 Gravity	2.5	40	40			4	4	场论					2.5			
	20628300	地电地磁学理论 Geoelectricity and Geomagnetism	3	48	48			4	4	场论					3			

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	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										
	20628400	地球物理大地测量学 Geophysical Geodesy	2	32	32					测量学					2				
	20621600	地球动力学* Geodynamics	2.5	40	40				4	4	连续介质力学						2.5		
	20602800	地震学 Seismology	4	64	64						高等数学A、连续介质力学						4		
	20616600	空间物理概论 Introduction to Space Physics	2	32	32						大学物理学						2		
	小计 Sum		21.5	344	328	16			20	12					5.5	7.5	8.5		
专业选修课 Specialty Elective Courses		可按方向设课，具体见专业选修课列表，至少选修 12 学分	12	192	192													12	
合计 Sub-total			125.5	1932	1848	84	28	20	12		19.5	21.5	19	21	10	8.5	12	2	
实践环节 Practical Work	44300400	军事训练 Military Training	2	2 周								2							
	42008300	劳动实践 Labor practice	1	4 周							劳动教育						1		
	41120901	测量学教学实习 A Surveying Practice (A)	1	1 周							测量学			1					
	41947700	C 语言课程设计 Course Design for C Language	1.5	1.5 周							C 语言程序设计			1.5					
	40621700	地震学实习 Seismological practice	2	2 周	4	28					地震学						2		
	40621800	重磁观测实习 Observation Practice of Gravity and Geomagnetic Fields	3	3 周	8	40					重力学、地电地磁学理论					3			
	40628800	地球物理大地测量学教学实习 Practice of Geophysical Geodesy	2	2 周		32					地球物理大地测量学						2		
	40622000	空间探测教学实习 Space exploration observation and practice	2	2 周		32					空间物理概论						2		
	40627600	地球物理学类专业野外地质实习 Field geological practice of Geophysics	4	4 周							地质学基础					4			

课程类别 Classi- fication	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	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									
	40635300	地球物理学专业教学实习 Geophysical Major Teaching Practice	5	5 周											5			
	40613800	毕业实习 Practice for Graduation	8	8 周													8	
	40621300	毕业论文（设计） Bachelor Thesis（Design）	8	8 周													8	
	小计 Sum		39.5	42.5							2		2.5		7	12	16	
创新创业自主学习 Freedom study	ZZ35000S	社会调查 Social Investigation	2												2			
		其他(含创新创业课程、学科竞赛、发明创造、科研报告) Others (Start-up, Contest, Invention, Innovation and Research Presentation)	3														3	
	小计 Sum		5	80											2		3	
总计 Total			170	2012+42.5 周	1848	84	28	20	12		21.5	21.5	21.5	21	19	20.5	12	21
可开出专业选修课列表 Specialty Elective Courses	20628900	地震观测与数据库 Seismic Observation and Database	1.5	24	20	4				地震学						1.5		
	20622300	地球科学绘图基础 Basic Drawing in Earth Science	1.5	24	12	12										1.5		
	20622400	地震勘探原理与应用 The Principle and Application of Seismic Exploration	2	32	32					地震学							2	
	20623500	重磁数据分析与解释 Processing and Interpretation of Gravity and Magnetic Data	2	32	16	16				重力学、地电地磁学理论						2		
	20622500	地震学编程与应用 Programming in Seismology and Applications	2	32	16	16				地震学							2	
	20622600	国际重磁数据库及应用 International Gravity and Magnetic Database and Applications	2	32	16	16				重力学、地电地磁学理论							2	
	20622700	地热学 Geothermics	2	32	32										2			

课程 类别 Classi- fication	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	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									
	20622800	区域地球物理调查方法 Regional geophysical surveying method	1.5	24	24				8	8								1.5
	20617700	地震大地测量学 Earthquakes and Geodesy	2	32	32						地球物理大 地测量学						2	
	20629100	卫星导航定位原理与应用 The Principle and Application of Navigation Satellite and Positioning	2	32	32						地球物理大 地测量学						2	
	20609300	地球物理专业英语* Specialized English of Geophysics	2	32	32												2	
	20601400	地球物理反演概论 Introduc tion of Geophysical Inversion	2.5	40	32	8												2.5
	20629600	地球物理数据处理中的 Python 应 用 Python Application in Geophysical Data Processing	2	32	24	8												2
	20628500	地球空间电磁现象 Electromagnetic phenomena in the earth's space	2	2	2						空间物理 概论						2	
	20604600	空间探测导论 Introduction to Space Exploration	2	32	32						空间物理 概论						2	
	20623100	空间探测资料处理与解释 Processing and Interpretation of Space exploration data	2	32	32						空间物理 概论						2	
	20623200	太空天气学 Space weather science	2	32	32													2
	20623300	等离子体物理导论 Introduction to Plasma physics	2	32	28	4												2
	20623000	大气科学概论 Introduction to atmospheric physics	1	16	16												1	
	20629800	月球与行星内部探测导论 Introduction to Lunar and Planetary Interior Exploration	1.5	24	24													1.5
	20629200	地球和行星的基本物理过程 Fundamental Geophysical Process on Earth and Other Planets	2	32	28	4											2	
	20628600	地球内部物理 physics of the earth interior	2	32	32												2	

课程类别 Classi- fication	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	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									
	20629300	Linux 编程在大气科学的应用 Application of Linux programming to atmospheric science	2	32	16	16									2			
	20629400	电离层物理与电波传播概论 Introduction to Ionospheric Physics and Radio Wave Propagation	2	32	32										2			
	21935400	人工智能导论 Introduction to Artificial Intelligence	2	32	32		16								2			
	20629900	大数据分析及应用 Big data analysis and applications	2	32	24	8										2		
	20635500	地学信息三维可视化 3D Geo-visualization	2	32	24	8								2				
	20628700	遥感地学信息处理方法 Remote Sensing Geo-information Analysis and Processing	2	32	24	8								2				
	20625000	地理信息系统空间分析 Geographic Information System Spatial Analysis	2	32	16	16									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。

地球物理学专业课程分类统计

Course Classifications and Statistics of Geophysics

课程类别 统计	通识教育课程 Liberal Education Courses		大类平台课+学科基础课 Platform & 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 Hours	学分总计 Total Credits
	必修	选修							
课内总学时/学分	580/31	192/12	624+192 /37+12	344/21.5	192/12	42.5 周 /39.5	80/5	2012 +42.5 周	170
学分所占比例	25.29%		28.82%	12.65%	7.06%	23.24%	2.94%	100%	100%

地球物理学专业辅修课程教学计划表
Course Descriptions of Geophysics (Minor)

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	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	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									
Fundamental Courses 学科基础课	21206400	数学物理方程 Mathematical Physics	3	48	48										3			
	21200700	场论 Field Theory	3.5	56	56										3.5			
	小计 Sum		6.5	104	104										6.5			
Main Specialty Courses 专业主干课	20602800	地震学 Seismology	4	64	64				4	4						4		
	20608400	重力学 Gravity	2.5	40	40				4	4	场论						2.5	
	20628300	地电地磁学理论 Geoelectricity and Geomagnetism	3	48	48				4	4	场论						3	
	20628400	地球物理大地测量学 Geophysical Geodesy	2	32	32												2	
	20616600	空间物理概论 Introduction to Space Physics	2	32	32													2
	小计 Sum		13.5	216	216												4	7.5
Practical Work 实践环节	40621700	地震学实习 Seismological practice	2	2 周												2		
	40621800	重磁观测实习 Gravity and Magnetic Measurements	3	3 周													3	
	小计 Sum		5	5 周												2	3	
总计 Total			25	320+5 周	320										6.5	6	10.5	2

地球物理学辅修专业课程分类统计
Course Classifications and Statistics of Geophysics (Minor)

课程类别 统计	学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	实践环节 Practical Work	学时总计 Total Hour	学分总计 Total Credits
/学分	104/6.5	216/13.5	5 周/5	320+5 周	25
学分所占比例	26%	54%	20%		100%

勘查技术与工程（勘查地球物理）专业培养方案

专业名称与代码：勘查技术与工程（勘查地球物理） 081402

专业培养目标：

本专业以学生全面发展为本，培养具有良好的思想道德、身心健康、科学与人文素质，具备扎实的数学、物理、计算机和地球科学基础，系统掌握勘查技术与工程理论与方法技术，具有基本的创新创业意识、管理协作、交流表达与国际理解能力，能运用现代化仪器设备与地球物理探测技术，在资源勘查与开发、重大工程基础勘查、城市地下空间探测、地质灾害防治、环境监测与治理等领域解决勘查地球物理复杂工程问题的高素质应用创新型人才。

预期本专业毕业生毕业后 5-8 年能够在社会及勘查地球物理工程领域担任项目负责人或业务骨干，并取得中级及以上职称。

专业毕业要求：

(1) 工程知识：能够将数学、物理学、地质学、测量学和专业知用于解决勘查地球物理领域的复杂工程问题。

(2) 问题分析：能够应用数学、物理和勘查地球物理的基本原理，识别、表达、并结合文献研究分析勘查地球物理领域的复杂工程问题，以获得有效结论。

(3) 设计/开发解决方案：能够设计针对勘查地球物理领域的复杂工程问题的解决方案，具有勘查地球物理野外数据采集、资料处理和地质解释的方案设计能力，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：能够基于科学原理并采用科学方法对勘查地球物理领域的复杂工程问题进行研究，包括勘查地球物理数据采集方案设计、资料分析与处理和地质地球物理综合解释、并通过分析得到合理有效的结论。具备初步的科学研究能力。

(5) 使用现代工具：能够针对勘查地球物理领域的复杂工程问题，开发、选择与使用恰当的技术、资源、现代仪器设备和计算机，包括对勘查地球物理领域的复杂工程问题的正演模拟和反演计算，并能够理解其多解性和局限性。

(6) 工程与社会：能够基于地球物理理论和所学的相关背景知识进行分析，评价勘查地球物理领域复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

(7) 环境和可持续发展：了解本专业的技术现状和发展动态，正确认识本专业与环境保护的关系，理解和评价针对勘查地球物理领域的复杂工程问题的工程实践对环境、社会可持续发展的影响。

(8) 职业规范：具有人文社会科学素养、社会责任感，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。

(9) 个人和团队：具有较强的团队意识和协作精神，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。

(10) 沟通：能够就勘查地球物理领域的复杂工程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，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

(11) 项目管理：理解并掌握勘查地球物理领域工程管理常识与经济决策方法，并

能在多学科环境中应用。

(12) 终身学习：具有自主学习和终身学习的意识，能够不断学习地球物理领域新方法和新技术，有不断学习和适应发展的能力。

序号	毕业要求	实现途径（教学过程）
1	工程知识：能够将数学、物理学、地质学、测量学和专业知 识用于解决勘查地球物理领 域的复杂工程问题。	①课堂教学：高等数学 A、线性代数 A、概率论与数理统计 B、大学物理 A、物理实验 A、地质学基础、测量学 A、C 语言程序设计、数学物理方程、场论、弹性波理论基础、地球物理数值分析、岩石物理学导论*、地球物理信号处理、重力勘探、磁法勘探、电法勘探、地震勘探、地球物理测井。 ②课外学习：测量教学实习 A、C 语言课程设计、地球物理仪器实验、地球物理学类专业野外地质实习、勘查地球物理教学实习。
2	问题分析：能够应用数学、物理和勘查地球物理的基本原理，识别、表达、并结合文献研究分析勘查地球物理领域的复杂工程问题，以获得有效结论。	①课堂教学：重力勘探、磁法勘探、电法勘探原理、地震勘探原理、人工智能导论、重磁勘探、电法勘探、地震勘探、数据结构与算法基础、井中地球物理、工程地质学基础 B、城市地下空间规划及利用。 ②课外学习：反射地震资料处理实习、反射地震资料解释实习、电磁法新方法技术实习、重磁资料处理和解释实习、地质雷达数据采集与处理实习、工程地震勘探实习、测井资料处理与解释实习、工程电磁法勘探实习、工程地震与声波检测实习、井中地球物理实习、地震数据处理与解释实习、毕业实习、毕业论文（设计）。
3	设计/开发解决方案：能够设计针对勘查地球物理领域的复杂工程问题的解决方案，具有勘查地球物理野外数据采集、资料处理和地质解释的方案设计能力，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。	①课堂教学：岩石物理学导论、地球物理信号处理、地球物理数值分析、重力勘探、磁法勘探、重磁资料处理与解释、电法勘探原理、电（磁）法资料处理与解释、地震勘探原理、地震资料采集与处理、地震勘探资料解释、地球物理测井、思想道德与法治、形势与政策。 ②课外学习：反射地震资料处理实习、反射地震资料解释实习、工程地震勘探实习、勘查地球物理教学实习、电磁法新方法技术实习、地质雷达数据采集与处理实习、重磁资料处理和解释实习、测井资料处理与解释实习、勘查地球物理教学实习、毕业实习、毕业论文（设计）。
4	研究：能够基于科学原理并采	①课堂教学：大学物理实验 A、地球物理信号处理；

