地球物理学专业培养方案

一、专业培养目标

本专业响应“向深部进军”的号召，面向地球物理学领域发展需求，坚持立德树人、以本为本，依托地球物理学国家一流专业建设，发挥我校地球物理专业方向齐全的特色与优势，培养德、智、体、美、劳全面发展，掌握扎实的数理基础和地球物理专业知识，具有出色的实践能力、自主学习能力和一定国际交流能力的专业人才。毕业后可在地球深部探测、空间探测、资源与能源勘查、环境与工程地球物理探测等领域从事基础性研究、应用性研究和行政管理等工作。

二、毕业要求

（1）素质培养要求：热爱祖国，拥护中国共产党的领导；具有学风优良，艰苦奋斗、求真务实、热爱劳动、遵纪守法、团结合作的品质；具有良好的思想品德、社会公德和职业道德；具有较好的文化素养和文学艺术修养；具有勤奋进取、求实创新的科学精神；具有科学的思维和研究方法，以及良好的身体和心理素质。

（2）知识培养要求：掌握综合地球物理基本理论及其应用的基本技能；掌握地球内部结构研究、深部能源和资源探测的原理和方法；掌握资源勘查与地质工程勘测方法技术；掌握空间物理现象的基本原理；掌握现代信息处理技术；具备地球物理探测数据采集、信息处理和结合地质知识进行综合解释的基本技能；了解地球科学的学科前沿及其发展趋势。

（3）能力培养要求：要求自主学习能力强，理论基础扎实、知识面宽、应变和适应能力强；具有较强的实践动手能力和组织、沟通、协调能力；至少掌握一门外语，具有一定的国际交流能力。

三、主干学科

地球物理学。

四、学制与学位

学制四年。学生修满规定的最低毕业学分，达到毕业要求后，授予理学学士学位。

五、核心课程

专业核心课程：高等数学、大学物理、复变函数与积分变换、线性代数、程序设计基础、地球物理场论、地球物理计算方法、电子电工技术、综合地质学、弹性动力学、数字信号处理、地震学、重力学与重力勘探、地磁学与磁法勘探、地电学与电法勘探、空间物理学、地震勘探与测井等。

实践课程：军事理论及训练、北戴河地质实习、周口店地质实习、北戴河专业实习、重磁数据处理与解释、地电数据处理与解释、地震数据处理与解释。

Undergraduate Program in Geophysics

1. Academic Objectives

Responding to the call of "March Deep into the Earth", facing the demands of Geophysics specialty, adhering to foster virtue through education, taking undergraduate education as foundation, based on the First-Class specialty construction, making best of the advantage of the complete directions, this major cultivates the students to have all-round development of morality, intelligence, beauty and labor, to master the solid Math and Physics foundation and knowledge of Geophysics, to have outstanding ability of practice, autonomous learning, and proper international communication. The graduates could be engaged in the fundamental research, application research, and administrative management in the field of deep exploration of earth, space exploration, resource and energy survey, and environmental engineering.

2. Graduation Requirements

(1) Requirements on Quality Education: Love motherland, and support the leadership of the Communist Party of China. Have the qualities of excellent study style, hard work, seeking truth and being pragmatic, loving labor, obeying laws and regulations, and uniting and cooperating. Have good ideological and moral character, social morality and professional ethics. Have cultural accomplishment and literary and artistic accomplishment. Have scientific spirit of diligence, enterprising, seeking truth and innovation. Have scientific thinking and research methods, as well as good physical and psychological qualities.

(2) Requirements on Knowledge Education: Master the basic skills of comprehensive geophysics theory and its application. Master the principles and methods of studying the internal structure of the earth and exploring deep energy and resources. Master the methods and techniques of resource exploration and geological engineering survey. Master the basic principles of space physical phenomena. Master modern information processing technology. Have the basic skills of geophysical exploration data acquisition, information processing and comprehensive interpretation combined with geological knowledge. Understand the frontier of earth science and its development trend.

(3) Requirement on Ability Education: Have strong self-learning ability, solid theoretical foundation, wide knowledge, and strong adaptability and adaptability. Have strong practical ability and organization, communication and coordination ability. Master at least one foreign language and have certain international communication ability.

3. Main disciplines

Geophysics.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Science when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

The core courses include: Advanced Mathematics, College Physics, Complex Function and Integral Transform, Linear Algebra, Fundamentals of Programming, Geophysical Field Theory, Geophysical Calculation Method, Electronic and Electrical Technology, Comprehensive Geology, Elastodynamics, Digital Signal Processing, Seismology, Gravity and Gravity Exploration, Geomagnetism and Magnetic Prospecting, Geoelectricity and Electrical Prospecting, Heliophysics, Seismic Exploration and Logging.

The main practice training includes: Military theory and training, Geological practice in Beidaihe, Geological practice in Zhoukoudian, Specialized Practice in Beidahe, Gravity and Magnetic Data Processing and Interpretation, Geoelectric Data Processing and Interpretation, and Seismic Data Processing and Interpretation.

六、最低毕业总学分要求及学分分配（Minimum Required Credits and Distribution）

课程模块 Course Module	课程类别 Course Classification	学时数 Hours	学分 Credits	学 期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	41	11	13		4	5	1	3	1			2
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	1000	61.5	7	14		13	18.5		10				
	专业核心课程 Specialized Fundamental Courses	272	17				1				16			
	专业拓展课程 Specialized Development	32	2										2	
实践教育 Practical Education	课程实践 Course Practice	32 周+112 学时	31		1	6	3	1	5			6	4	6
	课外实践 Extracurricular practice		6											
必修课总学分 Required course credits				150.5										
选修课总学分 Elective course credits				20										
最低毕业总学分 Total Credits				170.5										

七、课程设置（Curriculum）

1、通识教育必修课程（Required Courses of General Education）：730 学时(730 hours)，41 学分(41 Credits)

课程代码 Course Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR182024	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	32	2	32			考试 Exam	4	
GR182022	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策（1） Situation and Policy（1）	4	0.25	4			考查 Term paper	1	
GR181014	形势与政策（2） Situation and Policy（2）	4	0.25	4			考查 Term paper	2	
GR181015	形势与政策（3） Situation and Policy（3）	4	0.25	4			考查 Term paper	3	

GR181016	形势与政策（4） Situation and Policy（4）	4	0.25	4			考查 Term paper	4	
GR181017	形势与政策（5） Situation and Policy（5）	4	