序号	毕业要求	实现途径（教学过程）
	用科学方法对勘查地球物理领域的复杂工程问题进行研究，包括勘查地球物理数据采集方案设计、资料分析与处理和地质地球物理综合解释、并通过分析得到合理有效的结论。具备初步的科学研究能力。	地球物理数值分析、地震勘探原理、地震资料采集与处理、地震勘探资料解释、电法勘探原理、电（磁）法资料处理与解释、重力勘探、磁法勘探、重磁资料处理与解释、地球物理测井。 ②课外学习：反射地震资料处理实习、反射地震资料解释实习、电磁法新方法技术实习、重磁资料处理和解释实习、地质雷达数据采集与处理实习、工程地震勘探实习、测井资料处理与解释实习、地球物理学类专业野外地质实习、勘查地球物理教学实习、毕业设计、毕业论文（设计）。
5	使用现代工具：能够针对勘查地球物理领域的复杂工程问题，开发、选择与使用恰当的技术、资源、现代仪器设备和计算机，包括对勘查地球物理领域的复杂工程问题的正演模拟和反演计算，并能够理解其多解性和局限性。	①课堂教学：测量学 A、C 语言程序设计、地球物理数值分析、地球物理信号处理、数据结构与算法基础、机器学习、深度学习、重磁资料处理与解释、电（磁）法资料处理与解释、地震资料采集与处理、震勘资料解释、地球物理测井。 ②课外学习：测量教学实习 A、C 语言课程设计、地球物理仪器实验、重磁资料处理和解释实习、电磁法新方法技术实习、地质雷达数据采集与处理实习、测井资料处理与解释实习、地震数据处理与解释实习、勘查地球物理教学实习、毕业实习、毕业论文（设计）。
6	工程与社会：能够基于地球物理理论和所学的相关背景知识进行分析，评价勘查地球物理领域复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。	①课堂教学：毛泽东思想和中国特色社会主义理论体系概论、习近平新时代中国特色社会主义思想概论、思想道德与法治、形势与政策、劳动教育、地球物理与空间信息导论、勘查地球物理专业讲座。 ②课外学习：劳动实践、地球物理学类专业野外地质实习、勘查地球物理教学实习、毕业实习、毕业论文（设计）。
7	环境和可持续发展：了解本专业的技术现状和发展动态，正确认识本专业与环境保护的关系，理解和评价针对勘查地球物理领域的复杂工程问题的工程实践对环境、社会可持续发展的影响。	①课堂教学：思想道德与法治、形势与政策、劳动教育、地质学基础、地球物理与空间信息导论、人工智能导论、城市地球物理概论、勘查地球物理专业讲座。 ②课外学习：社会调查、劳动实践、地球物理学类专业野外地质实习、勘查地球物理教学实习、毕业实习、毕业论文（设计）。
8	职业规范：具有人文社会科学素养、社会责任感，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。	①课堂教学：马克思主义基本原理、毛泽东思想和中国特色社会主义理论体系概论、习近平新时代中国特色社会主义思想概论、中国近现代史纲要、思想道德与法治、地球物理与空间信息导论、勘查地球物理专业讲座、工程项目管理。 ②课外学习：军事训练、劳动教育、地球物理学类专

序号	毕业要求	实现途径（教学过程）
		业野外地质实习、勘查地球物理教学实习、社会调查、毕业实习、毕业论文（设计）。
9	个人和团队：具有较强的团队意识和协作精神，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：军事理论、体育、劳动教育、地球物理与空间信息导论、城市地球物理概论、勘查地球物理专业讲座。 ②课外学习：军事训练、劳动实践、地球物理学类专业野外地质实习、勘查地球物理教学实习、工程地震勘探实习、电磁法新方法技术实习、社会调查、毕业实习、毕业论文（设计）。
10	沟通：能够就勘查地球物理领域的复杂工程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，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。	①课堂教学：大学英语、勘查地球物理专业讲座、地球物理工程制图、科技论文写作。 ②课外学习：社会调查、含创新创业类自主学习课程、重磁资料处理和解释实习、电法资料处理与解释实习、地震数据处理与解释实习、测井资料处理与解释实习、地球物理学类专业野外地质实习、勘查地球物理教学实习、毕业实习、毕业论文（设计）。
11	项目管理：理解并掌握勘查地球物理领域工程管理常识与经济决策方法，并能在多学科环境中应用。工程中的应用和最新发展趋势；了解与勘查地球物理相关的工程技术国家标准及行业标准和规范。	①课堂教学：地球物理与空间信息导论、思想道德与法治、工程项目管理、勘查地球物理专业讲座。 ②课外学习：社会调查、勘查地球物理教学实习、毕业实习、毕业论文（设计）。
12	终身学习：具有自主学习和终身学习的意识，能够不断学习地球物理领域新方法和新技术，有不断学习和适应发展的能力。	①课堂教学：地球物理与空间信息导论、人工智能导论、机器学习、勘查地球物理专业讲座、科技论文写作。 ②课外学习：劳动实践、毕业实习、地球物理学类专业野外地质实习、勘查地球物理教学实习。

说明：围绕勘查技术与工程专业培养目标，面向不同就业领域，培养方案设置 3 个专业方向，并构建了 3 个相应课程体系模块，模块一为勘查地球物理方向，模块二为智能探测英才班，模块三为城市地球物理菁英班。3 个模块供不同专业志向的学生选择学习。本专业毕业生至少要完成 1 个方向模块课程的学习并通过考核，才能毕业。

主干学科：地质资源与地质工程。

专业核心课程：

模块一（勘查地球物理方向）：重力勘探，磁法勘探，重磁资料处理与解释，电法勘探原理，电（磁）法资料处理与解释，地震勘探原理，地震资料采集与处理，地震勘探资料解释，地球物理测井。

模块二（智能探测英才班）：人工智能导论，重磁勘探，电法勘探，地震勘探，测井技术及仪器，机器学习，数据结构与算法基础，深度学习。

模块三（城市地球物理菁英班）：重磁勘探，电法勘探原理，地震勘探原理，井中地球物理，工程地质学基础 B，城市地下空间规划及利用，地震数据处理与解释，城市地球物理概论，电（磁）法资料处理与解释。

主要专业实验：地球物理仪器实验、岩石物性测量（密度、磁化率、电阻率、极化率、速度等）、重力仪及野外测量实验、磁力仪及野外测量实验、常规直流电水槽实验、地震波超声波物理模拟实验、常规测井实验、浅层地震实验。

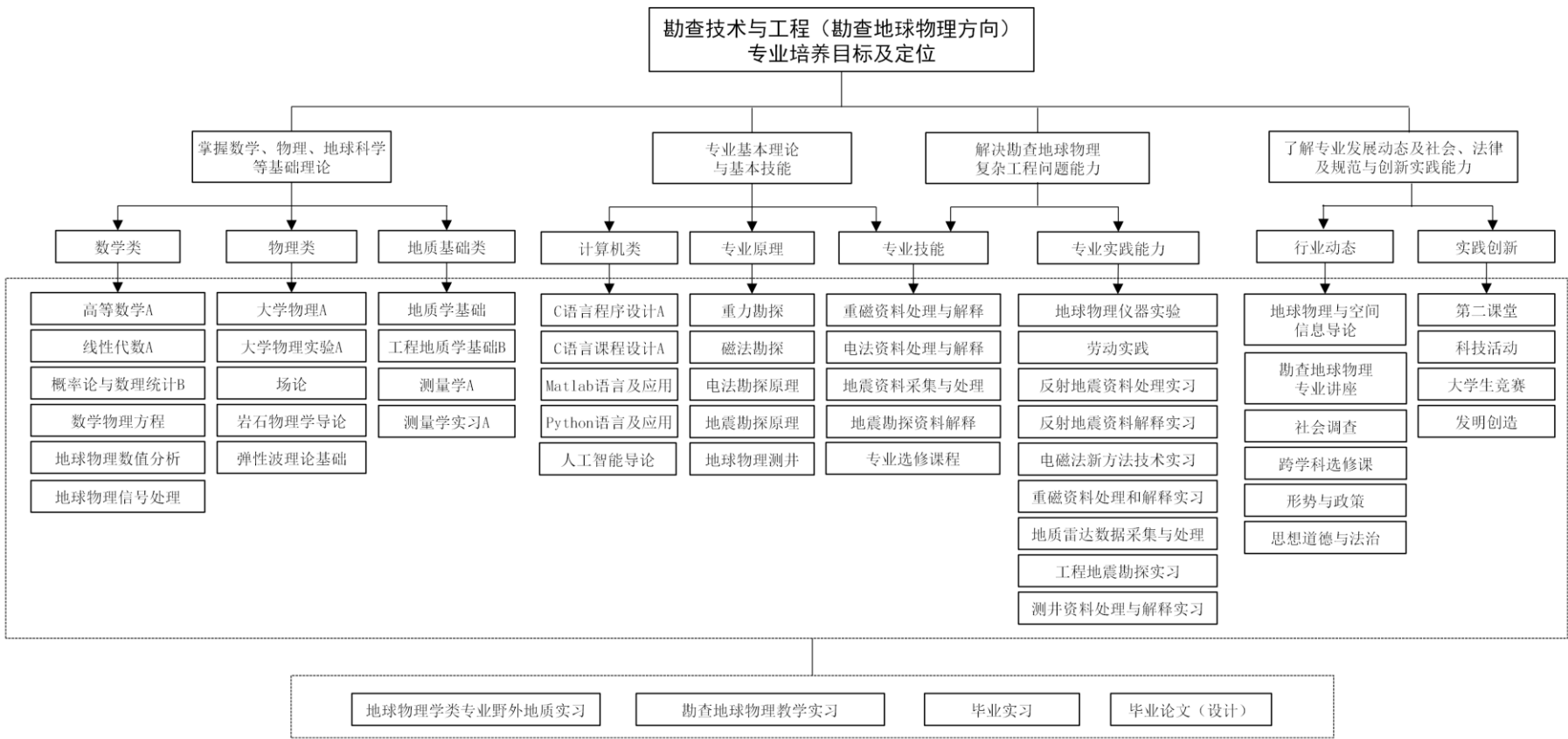
主要实践性教学环节：测量教学实习 A，C 语言课程设计，地球物理仪器实验，反射地震资料处理实习，反射地震资料解释实习、电磁法新方法技术实习、重磁资料处理和解释实习、地质雷达数据采集与处理实习、工程地震勘探实习、测井资料处理与解释实习、工程电磁法勘探实习、工程地震与声波检测实习、井中地球物理实习、地球物理学类专业野外地质实习、勘查地球物理教学实习、毕业实习、毕业论文（设计）。

毕业学分要求： ≥ 170 。

学制与学位：四年，工学学士。

本专业学生可以辅修的其他专业：地球物理学、地质工程、资源勘查工程。

相近专业：地球物理学、资源勘查工程、地质工程。



Program for Exploration Technology and Engineering (Exploration Geophysics)

Specialty and Code: Exploration Technology & Engineering 081402

Education Objectives: This major is based on the overall development of students, cultivates a good ideological and moral, physical and mental health, scientific and humanistic qualities, has a solid foundation in mathematics, physics, computer and earth sciences, systematically masters exploration technology and engineering theory and method technology, and has basic The innovative entrepreneurial awareness, management collaboration, communication expression and international understanding ability can solve the problem of exploration geophysical complex engineering in the fields of resource exploration and development, engineering basic exploration, urban underground space exploration, geological disaster prevention, environmental monitoring and governance, Quality application of innovative talents.

It is expected that graduates of this major will be able to serve as project leaders or key exports in the fields of social and exploration geophysical engineering within 5-8 years after graduation and obtain intermediate or higher professional titles.

Graduation Requirements:

(1) Engineering knowledge: master the basic theories, knowledge and skills in mathematics, physics, geology, survey, etc., and can solve complex engineering problems in exploration technology and engineering.

(2) Problem analysis: Ability to apply the basic principles of mathematics, physics, and geophysical exploration, identify, express, and combine literature research to study the complex engineering problems in geophysical fields to obtain effective conclusions.

(3) Engineering practice and research: The ability to design solutions for complex engineering problems in the exploration geophysical field, with the ability of explore geophysical field data acquisition, data processing and geological interpretation, and have innovation in the design process, considering social, health, safety, Legal, cultural, and environmental factors.

(4) Research: It is possible to conduct research on complex engineering problems in the field of geophysical exploration based on scientific principles and scientific methods, including exploration of geophysical data acquisition scheme design, data analysis and processing, and comprehensive interpretation of geological geophysics, and obtain reasonable and effective conclusions through analysis. Have initial scientific research capabilities.

(5) Using modern tools: Ability to develop, select and use appropriate technologies,

resources, modern instruments, and computers for complex engineering problems in the geophysical field, including forward modeling and inversion calculations for complex engineering problems in the geophysical field of exploration, and understand its non-unique and limitations.

(6) Engineering and society: Have the geophysical theory and relevant background knowledge and can study the complex engineering problems in the exploration geophysical field on social, health, safety, law, and culture, and understand the responsibilities.

(7) Environment and sustainable development: Understand the technical status and development of the major, correctly understand the relationship between the profession and environmental protection and understand and evaluate the impact of engineering practice on the complex engineering issues in the field of geophysics exploration on environmental and social sustainable development.

(8) Professional norms: Have the humanities, social science literacy, social responsibility, can understand, abide by engineering professional ethics and norms in engineering practice and fulfill his responsibilities.

(9) Individuals and teams: Through training, have the certain organizational management ability, strong team awareness and collaborative spirit, and can assume the roles of individuals, team members and responsible persons in a multidisciplinary team.

(10) Communication: effective communication with industry peers and the public on complex engineering issues in exploration technology and engineering, including writing reports and design contributions, presenting statements, articulating, or responding to instructions. Have a certain international perspective and be able to communicate in a cross-cultural context.

(11) Project management: understand and master engineering management principles and economic decision-making methods and apply them in a multidisciplinary environment.

(12) Continual learning: have the awareness of self-learning and lifelong learning, with the ability to continuously learn and adapt to development.

Graduation Requirements and Pathways :

No.	Graduation requirements	Pathways (Teaching Process)
1	Engineering knowledge: master the basic theories, knowledge and skills in mathematics, physics, geology, survey, and can solve complex engineering problems in exploration technology and engineering.	(1) Classroom Teaching: Advanced Mathematics A; Linear Algebra A; Probability and Statistics B; College Physics A; College Physics Experiments A; Foundations of Geology; Surveying A; C Language Programming; Mathematics and Physics Equations; Potential Field Theory; Foundation of Elastic Wave Theory; Geophysical Numerical Analysis; Introduction to Rock Physics; Geophysical Signal Processing; Gravity Exploration; Magnetic Exploration; Electrical Exploration; Seismic Exploration; Geophysical Well Logging. (2) Extracurricular Learning: Surveying Practice (A); C language Course Projects; Geophysics Instrument Experiment; Field geological practice of Geophysics; Exploration Geophysics Practice Teaching.
2	Problem analysis: Ability to apply the basic principles of mathematics, physics, and geophysical exploration, identify, express, and combine literature research to study the complex engineering problems in geophysical fields to obtain effective conclusions.	(1) Classroom Teaching: Gravity Exploration; Magnetic Exploration; Principles of Electrical Exploration; Principles of Seismic Exploration; Introduction to Artificial Intelligence; Gravity and Magnetic exploration; Electrical Exploration; Seismic Exploration; Foundation of Data Structure and Algorithm; Well logging Geophysics; Introduction to Engineering Geology B; Urban Underground Space Planning and Utilization. (2) Extracurricular Learning: Reflection Seismic Data Processing Practice; Reflection Seismic Data Interpretation Practice; Electromagnetic New Method and Technology Practice; Gravity and Magnetic Data Processing and Interpretation Practice; GPR Data Acquisition and Processing Practice; Engineering Seismic Exploration Practice; Geophysical Logging Data Processing & Interpretation Practice; Engineering Electromagnetic Exploration Practice; Engineering Seismic and Acoustic Detection Practice; Geophysical Logging Practice; Practice for Graduation; Graduation Thesis (Design).
3	Engineering practice and research: The ability to design solutions for complex engineering problems in the exploration geophysical field, with the ability of explore geophysical field data acquisition,	(1) Classroom Teaching: Geophysical Numerical Analysis; Introduction to Rock Physics; Geophysical Signal Processing; Gravity Exploration; Magnetic Exploration; Gravity and Magnetic Data Processing and Interpretation; Principles of Electrical Exploration; Electromagnetic Data Processing &

No.	Graduation requirements	Pathways (Teaching Process)
	data processing and geological interpretation, and have innovation in the design process, considering social, health, safety, Legal, cultural, and environmental factors.	Interpretation; Principles of Seismic Exploration; Seismic Data Acquisition & Processing; Seismic Data Interpretation; Geophysical Well Logging; Ideological morality and rule of law; Situation and Policy. (2) Extracurricular Learning: Reflection Seismic Data Processing Practice; Reflection Seismic Data Interpretation Practice; Electromagnetic New Method and Technology Practice; Gravity and Magnetic Data Processing and Interpretation Practice; GPR Data Acquisition and Processing Practice; Engineering Seismic Exploration Practice; Geophysical Well Logging Data Processing & Interpretation Practice; Exploration Geophysics Practice Teaching; Practice for Graduation; Graduation Thesis (Design).
4	Research: It is possible to conduct research on complex engineering problems in the field of geophysical exploration based on scientific principles and scientific methods, including exploration of geophysical data acquisition scheme design, data analysis and processing, and comprehensive interpretation of geological geophysics, and obtain reasonable and effective conclusions through analysis. Have initial scientific research capabilities.	(1) Classroom Teaching: College Physics Experiments (A); Geophysical Signal Processing; Geophysical Numerical Analysis; Principles of Seismic Exploration; Seismic Data Acquisition and Processing; Seismic Data Interpretation; Principles of Electrical Exploration; Electromagnetic Data Processing & Interpretation; Gravity Exploration; Magnetic Exploration; Gravity and Magnetic Data Processing and Interpretation; Geophysical Well Logging. (2) Extracurricular Learning: Reflection Seismic Data Processing Practice; Reflection Seismic Data Interpretation Practice; Electromagnetic New Method and Technology Practice; Gravity and Magnetic Data Processing and Interpretation Practice; GPR Data Acquisition and Processing Practice; Engineering Seismic Exploration Practice; Geophysical Well Logging Data Processing & Interpretation Practice; Field geological practice of Geophysics; Exploration Geophysics Practice Teaching Practice for Graduation; Graduation Thesis (Design).
5	Using modern tools: Ability to develop, select and use appropriate technologies, resources, modern instruments, and computers for complex engineering problems in the geophysical field, including forward modeling and inversion calculations for complex	(1) Classroom Teaching: Surveying A; C Language Programming; Geophysical Numerical Analysis; Geophysical Signal Processing; Foundation of Data Structure and Algorithm; Machine learning; Deep learning; Gravity and Magnetic Data Processing and Interpretation; Electromagnetic Data Processing & Interpretation; Seismic Data Acquisition & Processing; Seismic Data Interpretation; Geophysical Well

No.	Graduation requirements	Pathways (Teaching Process)
	engineering problems in the geophysical field of exploration, and understand Its non-unique and limitations.	Logging. (2) Extracurricular Learning: Surveying Practice (A); C language Course Projects; Geophysics Instrument Experiment; Gravity and Magnetic Data Processing and Interpretation Practice; Electromagnetic New Method and Technology Practice; GPR Data Acquisition and Processing Practice; Well Logging Data Processing & Interpretation Practice; Geophysical Engineering Mapping Practice; Exploration Geophysics Practice Teaching; Practice for Graduation; Graduation Thesis (Design).
6	Engineering and society: Have the geophysical theory and relevant background knowledge and can study the complex engineering problems in the exploration geophysical field on social, health, safety, law and culture, and understand the responsibilities.	(1) Classroom Teaching: Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics; Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era; Ideological morality and rule of law; Situation and Policy; Labor Education; Introduction to Geophysics and Geoinformatics; Exploration Geophysical Lectures. (2) Extracurricular Learning: Labor practice; Field geological practice of Geophysics; Exploration Geophysics Practice Teaching; Practice for Graduation; Graduation Thesis (Design).
7	Environment and sustainable development: Understand the technical status and development of the major, correctly understand the relationship between the profession and environmental protection and understand and evaluate the impact of engineering practice on the complex engineering issues in the field of geophysics exploration on environmental and social sustainable development.	(1) Classroom Teaching: Ideological morality and rule of law; Situation and Policy; Labor Education; Foundations of Geology; Introduction to Geophysics and Geoinformatics; Introduction to Artificial Intelligence; Introduction to Urban Geophysics; Exploration Geophysical Lectures. (2) Extracurricular Learning: Social Investigation; Labor practice; Field geological practice of Geophysics; Exploration Geophysics Practice Teaching; Practice for Graduation; Graduation Thesis (Design).
8	Professional norms: Have the humanities and social science literacy and social responsibility and can understand and abide by engineering professional ethics and norms in engineering practice and fulfill his responsibilities.	(1) Classroom Teaching: The Essentials of Modern Chinese History; Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics; Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era; Principles of Marxism; Military Theory; Introduction to Exploration Geophysics; Exploration Geophysical Lectures; Morality Education and Fundamentals of Law. (2) Extracurricular Learning:

No.	Graduation requirements	Pathways (Teaching Process)
		Military Training; Labor Education; Field geological practice of Geophysics Exploration Geophysics Practice Teaching; Social Investigation; Practice for Graduation; Graduation Thesis (Design).
9	Individuals and teams: Through training, have the certain organizational management ability, strong team awareness and collaborative spirit, and can assume the roles of individuals, team members and responsible persons in a multidisciplinary team.	(1) Classroom Teaching: Military Theory; Physical Education; Labor Education; Introduction to Geophysics and Geoinformatics; Introduction to Urban Geophysics; Exploration Geophysical Lectures. (2) Extracurricular Learning: Military Training; Labor practice; Field geological practice of Geophysics; Exploration Geophysics Practice Teaching; Engineering Seismic Exploration Practice; Electromagnetic New Method and Technology Practice; Social Investigation; Practice for Graduation; Graduation Thesis (Design).
10	Communication: effective communication with industry peers and the public on complex engineering issues in exploration technology and engineering, including writing reports and design contributions, presenting statements, articulating, or responding to instructions. Have a certain international perspective and be able to communicate in a cross-cultural context.	(1) Classroom Teaching: College English; Exploration Geophysical Lectures; Geophysical Engineering Mapping; Scientific Paper Writing. (2) Extracurricular Learning: Social Investigation self-study; Invention and Innovation; Gravity and Magnetic Data Processing and Interpretation Practice; Electromagnetic Data Processing and Interpretation Practice; Geophysical Engineering Mapping Practice; Well Logging Data Processing & Interpretation Practice; Field geological practice of Geophysics; Exploration Geophysics Practice Teaching; Practice for Graduation; Graduation Thesis (Design).
11	Project management: understand and master engineering management principles and economic decision-making methods and apply them in a multidisciplinary environment.	(1) Classroom Teaching: Introduction to Geophysics and Geoinformatics; Ideological morality and rule of law; Engineering Project Management Exploration Geophysical Lectures. (2) Extracurricular Learning: Social Investigation; Exploration Geophysics Practice Teaching; Practice for Graduation; Graduation Thesis (Design).
12	Continual learning: have the awareness of self-learning and lifelong learning, with the ability to continuously learn and adapt to development.	(1) Classroom Teaching: Introduction to Geophysics and Geoinformatics; Introduction to Artificial Intelligence; Machine learning; Exploration Geophysical Lectures; Scientific Paper Writing. (2) Extracurricular Learning: Labor practice; Practice for Graduation; Field geological practice of Geophysics; Exploration Geophysics Practice Teaching.

Major Disciplines: Geological Resources and Geological Engineering

Core Courses:

Module 1 (Exploration Geophysics): Gravity Exploration, Magnetic Exploration, Gravity and Magnetic Data Processing and Interpretation, Principles of Electrical Exploration, Electromagnetic Data Processing & Interpretation, Principles of Seismic Exploration, Seismic Data Acquisition & Processing, Seismic Data Interpretation, Geophysical Well Logging.

Module 2 (Intelligent Exploration): Introduction to Artificial Intelligence, Gravity and Magnetic exploration, Electrical Exploration, Seismic Exploration, Well Logging Techniques and Instruments, Machine learning, Foundation of Data Structure and Algorithm, Deep learning。

Module 3 (Urban Geophysics): Gravity and Magnetic Exploration, Principles of Electrical Exploration, Principles of Seismic Exploration, Well logging Geophysics, Introduction to Engineering Geology B, Urban Underground Space Planning and Utilization, Seismic Data Processing and Interpretation, Introduction to Urban Geophysics, Electromagnetic Data Processing & Interpretation。

Lab Experiments: Geophysics Instrument Experiment, Rock Physics Measurement (density, magnetic susceptibility, resistivity, polarizability, velocity, etc.), Gravimeter and Field Measurement Experiment, Magnetometer and Field Measurement Experiment, Conventional DC Electric Water Tank Experiment, Seismic Wave Ultrasonic Physics Simulation Experiment, Conventional Logging Experiment, Shallow Seismic Experiment.

Practical Work: Surveying Practice (A), C language Course Projects, Geophysics Instrument Experiment, Reflection Seismic Data Processing Practice, Reflection Seismic Data Interpretation Practice, Electromagnetic New Method and Technology Practice, Gravity and Magnetic Data Processing and Interpretation Practice, GPR Data Acquisition and Processing Practice, Engineering Seismic Exploration Practice, Geophysical Logging Data Processing & Interpretation Practice, Engineering Electromagnetic Exploration Practice, Engineering Seismic and Acoustic Detection Practice, Geophysical Logging Practice, Field geological practice of Geophysics, Exploration Geophysics Practice Teaching, Practice for Graduation, Graduation Thesis (Design).

Required Credits for Graduation: ≥ 170

Duration& Degree Granted: Four years, Bachelor of Engineering.

Recommended Minors: Geophysics; Resource Exploration Engineering; Geological Engineering.

Related Specialties: Geophysics; Resource Exploration Engineering; Geological Engineering.

勘查技术与工程（勘查地球物理）专业课程教学计划表
Course Descriptions of Exploration Technology and Engineering
(Exploration Geophysics)

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	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 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 Zedong 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 College English	9	144	144				48		3	3	3					
		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） 总计 12 学分，跨学科选修课不低于 4 学分		12	192														
		小计 Sum		43	580	580				48		13	6	4	6				
大类平台课 Platform Courses	20617600	地球物理与空间信息导论 Introduction to Geophysics and Geoinformatics	1.5	24	24							1.5							
	212127*1	高等数学 A Advanced Mathematics A	11.5	184	184							5	6.5						
	21212801	线性代数 A Linear Algebra A	3.5	56	56									3.5					
	21213502	概率论与数理统计 B Probability and Statistics B	2.5	40	40									2.5					
	212130*1	大学物理 A College Physics A	8	128	128								4	4					

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	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									
	212169*1	物理实验 A College Physics Experiments A	2	64	4	60						1	1					
	20119700	地质学基础 Foundations of Geology	4	64	56	8	4	2	2			4						
	21130401	测量学 A Surveying A	2	32	32		16						2					
	21947600	C 语言程序设计 C Language Programming	2	32	32		8		8				2.5					
	小计 Sum		37	624	556	68	28	2	10		6.5	15.5	15					
学科基础课 Disciplinary Fundamental Courses	21206400	数学物理方程 Mathematics and Physics Equations	3	48	48					高等数学 A 大学物理 A				3				
	21200700	场论 Potential Field Theory	3.5	56	56					高等数学 A 大学物理 A				3.5				
	20618200	弹性波理论基础 Foundation of Elastic Wave Theory	2	32	32					高等数学 A 大学物理 A				2				
	20628100	地球物理数值分析 Geophysical Numerical Analysis	3	48	40	8				高等数学 A				3				
	20635600	岩石物理学导论* Introduction to Rock Physics	2	32	24	8	8			大学物理 A				2				
	20628200	地球物理信号处理 Geophysical Signal Processing	2.5	40	40		8			高等数学 A				2.5				
	小计 Sum		16	256	248	8	16							16				
专业主干课 Main Specialty Courses	勘查地球物理方向（模块一）专业主干课																	
	20609700	重力勘探 Gravity Exploration	2	32	32					大学物理 A 场论				2				
	20609800	磁法勘探 Magnetic Exploration	2	32	32					大学物理 A 场论					2			
	20618400	重磁资料处理与解释 Gravity and Magnetic Data Processing and Interpretation	1.5	24	24		8			重力勘探 磁法勘探					1.5			
	20609900	电法勘探原理 Principles of Electrical Exploration	2.5	40	40					大学物理 A 场论				2.5				
	20618500	电（磁）法资料处理与解释 Electromagnetic Data Processing & Interpretation	2	32	32		8			电法勘探 原理					2			
	20610000	地震勘探原理 Principles of Seismic Exploration	2.5	40	40					大学物理 A 弹性波理论 基础					2.5			
	20618600	地震资料采集与处理 Seismic Data Acquisition & Processing	2.5	40	40		16			地震勘探 原理					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	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									
	20618700	地震勘探资料解释 Seismic Data Interpretation	1.5	24	24		8			地震勘探原理						1.5		
	20618800	地球物理测井 Geophysical Well Logging	3	48	48		8									3		
	小计 Sum		19.5	312	312		48							4.5	10.5	4.5		
智能探测英才班（模块二）专业主干课																		
	21935400	人工智能导论 Introduction to Artificial Intelligence	2	32	32		16								2			
	20626200	重磁勘探 Gravity and Magnetic exploration	3	48	48		8							3				
	20627300	电法勘探 Electrical Exploration	3	48	48		8								3			
	20627400	地震勘探 Seismic Exploration	3	48	48		8								3			
	20627500	测井技术及仪器 Well Logging Techniques and Instruments	2	32	32		8							2				
	20631400	机器学习 Machine learning	2	32	32		8							2				
	20612400	数据结构与算法基础 Foundation of Data Structure and Algorithm	2.5	40	40					C 语言程序设计				2.5				
	20631500	深度学习 Deep learning	2	32	32		16								2			
	小计 Sum		19.5	312	312		72							2.5	9	8		
城市地球物理菁英班（模块三）专业主干课																		
	20626200	重磁勘探 Gravity and Magnetic Exploration	3	48	48		8			场论 大学物理 A					3			
	20609900	电法勘探原理 Principles of Electrical Exploration	2.5	40	40					大学物理				2.5				
	20610000	地震勘探原理 Principles of Seismic Exploration	2.5	40	40					弹性波理论 基础					2.5			
	20626800	井中地球物理 Well logging Geophysics	2	32	32		8			大学物理					2			
	20539002	工程地质学基础 B Introduction to Engineering Geology B	2	32	32									2				
	20529800	城市地下空间规划及利用 Urban Underground Space Planning and Utilization	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	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									
	20631700	地震数据处理与解释 Seismic Data Processing and Interpretation	2	32	32		16			地震勘探原理						2		
	20631800	城市地球物理概论 Introduction to Urban Geophysics	1.5	24	24											1.5		
	20618500	电（磁）法资料处理与解释 Electromagnetic Data Processing & Interpretation	2	32	32		8			电法勘探原理					2			
	小计 Sum		19.5	312	312		40							4.5	9.5	5.5		
专业选修课 Specialty Elective Courses		可按方向设课，具体见专业选修课列表	9	144														
合计 Sub-total			124.5	1916	1696	76	84	2	58		19.5	21.5	19	26.5	10.5	4.5		
实践环节 Practical Work	三个模块公共实践环节																	
	44300400	军事训练 Military Training	2	2周							2							
	42008300	劳动实践 Labor practice	1	4周												1		
	41120901	测量教学实习 A Surveying Practice (A)	1	1周									1					
	41919001	C语言课程设计 C language Course Projects	1.5	1.5周						C语言程序设计			1.5					
	406357*0	地球物理仪器实验 Geophysics Instrument Experiment	2	2周						大学物理						1	1	
	40627600	地球物理学类专业野外地质实习 Field geological practice of Geophysics	4	4周											4			
	40635400	勘查地球物理教学实习 Exploration Geophysics Practice Teaching	5	5周													5	
	40613800	毕业实习 Practice for Graduation	8	8周														8
	40621300	毕业论文（设计） Graduation Thesis (Design)	8	8周														8
	勘查地球物理方向（模块一）实践环节																	
	40619100	反射地震资料处理实习 Reflection Seismic Data Processing Practice	1	1周							地震资料采集与处理						1	
	40619200	反射地震资料解释实习 Reflection Seismic Data Interpretation Practice	1	1周							地震勘探资料解释						1	

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	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									
40615100	电磁法新方法技术实习 Electromagnetic New Method and Technology Practice	2	2 周						电法勘探原理						2			
40615200	重磁资料处理和解释实习 Gravity and Magnetic Data Processing and Interpretation Practice	1	1 周						重磁资料处理与解释					1				
40615300	地质雷达数据采集与处理实习 GPR Data Acquisition and Processing Practice	1	1 周						电法勘探原理						1			
40615400	工程地震勘探实习 Engineering Seismic Exploration Practice	1	1 周						地震勘探原理						1			
40615500	测井资料处理与解释实习 Geophysical Logging Data Processing & Interpretation Practice	1	1 周						地球物理测井						1			
小计 Sum		40.5	43.5 周							2		2.5		6	14		16	
智能探测英才班（模块二）实践环节																		
40619100	反射地震资料处理实习 Reflection Seismic Data Processing Practice	1	1 周						地震勘探						1			
40619200	反射地震资料解释实习 Reflection Seismic Data Interpretation Practice	1	1 周						地震勘探						1			
40626300	数据结构与算法基础课程设计 Foundation of Data Structure and Algorithm Course Design	1	1 周						数据结构与算法基础				1					
40615200	重磁资料处理和解释实习 Gravity and Magnetic Data Processing and Interpretation Practice	1	1 周						重磁勘探					1				
40626500	电法资料处理与解释实习 Electromagnetic Data Processing and Interpretation Practice	1	1 周						电法勘探原理						1			
41932602	机器学习课程设计 B Machine Learning Course Design B	1	1 周						机器学习					1				
40631600	深度学习课程设计 Deep Learning Course Design	1	1 周												1			
40615500	测井资料处理与解释实习 Well Logging Data Processing & Interpretation Practice	1	1 周						测井技术及仪器						1			
小计 Sum		40.5	43.5 周							2		2.5	1	7	12		16	
城市地球物理菁英班（模块三）实践环节																		

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	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									
	40615200	重磁资料处理和解释实习 Gravity and Magnetic Data Processing and Interpretation Practice	1	1 周						重磁勘探					1			
	40626900	工程电磁法勘探实习 Engineering Electromagnetic Exploration Practice	2	2 周						电法勘探						2		
	40627000	工程地震与声波检测实习 Engineering Seismic and Acoustic Detection Practice	2	2 周						地震勘探						2		
	40615300	地质雷达数据采集与处理实习 GPR Data Acquisition and Processing Practice	1	1 周						地质雷达原理及应用						1		
	40627100	井中地球物理实习 Geophysical Logging Practice	1	1 周						井中地球物理						1		
	40631900	地震数据处理与解释实习 Geophysical Engineering Mapping Practice	1	1 周												1		
	小计 Sum		40.5	43.5 周							2		2.5		6	14		16
创新创业自主学习 Freedom study	ZZ35000S	社会调查 Social Investigation	2												2			
		其他(含创新创业课程、学科竞赛、发明创造、科研报告) Others (Start-up, Contest, Invention, Innovation and Research Presentation)	3															
	小计 Sum		5												2			
总计 Total			170	2108 43.5 周	1696	76	92	2	58		21.5	21.5	21.5	26.5	18.5	18.5		16
可开出专业选修课列表 Specialty Elective Courses	三个模块公共专业选修课																	
	20619400	勘查地球物理专业讲座 Exploration Geophysical Lectures	1	16	16										1			
	20619900	Matlab 语言及应用 MATLAB Programming and Its Application	1	16	16		8							1				
	20620000	Python 语言及应用 Python Programming and Its Application	1	16	16		8							1				
	20619600	地球物理反演概论 Introduction to Geophysical Inversion	1.5	24	24		8									1.5		

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	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									
	20604000	海洋地球物理概论 Introduction to Marine Geophysics	1	16	16									1				
	20629100	卫星导航定位原理与方法 Principles and Methods of Satellite Navigation and Positioning	2	32	24	8									2			
	20620200	地球物理工程制图 Geophysical Engineering Mapping	1	16	8	8	8							1				
	20631300	遥感基础与应用 Basics and Application of Remote Sensing	2	2	20	12									2			
	20631200	科技论文写作 Scientific Paper Writing	1	16	16											1		
	20631100	地球物理高性能计算 Geophysical High Performance Computing	1	16	16		8								1			
	20610600	大地电磁测深 Magnetotelluric Sounding	1	16	16										1			
	20610700	瞬变电磁法 Transient Electromagnetic Method	1	16	16											1		
	20626700	地震岩石物理原理及应用 Seismic Rock Physics Theory and Its Application	1	16	16											1		
勘查地球物理方向（模块一）专业选修课																		
	20620600	机器深度学习与地球物理 Machine Deep Learning and Geophysics	1	16	16										1			
	21935400	人工智能导论 Introduction to Artificial Intelligence	2	32	32		16							2				
	20615900	工程地震勘探（必选） Engineering Seismic Prospecting	1.5	24	24										1.5			
	20620400	管线探测 Pipeline and Detection	1	16	16										1			
	20631000	探地雷达方法原理及应用 GPR Theory and Application	2	24	24										1.5			
	20620900	资源地震勘探新方法技术 New Method and Technology for Resource Seismic Exploration	2	32	32										2			
	20621000	重磁勘探新方法技术 New Method and Technology for Gravity & Magnetic Exploration	1	16	16											1		
	20222303	石油及天然气地质学 C Geology of Oil and Gas C	2.5	40	40		8								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	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									
	20621100	非常规储层测井评价 Well Logging Evaluation for Unconventional Reservoir	1	16	16										1			
	20607600	地震沉积相解释 Seismic Sedimentary Facies Interpretation	1.5	24	24		8									1.5		
	20630900	现代地球物理仪器及应用	1	16	16		4									1		
	20621200	固体矿产资源地球物理勘探案例分析 Case Study for Solid Ore Resources Geophysical Exploration	1	16	16											1		
智能探测英才班（模块二）专业选修课																		
	20620900	资源地震勘探新方法技术 New Method and Technology for Resources Seismic Exploration	2	32	32											2		
	20621000	重磁勘探新方法技术 New Method and Technology for Gravity & Magnetic Exploration	1	16	16												1	
	20222303	石油及天然气地质学 C Geology of Oil and Gas C	2.5	40	40		8								2.5			
	20621100	非常规储层测井评价 Well Logging Evaluation for Unconventional Reservoir	1	16	16											1		
	20621200	固体矿产资源地球物理勘探案例分析 Case Study for Solid Ore Resources Geophysical Exploration	1	16	16												1	
城市地球物理菁英班（模块三）专业选修课																		
	20620600	机器深度学习与地球物理 Machine Deep Learning and Geophysics	1	16	16											1		
	20540600	地质灾害防治设计与施工（必选） Introduction to Geological Hazards & Prevention	2	32	32		8									2		
	20115100	地貌学及第四纪地质学 Geomorphology and Quaternary Geology	3	48	48										3			
	20605400	探地雷达方法原理及应用（必选） GPR Theory and Application	1	16	14	2				场论 大学物理						1		
	20620400	管线探测（必选） Pipeline and Its Detection	1	16	16											1		

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	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									
	20632000	面波地震勘探（必选） Surface Wave Seismic Prospecting	1.5	24	24										1.5			
	21935400	人工智能导论 Introduction to Artificial Intelligence	2	32	32		16							2				
	20853200	工程项目管理 Engineering Project Management	2	32	32		8								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。

勘查技术与工程专业（勘查地球物理方向，模块一）课程分类统计

Course Classifications and Statistics of Exploration Technology and Engineering (Exploration Geophysics, Module 1)

课程类别 统计	通识教育课程 Liberal Education Courses		大类平台课 +学科基础课 Platform & 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 Hours	学分总计 Total Credits
	必修	选修							
课内总学时/学分	580/31	192/12	880/53	312/19.5	144/9	43.5 周/40.5	80/5	2108+ 43.5 周	170
学分所占比例	25.3%		31.2%	11.5%	5.3%	23.8%	2.9%		100%

勘查技术与工程专业（智能探测英才班，模块二）课程分类统计

Course Classifications and Statistics of Exploration Technology and Engineering (Intelligent Exploration, Module 2)

课程类别 统计	通识教育课程 Liberal Education Courses		大类平台课 +学科基础课 Platform & 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 Hours	学分总计 Total Credits
	必修	选修							
课内总学时/学分	580/31	192/12	880/53	312/19.5	144/9	43.5 周/40.5	80/5	2108+ 43.5 周	170
学分所占比例	25.3%		31.2%	11.5%	5.3%	23.8%	2.9%		100%

勘查技术与工程专业（城市地球物理菁英班，模块三）课程分类统计

Course Classifications and Statistics of Exploration Technology and Engineering (Urban Geophysics, Module 3)

课程类别 统计	通识教育课程 Liberal Education Courses		大类平台课 +学科基础课 Platform & 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 Hours	学分总计 Total Credits
	必修	选修							
课内总学时/学分	580/31	192/12	880/53	312/19.5	144/9	43.5 周/40.5	80/5	2108+ 43.5 周	170
学分所占比例	25.3%		31.2%	11.5%	5.3%	23.8%	2.9%		100%

附：

学校与企事业单位联合培养阶段实施方案

培养目标：培养具有扎实的专业基础知识，较强的工程能力和创新意识，良好的团队合作精神，掌握勘查地球物理的施工方案设计、工程预算与管理、野外地球物理资料采集与质量控制、工程制图与分析、地球物理资料综合解释与评价等技能，能在勘查地球物理工程领域从事生产相关的设计、施工、资料处理与分析、项目管理等方面工作的工程师。

培训重点：

2.1 掌握勘查地球物理基础技术知识、工程方法和技术规范。了解勘查地球物理工程领域的新产品、新技术、新工艺以及技术发展趋势。

(1) 掌握扎实的勘查地球物理工程基础技术知识和工程方法。掌握各类勘查地球物理基本原理；掌握勘查地球物理数据工作流程与工作方法；掌握勘查地球物理常用仪器基本原理、掌握仪器操作与维护；掌握勘查地球物理工程项目设计安全管理的知识。

(2) 熟悉勘查地球物理工程领域的技术标准，了解勘查地球物理的相关政策、法律和法规。熟悉勘查地球物理工程领域的技术标准；了解勘查地球物理工程行业的相关政策、法律和法规。

(3) 了解勘查地球物理工程领域的新产品、新技术、新工艺以及技术发展趋势。了解地球物理装备中运用的新原理、新技术；了解勘查地球物理方法运用的新原理、新技术；了解勘查地球物理工程领域的技术发展趋势。

2.2 具备运用适当的理论和实践方法解决勘查地球物理工程实际问题的能力，在勘查地球物理数据采集、处理与综合解释等解决实际工程问题方面得到系统化训练。

(1) 掌握勘查地球物理仪器工作原理和操作方法，能对设备（系统）运行过程和维护进行常规管理。

(2) 能对勘查地球物理仪器运行过程中出现的一般问题（如：人文干扰、数据异常、常规故障等）进行分析、判断，提出处理意见或解决方案。

(3) 能对勘查地球物理工作方法提出改进建议或方案。具备进行技术改造的初步能力。

2.3 参与项目及工程管理

(1) 具有较强的质量、环境、职业健康安全和法律意识，在法律法规规定的范畴内，按确定的相关标准和程序要求开展工作。

(2) 具有初步的项目和工程管理能力，能运用经济管理知识。具有项目预算和工程

成本核算的初步能力；能运用生产管理知识，具有制定施工计划和过程管理的初步能力；具有一定的组织管理能力和进行项目任务分解、人力和资源调度的初步能力；具有团队协作精神，参与团队管理、协调团队工作，确保工作进度；

2.4 具备有效的沟通与交流能力和较强的获取知识、终身学习的能力。

(1) 具有较强的表达和沟通能力；能够使用技术语言，在跨文化环境下进行沟通与表达；能够进行工程文件的编写，如可行性分析报告、项目任务书、投标书；能够运用英语进行与勘查地球物理方法与技术方面的表达、沟通和交流。

(2) 具有较强的交流能力。具备较强的人际交往能力，能够控制自我，并了解、理解他人需求和意愿；具备较强的适应能力，自信、灵活地处理新的和不断变化的人际环境和工作环境；具备团队合作精神，并具备一定的协调、管理、竞争与合作的初步能力；能够了解勘查地球物理领域研究现状和发展趋势，了解最新知识与技术成果，不断提升自身专业水平；具有较强的获取知识、终身学习的能力。

2.5 具备良好道德和工程伦理素养

(1) 具有良好的道德。具有良好的社会公德，自觉遵守社会行为规范。自觉遵守法律法规。为人正直、诚实守信。具有良好的职业道德规范，自觉遵守所属职业体系的职业行为准则。

(2) 较强的工程伦理素养。具有较强工程伦理素养，在环境保护、节约资源、公共安全、社会服务、社会福利、公共卫生、社会秩序等方面体现对社会的责任。

培训阶段：

3.1 勘查地球物理野外资料采集训练

安排学生参加野外地球物理施工。在生产实习中，进一步深入理解勘查地球物理工作原理，地球物理仪器基本原理及操作，野外干扰因素分析及各种突发情况处理，了解地球物理野外施工经费预算及实际成本。

3.2 勘查地球物理室内资料整理与分析

安排学生参加生产单位地球物理资料整理、数据处理与综合解释工作。在生产实习中，熟悉各种地球物理数据特点及噪声特点，掌握地球物理资料整理基本流程、数据质量评价方法、噪声分析与压制主要技术。能够在企业指导老师指导下，进行对实际资料开展地球物理数据处理与初步综合解释。

3.3 毕业实习与设计/论文

企业为学生配备企业导师、学校配备指导老师。毕业实习与设计或论文，结合就业工作分散进行、或结合校内导师的研究课题、或结合与企业的横向合作项目为题，以野外生产、室内研究相结合的方式。

课程及学分设置：

和企业联合培养的课程包括：勘查地球物理专业讲座（1 学分，16 学时），毕业实习（8 周，8 学分）、毕业设计（论文）（8 周，8 学分）。

考核标准及成绩评定：

由企业导师和学校导师联合，根据学生出勤情况、提交的实习报告和答辩质询的情况等综合评定，各部分成绩比例为 30%、40%、30%。

工作、生活及安全保障管理：

- （1）实践场地。企业提供完成课程教学、实习和毕业设计所需的工作室和现场。
- （2）实践设备。企业提供用于学生进行观察、操作、试验所需的生产设备。
- （3）实践资料。企业提供用于学生学习、分析的资料、标准、规范等资料。
- （4）师资配备。企业和学校联合，为学生配备企业指导教师和学校指导教师，指导学生实习和毕业设计，保障学生的安全高效完成企业实训。
- （5）实践课题。企业和学校配备的指导教师联合商定用于学生进行工程设计训练和毕业设计的项目或课题。

勘查技术与工程（勘查地球物理）专业辅修课程教学计划表
Minor Course Descriptions of Geophysics (Exploration Geophysics)

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	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									
学科基础课 Disciplinary Fundamental Courses	21206400	数学物理方程 Mathematics and Physics Equations	3	48	48										3			
	21200700	场论 Potential Field Theory	3.5	56	56											3.5		
	小计 Sum		6.5	104	104										3	3.5		
专业主干课 Main Specialty Courses	20609700	重力勘探 Gravity Exploration	2	32	32											2		
	20609800	磁法勘探 Magnetic Exploration	2	32	32										2			
	20609900	电法勘探原理 Principles of Electrical Exploration	2.5	40	40											2.5		
	20610000	地震勘探原理 Principles of Seismic Exploration	2.5	40	40										2.5			
	20618800	地球物理测井 Geophysical Well Logging	3	48	48											3		
	小计 Sum		12	192	192											4.5	7.5	
实践环节 Practical Work	406357*0	地球物理仪器实验 Geophysics Instrument Experiment	2	2 周													1	1
	40627100	井中地球物理实习 Geophysical Logging Practice	1	1 周													1	
	小计 Sum		3	3 周													2	1
总计 Total			21.5	296+3 周	296										7.5	11	2	1

勘查技术与工程（勘查地球物理）辅修专业课程分类统计
Minor Course Descriptions of Geophysics (Exploration Geophysics)

课程类别 统计	学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	实践环节 Practical Work	学时总计 Total Hour	学分总计 Total Credits
学时/学分	104/6.5	192/12	3 周/3	296+3 周	21.5
学分所占比例	30.2%	55.8%	14.0%		100%

地球信息科学与技术专业培养方案

专业名称与代码：地球信息科学与技术 070903T

专业培养目标：本专业以学生德智体美劳全面发展为本，培养具有良好的思想道德、身心健康、科学与人文素质，具备扎实的数学、物理、计算机和地球科学基础，系统掌握地球信息科学与技术理论与方法，具有基本的创新创业意识、管理协作、交流表达与国际理解能力，能在工程建设、地质灾害防治、环境监测与治理、资源与能源勘探开发等领域解决地球信息技术复杂工程问题，并具有家国情怀、全球视野、创新精神和实践能力的复合型人才。

专业毕业要求：

(1) 工程知识：掌握数学、物理学、地质学、计算机科学和专业知用于解决地球信息科学领域的复杂工程问题。

(2) 问题分析：掌握地质学、遥感、地理信息系统、全球导航卫星系统等地球信息科学基本理论及其技术方法；能够应用这些方法/技术，识别、表达、并通过文献研究分析相关学科专业问题，以获得有效结论。

(3) 设计/开发解决方案：能够设计针对地球信息科学领域复杂技术问题的解决方案，具有地球空间信息数据采集、分析、处理、管理和综合应用的方案设计能力，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：能够基于科学原理并采用科学方法对地球信息科学领域的复杂技术问题进行研究，包括地球空间信息数据采集、分析、处理、管理和综合应用，并通过分析得到合理有效的结论。

(5) 使用现代工具：能够针对地球信息科学领域的专业问题，开发、选择与使用恰当的技术、资源、现代仪器设备和计算机，包括对地球信息科学领域的复杂技术问题的预测与模拟，并能够理解其多解性和局限性。

(6) 工程与社会：能够基于地球信息科学理论和所学的相关背景知识进行合理分析，评价地球信息科学领域复杂工程问题的解决方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响，并理解应承担的责任。

(7) 环境和可持续发展：了解本专业的技术现状和发展动态，正确认识本专业与环境保护的关系，理解和评价针对地球信息科学领域的复杂工程问题的工程实践对环境、社会可持续发展的影响。

(8) 职业规范：具有人文社会科学素养、社会责任感，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。

(9) 个人和团队：具有较强的团队意识和协作精神，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。

(10) 沟通:能够就地球信息科学领域的复杂工程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,并具备一定的国际视野,能够在跨文化背景下进行沟通和交流。

(11) 项目管理:理解并掌握地球信息科学领域工程管理常识与经济决策方法,并能在多学科环境中应用。

(12) 终身学习:具有自主学习和终身学习的意识,能够不断学习地球信息科学领域新方法和新技术,有不断学习和适应发展的能力。

毕业要求及实现途径：

序号	毕业要求	实现途径（教学过程）
1	工程知识：掌握数学、物理学、地质学、计算机科学和专业知识用于解决地球信息科学领域的复杂工程问题。	①课堂教学：马克思主义基本原理概论、毛泽东思想与中国特色社会主义体系概论、习近平新时代中国特色社会主义思想概论、中国近现代史纲要、思想道德与法治、形势与政策、体育、大学英语、军事理论、劳动教育、C 语言程序设计、地球物理与空间信息导论、高等数学 A、地质学基础、测量学 A、线性代数 A、大学物理 A、物理实验 A、概率论与数理统计 B、数字图像处理 B、面向对象程序设计、数据结构与算法基础 ②课外学习：测量学教学实习 A、C 语言课程设计、地球物理学类专业野外地质实习。
2	问题分析：掌握地质学、遥感、地理信息系统、全球导航卫星系统等地球信息科学基本理论及其技术方法；能够应用这些方法/技术，识别、表达、并通过文献研究分析相关学科专业问题，以获得有效结论。	①课堂教学：遥感概论、数字图像处理 B、地理信息系统原理与应用、遥感地质学、地图学与地质制图、数据库原理 C、环境与灾害地质学、卫星导航定位原理与应用 ②课外学习：测量学教学实习 A、地理信息系统原理与应用实践、遥感图像解译、遥感概论课程设计、数据库课程设计、遥感地学分析与计算、图像处理算法实践、地球信息技术综合实习、GIS 设计与开发、毕业实习、毕业论文（设计）
3	设计/开发解决方案：能够设计针对地球信息科学领域复杂技术问题的解决方案，具有地球空间信息数据采集、分析、处理、管理和综合应用的方案设计能力，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。	①课堂教学：地学信息三维可视化、遥感地学信息处理方法、数字地形模型及应用、地理信息系统空间分析、微波遥感原理与应用、计算机网络、人工智能原理及应用、地质环境遥感监测、地球信息科学与技术专业英语、地貌学及第四纪地质学、地球物理学概论 ②课外学习：测量学教学实习 A、地理信息系统原理与应用实践、遥感图像解译、遥感概论课程设计、数据库课程设计、遥感地学分析与计算、图像处理算法实践、地球信息技术综合实习、GIS 设计与开发、毕业实习、毕业论文（设计）
4	研究：能够基于科学原理并采用科	① 课堂教学 ：地学信息三维可视化、遥感地

序号	毕业要求	实现途径（教学过程）
	学方法对地球信息科学领域的复杂技术问题进行研究,包括地球空间信息数据采集、分析、处理、管理和综合应用,并通过分析得到合理有效的结论。	学信息处理方法、数字地形模型及应用、地理信息系统空间分析、微波遥感原理与应用、计算机网络、人工智能原理及应用、地质环境遥感监测、地球信息科学与技术专业英语、地貌学及第四纪地质学、地球物理学概论、大学物理实验 A ②课外学习: 地理信息系统原理与应用实践、遥感图像解译、遥感概论课程设计、数据库课程设计、遥感地学分析与计算、图像处理算法实践、地球信息技术综合实习、GIS 设计与开发、毕业实习、毕业论文(设计)、C 语言课程设计、Matlab 语言及应用。
5	使用现代工具:能够针对地球信息科学领域的专业问题,开发与使用恰当的技术、资源、现代仪器设备和计算机,包括对地球信息科学领域的复杂技术问题的预测与模拟,并能够理解其多解性和局限性。	①课堂教学: 地学信息三维可视化、遥感地学信息处理方法、数字地形模型及应用、地理信息系统空间分析、微波遥感原理与应用、机器学习、地质环境遥感监测、C 语言程序设计 ②课外学习: C 语言课程设计、Matlab 语言及应用、地理信息系统原理与应用实践、遥感图像解译、遥感地学分析与计算、图像处理算法实践、地球信息技术综合实习、GIS 设计与开发
6	工程与社会:能够基于地球信息科学理论和所学的相关背景知识进行合理分析,评价地球信息科学领域复杂工程问题的解决方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响,并理解应承担的责任。	①课堂教学: 地学信息三维可视化、遥感地学信息处理方法、数字地形模型及应用、地理信息系统空间分析、微波遥感原理与应用、人工智能原理及应用、地质环境遥感监测、C 语言程序设计 ②课外学习: C 语言课程设计、Matlab 语言及应用、地理信息系统原理与应用实践、遥感图像解译、遥感地学分析与计算、图像处理算法实践、地球信息技术综合实习、GIS 设计与开发

序号	毕业要求	实现途径（教学过程）
7	环境和可持续发展：了解本专业的技术现状和发展动态，正确认识本专业与环境保护的关系，理解和评价针对地球信息科学领域的复杂工程问题的工程实践对环境、社会可持续发展的影响。	① 课堂教学 ：地球物理与空间信息导论 ② 课外学习 ：地球物理学类专业野外地质实习、地球信息技术综合实习、GIS 设计与开发
8	职业规范：具有人文社会科学素养、社会责任感，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。	① 课堂教学 ：地球物理与空间信息导论 ② 课外学习 ：地球物理学类专业野外地质实习、地球信息技术综合实习、GIS 设计与开发
9	个人和团队：具有较强的团队意识和协作精神，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 ：中国近代史纲要、毛泽东思想与中国特色社会主义理论体系概论、马克思主义基本原理、习近平新时代中国特色社会主义思想概论、劳动教育、美育课程、军事理论、地球物理与空间信息导论、思想道德与法治 ② 课外学习 ：军事训练、劳动实践、地球物理学类专业野外地质实习、地球信息技术综合实习、GIS 设计与开发、创新创业
10	沟通：能够就地球信息科学领域的复杂工程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，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。	① 课堂教学 ：大学英语、思想道德与法治、马克思主义基本原理 ② 课外学习 ：毕业论文（设计）、毕业实习、地球信息技术综合实习、GIS 设计与开发、遥感图像解译、遥感地学分析与计算、图像处理算法实践
11	项目管理：理解并掌握地球信息科学领域工程管理常识与经济决策方法，并能在多学科环境中应用。	① 课堂教学 ：大学英语 ② 课外学习 ：毕业论文（设计）、毕业实习、Matlab 语言及应用、地理信息系统原理与应用实践、遥感图像解译、遥感地学分析与计算、图像处理算法实践、地球信息技术综合实习、GIS 设计与开发
12	终身学习：具有自主学习和终身学习的意识，能够不断学习地球信息科学领域新方法和新技术，有不断学习和适应发展的能力	① 课堂教学 ：思想道德与法治、地球物理与空间信息导论、大学英语、C 语言程序设计；专业选修课

序号	毕 业 要 求	实现途径（教学过程）
		②课外学习：地球信息技术综合实习、GIS设计与开发、C语言课程设计

主干学科：地质学、遥感科学与技术、计算机科学与技术。

专业核心课程：构造地质学、地貌学及第四纪地质学、遥感概论、遥感地质学、环境与灾害地质学、地图学与地质制图、地学信息三维可视化、地理信息系统原理与应用、数据结构与算法基础、C 语言程序设计及课程设计、人工智能原理与应用。

主要专业实验：图像处理算法实践、Matlab 语言及应用、专业课程的实验和实习。

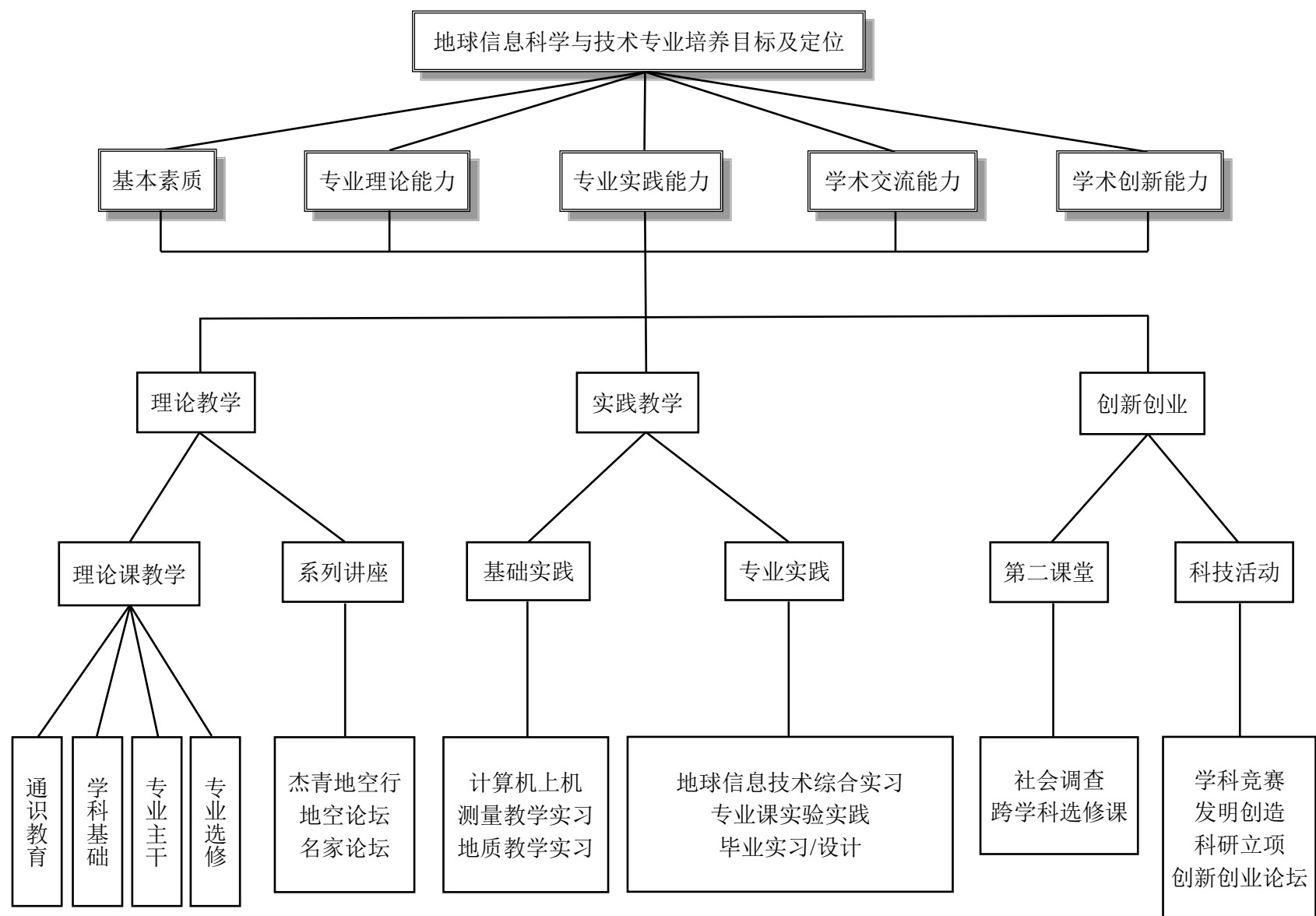
主要实践性教学环节：测量学教学实习 A、地球物理学类专业野外地质实习、地球信息技术综合实习、GIS 设计与开发、生产实习和毕业论文等。

毕业学分要求：四年总学分不少于 170。

学制与学位：四年，工学学士。

本专业学生可以辅修的其他专业：不限。

相近专业：空间信息与数字技术、空间科学与技术。



Program for Geoinformatics

Specialty and Code: Geoinformatics 070903T

Education Objectives:

This major is based on the comprehensive development of students' morality, intelligence, physique, art and labor, and cultivates good ideological and moral, physical and mental health, scientific and humanistic qualities, with a solid foundation in mathematics, physics, computer and earth science, and systematically grasps the theory of earth information science and technology and methods, with basic innovation and entrepreneurship awareness, management collaboration, communication and expression and international understanding ability, able to solve complex engineering problems of earth information technology in the fields of engineering construction, geological disaster prevention, environmental monitoring and governance, resource and energy exploration and development, and Composite talents with patriotism, global vision, innovative spirit and practical ability.

Graduation Requirements:

Students are expected to

- (1) Engineering knowledge: Master mathematics, physics, geology, computer science and professional knowledge to solve complex engineering problems in the field of geoinformation science.
- (2) Problem analysis: master the basic theories and technical methods of geoinformation science such as geology, remote sensing, geographic information system, and global navigation satellite system; be able to apply these methods/technologies, identify, express, and analyze related disciplines through literature research questions to draw valid conclusions.
- (3) Design/development solutions: be able to design solutions to complex technical problems in the field of geoinformation science, have the ability to design geospatial information data collection, analysis, processing, management and comprehensive applications, and be able to reflect in the design process A sense of innovation, considering social, health, safety, legal, cultural and environmental factors.
- (4) Research: Be able to conduct research on complex technical issues in the field of geoinformation science based on scientific principles and using scientific methods, including data collection, analysis, processing, management and comprehensive application of geo-spatial information, and obtain reasonable and effective conclusions through analysis.
- (5) Use modern tools: be able to develop, select and use appropriate technologies, resources, modern instruments and computers for professional issues in the field of geo-information science, including prediction and simulation of complex technical issues in the field of geoinformation science, and Ability to understand its versatility and limitations.

- (6) Engineering and society: be able to conduct reasonable analysis based on geo-information science theories and relevant background knowledge, and evaluate the impact of solutions to complex engineering problems in the field of geo-information science on society, environment, health, safety, law, culture, and sustainability developmental implications and understand the responsibilities that should be assumed.
- (7) Environment and sustainable development: Understand the technical status and development trends of this major, correctly understand the relationship between this major and environmental protection, understand and evaluate the engineering practice for complex engineering problems in the field of geoinformation science for environmental and social sustainability development impact.
- (8) Professional norms: Humanities and social sciences, a sense of social responsibility, the ability to understand and abide by engineering professional ethics and norms in engineering practice, and fulfill responsibilities.
- (9) Individuals and teams: have a strong sense of teamwork and collaboration, and be able to assume the roles of individuals, team members, and leaders in teams under a multidisciplinary background.
- (10) Communication: be able to effectively communicate and communicate with industry peers and the public on complex engineering issues in the field of geoinformation science, including writing reports and design manuscripts, making statements, expressing clearly or responding to instructions, and have a certain international perspective, Ability to communicate and communicate in cross-cultural contexts.
- (11) Project management: understand and master the general knowledge of engineering management and economic decision-making methods in the field of geoinformation science, and be able to apply them in a multidisciplinary environment.
- (12) Lifelong learning: have the awareness of independent learning and lifelong learning, be able to continuously learn new methods and technologies in the field of geo-information science, and have the ability to continuously learn and adapt to development.

Graduation Requirements and Pathways :

No.	Graduation Requirements	Pathways (Teaching Process)
1	Engineering knowledge: Master mathematics, physics, geology, computer science and professional knowledge to solve complex engineering problems in the field of geoinformation science.	① Classroom teaching: Principles of Marxism, Introduction to Mao Zedong Thought and the Socialist System with Chinese Characteristics, Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, The Essentials of Modern Chinese History, Ideology, Ideological Morality and Rule of Law, Situation and Policy, Physical Education, College English, Military Theory, Labor Education, C Language Programming, Introduction to Geophysics and Geoinformatics, Advanced Mathematics A, Geology Foundation, Surveying A, Linear Algebra A, College Physics A, Physical Experiments A, Probability and Statistics B, Digital Image Processing B, Object-Oriented Programming, Data Structure and Algorithm Foundation. ② Extracurricular study: Surveying Practice A, Course Design for C Language, Geological Field Training of Geophysics.
2	Problem analysis: master the basic theories and technical methods of geoinformation science such as geology, remote sensing, geographic information system, and global navigation satellite system; be able to apply these methods/technologies, identify, express, and analyze related disciplines through literature research questions to draw valid conclusions.	① Classroom teaching: Introduction to Remote Sensing, Digital Image Processing A, Geographic Information System Principles and Application, Remote Sensing Geology, Cartography and Geological Mapping, Principle of Database C, Environmental and Disaster Geology, The Principle and Application of Navigation Satellite and Positioning ② Extracurricular study: Surveying Practice A, Geographic Information System Principle and Application Practice, Remote Sensing Image Interpretation, Course Design for Introduction to Remote Sensing, Database Course Project, Remote Sensing Geoscience Analysis and Calculation, Experiment for Digital Image Processing Algorithm, Major Teaching Practice, GIS Design and Development, Practice for Graduation, Bachelor Thesis (Design)
3	Design/development solutions: be able to design solutions to complex technical problems in the field of geoinformation science, have the ability to design geospatial information data collection, analysis, processing, management and comprehensive applications, and be able to reflect in the design process A sense of innovation, considering social, health, safety, legal, cultural	① Classroom teaching: 3D Geo-visualization, Remote Sensing Geo-information Processing Methods, Digital Terrain Model and Its Application, Geographic Information System Spatial Analysis, Microwave Remote Sensing Principles and Applications, Computer Networks, Principle and Application of Artificial Intelligence, Geological Environment Remote Sensing Monitoring, Geoinformatics Academic English, Geomorphology and Quaternary Geology, Introduction of Geophysics

No.	Graduation Requirements	Pathways (Teaching Process)
	and environmental factors.	② Extracurricular study: Surveying Practice A, Geographic Information System Principles and Application Practice, remote sensing image interpretation, Course Design for Introduction to Remote Sensing, Database Course Project, Remote Sensing Geoscience Analysis and Calculation, Experiment for Digital Image Processing Algorithm, Major Teaching Practice, GIS Design and Development, Practice for Graduation, Bachelor Thesis (Design)
4	Research: Be able to conduct research on complex technical issues in the field of geo-information science based on scientific principles and using scientific methods, including data collection, analysis, processing, management and comprehensive application of geo-spatial information, and obtain reasonable and effective conclusions through analysis.	① Classroom teaching: 3D Geo-visualization, Remote Sensing Geo-information Processing Methods, Digital Terrain Model and Its Application, Geographic Information System Spatial Analysis, Microwave Remote Sensing Principles and Applications, Computer Networks, Principle and Application of Artificial Intelligence, Geological Environment Remote Sensing Monitoring, Geoinformatics Academic English, Geomorphology and Quaternary Geology, Introduction of Geophysics, Physics Experiments A ② Extracurricular learning: Geographic Information System Principle and Application Practice, Remote Sensing Image Interpretation, Course Design for Introduction to Remote Sensing, Database Course Project, Remote Sensing Geoscience Analysis and Computing, Experiment for Digital Image Processing Algorithm, Major Teaching Practice, GIS Design and Development, Practice for Graduation, Bachelor Thesis (Design), Course Design for C Language, Matlab Language Practice
5	Use modern tools: be able to develop, select and use appropriate technologies, resources, modern instruments and computers for professional issues in the field of geo-information science, including prediction and simulation of complex technical issues in the field of geo-information science, and Ability to understand its versatility and limitations.	① Classroom teaching: 3D Geo-visualization, Remote Sensing Geo-information Processing Methods, Digital Terrain Model and Its Application, Geographic Information System Spatial Analysis, Microwave Remote Sensing Principles and Applications, Principle and Application of Artificial Intelligence, Geological Environment Remote Sensing Monitoring, C Language Programming ② Extracurricular study: Course Design for C Language, Matlab Language Practice, Geographic Information System Principles and Application Practice, Remote Sensing Image Interpretation, Remote Sensing Geoscience Analysis and Computing, Experiment for Digital Image Processing Algorithm, Major Teaching Practice, GIS Design and Development
6	Engineering and society: be able to	① Classroom teaching: 3D Geo-visualization,

No.	Graduation Requirements	Pathways (Teaching Process)
	conduct reasonable analysis based on geo-information science theories and relevant background knowledge, and evaluate the impact of solutions to complex engineering problems in the field of geo-information science on society, environment, health, safety, law, culture, and sustainability developmental implications and understand the responsibilities that should be assumed.	Remote Sensing Geo-information Processing Methods, Digital Terrain Model and Its Application, Geographic Information System Spatial Analysis, Microwave Remote Sensing Principles, Principle and Application of Artificial Intelligence, Geological Environment Remote Sensing Monitoring, C Language Programming ② Extracurricular study: Course Design for C Language, Matlab Language Practice, Geographic Information System Principles and Application Practice, Remote Sensing Image Interpretation, Remote Sensing Geoscience Analysis and Computing, Experiment for Digital Image Processing Algorithm, Major Teaching Practice, GIS Design and Development
7	Environment and sustainable development: Understand the technical status and development trends of this major, correctly understand the relationship between this major and environmental protection, understand and evaluate the impact of engineering practice on complex engineering problems in the field of geoinformation science on the sustainable development of the environment and society .	① Classroom Teaching: Introduction to Geophysics and Geoinformatics ②Extracurricular study: Geological Field Training of Geophysics, Major Teaching Practice, GIS Design and Development
8	Professional norms: have humanities and social science literacy, a sense of social responsibility, be able to understand and abide by engineering professional ethics and norms in engineering practice, and fulfill responsibilities.	① Classroom Teaching: Introduction to Geophysics and Geoinformatics ②Extracurricular study: Geological Field Training of Geophysics, Major Teaching Practice, GIS Design and Development
9	Individuals and teams: Have a strong sense of teamwork and collaboration, and be able to assume the roles of individuals, team members, and leaders in a team under a multidisciplinary background.	① Classroom teaching: The Essentials of Modern Chinese History, Introduction to Mao Zedong Thought and Theoretical System of Socialism with Chinese Characteristics, Principles of Marxism, Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, Labor Education, Aesthetic Education Courses, Military Theory, Introduction to Geophysics and Geoinformatics, Ideological Morality and Rule of Law ② Extracurricular learning: Military Training, Labor Practice, Geological Field Training of Geophysics, Major Teaching Practice, GIS Design and Development, Innovation and Entrepreneurship
10	Communication: be able to	① Classroom teaching: College English,

No.	Graduation Requirements	Pathways (Teaching Process)
	communicate effectively with peers in the industry and the public on complex engineering issues in the field of geoinformation science, including writing reports and design manuscripts, making statements, expressing clearly or responding to instructions, and possessing a certain international perspective. Communicate and communicate in cross-cultural contexts.	Ideological Morality and Rule of Law, Principles of Marxism ② Extracurricular study: Bachelor Thesis (Design), Practice for Graduation, Major Teaching Practice, GIS Design and Development, Remote Sensing Image Interpretation, Remote Sensing Geoscience Analysis and Computing, Experiment for Digital Image Processing Algorithm
11	Project management: understand and master the general knowledge of engineering management and economic decision-making methods in the field of geoinformation science, and be able to apply them in a multidisciplinary environment.	② Classroom teaching: College English ③ Extracurricular study: Bachelor Thesis (Design), Practice for Graduation, Matlab Language Practice, Geographic Information System Principles and Application Practice, Remote Sensing Image Interpretation, Remote Sensing Geoscience Analysis and Computing, Experiment for Digital Image Processing Algorithm, Major Teaching Practice, GIS Design and Development
12	Lifelong learning: have the awareness of independent learning and lifelong learning, be able to continuously learn new methods and new technologies in the field of geoinformation science, and have the ability to continuously learn and adapt to development	① Classroom teaching: Ideological Morality and Rule of Law, Introduction to Geophysics and Geoinformatics, College English, C Language Programming; Specialty Elective Courses ② Extracurricular study: Major Teaching Practice, GIS Design and Development, Course Design for C Language

Major Disciplines: Geology, Remote Sensing Science and Technology, Computer Science and Technology.

Core Courses: Structural Geology, Geomorphology and Quaternary Geology, Introduction to Remote Sensing, Remote Sensing Geology, Environmental and Disaster Geology, Cartography and Geological Mapping, 3D Geo-visualization, Geographic Information System Principle and Application, Data Structure and Algorithm Foundation, Course Design and Programming for C Language, Principle and Application of Artificial Intelligence.

Lab Experiments: Experiment for Digital Image Processing Algorithm, Matlab Language Practice, Experiment and Practice of Specialty Courses.

Practical Work: Surveying Practice A, Geological Field Training of Geophysics, Major Teaching Practice, GIS Design and Development, Production Practice, Graduation Thesis and etc.

Required Credits for Graduation: The total credits for four years should be no fewer than 170 credits.

Duration & Degree Granted: Four years, Bachelor of Engineering in Geoinformatics.

Recommended Minors: Not limited.

Related Specialties: Spatial Information and Digital Technology, Space Science and Technology.

地球信息科学与技术专业课程教学计划表

Course Descriptions of Geoinformatics

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	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	General Education Courses	12007800	马克思主义基本原理 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 College English	9	144	144					48		3	3	3					
		14300300	军事理论 Military Theory	2	36	36							2							
	12008200	劳动教育 Labor Education	1	16	16							1								
	General Education Courses	包括美育课程、心理健康教育课程（各不少于2学分）总计12学分，跨学科选修课不低于4学分		12	192															
		小计 Sum		43	580	580				48		13	6	4	6				2	

课程类别 Classi- fication	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	七 7th	八 8th
					讲课 Lec.	课内 实验 Lab	实验/科研 实践 Lab/Res.	研 讨 Di s	素 质 拓 展 Ex p									
大类平台课	20617600	地球物理与空间信息导论 Introduction to Geophysics and Geoinformatics	1.5	24	24						1.5							
	21212711	高等数学 A Advanced Mathematics (A)	11.5	184	184						5	6.5						
	21212801	线性代数 A Linear Algebra (A)	3.5	56	56								3.5					
	21213502	概率论与数理统计 B Probability and Statistics (B)	2.5	40	40								2.5					
	212130*1	大学物理 A College Physics (A)	8	128	128							4	4					
	212169*1	物理实验 A Physics Experiments (A)	2	64	4	60						1	1					
	20119700	地质学基础 Geology Foundation	4	64	56	8	4	2	2			4						
	21130401	测量学 A Surveying (A)	2	32	32		16						2					
	21947600	C 语言程序设计 C Programming Language	2	32	32		8		8				2					
		小计 Sum		37	624	556	68	28	2	10		6.5	15.5	15				
学科基础课 Disciplinary Fundamental Courses	20630000	遥感概论 Introduction to Remote Sensing	2	32	32		16							2				
	20123402	构造地质学 B Structural Geology (B)	2	32	32		16							2				
	20115100	地貌学及第四纪地质学 Geomorphology and Quaternary Geology	3	48	48									3				
	20623700	地理信息系统原理与应用 Geographic Information System Principle and Application	2	32	32									2				
	20630300	人工智能原理与应用 Principle and Application of Artificial Intelligence	2.5	40	20	20									2.5			
		小计 Sum		11.5	184	164	20	32							9	2.5		
专业主干课 Main Specialty Courses	20612400	数据结构与算法基础* Data Structure and Algorithm Foundation*	2.5	40	40									2.5				
	20635500	地学信息三维可视化 3D Geo-visualization	2	32	24	8									2			
	20623800	环境与灾害地质学 Environment and Hazard Geology	3	48	32	16									3			
	20628700	遥感地学信息处理方法 Remote Sensing Geo-information Processing Methods	2	32	24	8									2			

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Cr	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	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									
	20624900	数学地质 Mathematical Geology	2	32	20	12									2			
	20623900	地图学与地质制图 Cartography and Geological Mapping	2	32	20	12										2		
	20106800	遥感地质学 Remote Sensing Geology	2	32	24	8									2			
	小计 Sum		15.5	248	192	56								2.5	9	4		
	专业选修课 Elective Courses	可按方向设课，具体见专业选修课列表	14	224	224													
合计 Sub-total			121	1860	1716	144	60	2	58		19.5	21.5	19	17.5	11.5	4	14	2
实践环节 Practical Work	44300400	军事训练 Military Training	2	2 周							2							
	42008300	劳动实践 Labor Practice	1	4 周												1		
	41120901	测量学教学实习 A Surveying Practice A	1	1 周									1					
	41947700	C 语言课程设计 Course Design for C Language	1.5	1.5 周									1.5					
	40624000	Matlab 语言及应用 Matlab Language Practice	2	2 周										2				
	40624100	地理信息系统原理与应用实践 Geographic Information System Principle and Application Practice	1	1 周										1				
	40630400	遥感图像解译 Remote Sensing Image Interpretation	1	1 周											1			
	40630100	遥感概论课程设计 Course Design for Introduction to Remote Sensing	1	1 周										1				
	41921202	数据库课程设计 Database Course Project	1	1 周												1		
	40627900	遥感地学分析与计算 Remote Sensing Geoscience Analysis and Computing	1.5	1.5 周												1.5		
	40630200	数据结构与程序设计 Data Structure and Programming	2	2 周										2				
	40627600	地球物理学类专业野外地质实习 Geological Field Training of Geophysics	4	4 周											4			

课程类别 Classi- fication	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	七 7th	八 8th
					讲 课 Lec.	课 内 实 验 Lab	实 验 / 科 研 实 践 Lab/Res.	研 讨 Di s	素 质 拓 展 Ex p									
	40624300	图像处理实践 Experiment for Digital Image Processing Algorithm	2	2 周											2			
	40624500	地球信息技术综合实习 Major Teaching Practice	4	4 周												4		
	40630600	GIS 设计与开发 GIS Design and Development	3	3 周												3		
	40613800	毕业实习 Practice for Graduation	8	8 周														8
	40621300	毕业论文（设计） Bachelor Thesis (Design)	8	8 周														8
	小计 Sum		44	47								2		2.5	6	7	10.5	16
创新创业自主学习 Freedom study	ZZ35000S	社会调查 Social Investigation	2													2		
		其他(含创新创业课程、学科竞赛、发明创造、科研报告) Others (Start-up, Contest, Invention, Innovation and Research Presentation)	3															3
	小计 Sum		5	80												2		3
总计 Total			170	1940 +47 周	1716	144	60	2	58		21.5	21.5	21.5	23.5	20.5	14.5	14	21
可开出专业选修课列表 Specialty Elective Courses	20626000	地球物理学概论 Introduction of Geophysics	2	32	32										2			
	20625000	地理信息系统空间分析 Geographic Information System Spatial Analysis	2	32	16	16										2		
	20613300	计算机网络 Computer Networks	2	32	32											2		
	21932103	数据库原理 C Principle of Database C	2	32	32											2		
	20629100	卫星导航定位原理与应用 The Principle and Application of Navigation Satellite and Positioning	2	32	20	12								2				
	20623600	面向对象程序设计 Object-oriented Programming	2	32	32					C 语言程序 设计					2			
	21909602	数字图像处理 B Digital Image Processing (B)	2	32	32									2				
	20630500	微波遥感原理与应用 Microwave Remote Sensing Principles and Applications	2	32	20	12									2			
	20605300	数字地形模型及应用 Digital Terrain Model and Its Application	2	32	20	12				地理信息 系统					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	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									
	20630700	地质环境遥感监测 Geological Environment Remote Sensing Monitoring	2.5	40	24	16				环境与灾害地质学						2.5		
	20611200	地球信息科学与技术专业英语 Geoinformatics Academic English	2	32	32												2	
	20630800	行星空间探测 Planetary Space Exploration	1.5	24	24											1.5		
	20620000	Python 语言及应用 Python Programming and Its Application	1	16	16		8							1				
	20630900	现代地球物理仪器及应用 Modern Geophysical Instruments and Applications	1	16	16		4										1	
	20619600	地球物理反演概论 Introduction to Geophysical Inversion	1.5	24	24		8									1.5		

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。

地球信息科学与技术专业课程分类统计

Course Classifications and Statistics of Geoinformatics

课程类别 统计	通识教育课程 Liberal Education Courses		大类平台课+学科基础课 Platform & 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 Hours	学分总计 Total Credits
	必修	选修							
课内总学时/学分	580/31	192/12	808/48.5	248/15.5	224/14	47 周/44	80/5	2060 学时 +47 周	170
学分所占比例	25%		29%	9%	8%	26%	3%	100%	100%

附：

学校与企事业单位联合培养阶段实施方案

1. 培养目标

培养具有扎实的专业基础知识，较强的工程能力和创新意识，良好的团队合作精神，掌握地球信息技术的施工方案设计、工程预算与管理、地球信息数据采集与质量控制、工程制图与分析、地球信息数据处理与评价等技能，能在地球信息技术工程领域从事生产相关的设计、施工、资料处理与分析、项目管理等方面工作的工程师。

2. 培训重点

2.1 掌握地球信息技术基础技术知识、工程方法和技术规范。了解地球信息技术工程领域的新产品、新技术、新工艺以及技术发展趋势。

(1) 掌握扎实的地球信息技术工程基础技术知识和工程方法。掌握各类地球信息技术基本原理；掌握地球信息技术数据工作流程与工作方法；掌握地球信息技术常用观测仪器基本原理、掌握仪器操作与维护；掌握地球信息技术工程项目设计安全管理的知识。

(2) 熟悉地球信息技术工程领域的技术标准，了解地球信息技术的相关政策、法律和法规。熟悉地球信息技术工程领域的技术标准；了解地球信息技术工程行业的相关政策、法律和法规。

(3) 了解地球信息技术工程领域的新产品、新技术、新工艺以及技术发展趋势。了解地球信息装备中运用的新原理、新技术；了解地球信息技术方法运用的新原理、新技术；了解地球信息技术工程领域的技术发展趋势。

2.2 具备运用适当的理论和实践方法解决地球信息技术工程实际问题的能力，在地球信息数据采集、处理与分析等解决实际工程问题方面得到系统化训练。

(1) 掌握地球信息观测仪器工作原理和操作方法，能对设备（系统）运行过程和维护进行常规管理。

(2) 能对地球信息观测仪器运行过程中出现的一般问题（如：人文干扰、数据异常、常规故障等）进行分析、判断，提出处理意见或解决方案。

(3) 能对地球信息技术工作方法提出改进建议或方案。具备进行技术改造的初步能力。

2.3 参与项目及工程管理

(1) 具有较强的质量、环境、职业健康安全和法律意识，在法律法规规定的范畴内，按确定的相关标准和程序要求开展工作。

(2) 具有初步的项目和工程管理能力,能运用经济管理知识。具有项目预算和工程成本核算的初步能力;能运用生产管理知识,具有制定施工计划和过程管理的初步能力;具有一定的组织管理能力和进行项目任务分解、人力和资源调度的初步能力;具有团队协作精神,参与团队管理、协调团队工作,确保工作进度。

2.4 具备有效的沟通与交流能力和较强的获取知识、终身学习的能力。

(1) 具有较强的表达和沟通能力;能够使用技术语言,在跨文化环境下进行沟通与表达;能够进行工程文件的编写,如可行性分析报告、项目任务书、投标书;能够运用英语进行与地球信息方法与技术方面的表达、沟通和交流。

(2) 具有较强的交流能力。具备较强的人际交往能力,能够控制自我,并了解、理解他人需求和意愿;具备较强的适应能力,自信、灵活地处理新的和不断变化的人际环境和工作环境;具备团队合作精神,并具备一定的协调、管理、竞争与合作的初步能力;能够了解地球信息技术领域研究现状和发展趋势,了解最新知识与技术成果,不断提升自身专业水平;具有较强的获取知识、终身学习的能力。

2.5 具备良好道德和工程伦理素养

(1) 具有良好的道德。具有良好的社会公德,自觉遵守社会行为规范。自觉遵守法律法规。为人正直、诚实守信。具有良好的职业道德规范,自觉遵守所属职业体系的职业行为准则。

(2) 较强的工程伦理素养。具有较强工程伦理素养,在环境保护、节约资源、公共安全、社会服务、社会福利、公共卫生、社会秩序等方面体现对社会的责任。

3. 培训阶段

3.1 地球信息数据采集训练

安排学生参加地球信息数据采集施工。在生产实习中,进一步深入理解地球信息技术工作原理,地球信息观测仪器基本原理及操作,野外干扰因素分析及各种突发情况处理,了解地球信息工程野外施工经费预算及实际成本。

3.2 地球信息室内数据整理与分析

安排学生参加生产单位地球信息数据采集、数据处理与分析工作。在生产实习中,熟悉各种地球信息数据特征,掌握地球信息数据整理基本流程、数据质量评价方法等。能够在企业指导老师指导下,进行对实际资料开展地球信息数据处理与分析。

3.3 毕业实习与设计/论文

企业为学生配备企业导师、学校配备指导老师。毕业实习与设计或论文,结合就业工作分散进行、或结合校内导师的研究课题、或结合与企业的横向合作项目为题,以野外生产、室内研究相结合的方式。

3. 课程及学分设置

和企业联合培养的课程包括：地球信息技术专业讲座（1.5 学分，24 学时），毕业实习（8 周，8 学分）、毕业论文（设计）（8 周，8 学分）。

5. 考核标准及成绩评定

由企业导师和学校导师联合，根据学生出勤情况、提交的实习报告和答辩质询的情况等综合评定，各部分成绩比例为 30%、40%、30%。

6. 工作、生活及安全保障管理

（1）实践场地。企业提供完成课程教学、实习和毕业设计所需的工作室和现场。

（2）实践设备。企业提供用于学生进行观察、操作、试验所需的生产设备。

（3）实践资料。企业提供用于学生学习、分析的资料、标准、规范等资料。

（4）师资配备。企业和学校联合，为学生配备企业指导教师和学校指导教师，指导学生实习和毕业设计，保障学生的安全高效完成企业实训。

（5）实践课题。企业和学校配备的指导教师联合商定用于学生进行工程设计训练和毕业设计的项目或课题。

地球信息科学与技术专业辅修课程教学计划表

Course Descriptions of Geoinformatics (Minor)

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	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									
学科基础课 Disciplinary Fundamental Courses	21212801	线性代数 A Linear Algebra (A)	3.5	56	56										3.5			
	20119700	地质学基础 Geology Foundation	4	64	56	8	4	2	2							4		
	21130401	测量学 A Surveying (A)	2	32	32		16								2			
	小计 Sum		9.5	152	144	8	20	2	2						5.5	4		
专业主干课 Main Specialty Courses	20623700	地理信息系统原理与应用 Geographic Information System Principle and Application	2	32	32											2		
	20635500	地学信息三维可视化 3D Geo-visualization	2	32	24	8											2	
	20629100	卫星导航定位原理与应用 The Principle and Application of Navigation Satellite and Positioning	2	32	20	12												2
	20623800	环境与灾害地质学 Environment and Hazard Geology	3	48	32	16				地理信息系统原理与应用							3	
	小计 Sum		9	144	108	36										2	5	2
实践环节 Practical Work	40624300	图像处理算法实践 Experiment for Digital Image Processing Algorithm	2	2 周													2	
	40115701	地球物理学类专业野外地质实习 Geological Field Training of Geophysics	4	4 周													4	
	小计 Sum		6	6 周													6	1
总计 Total			24.5	296+6 周	252	44	20	2	2						5.5	6	11	3

地球信息科学与技术辅修专业课程分类统计

Courses Classifications and Statistics of Geoinformatics (Minor)

课程类别 统计	学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	实践环节 Practical Work	学时总计 Total Hour	学分总计 Total Credits
学时/学分	152/9.5	144/9	6 周/6	296 学时+6 周	24.5
学分所占比例	39%	37%	24%	100%	100%

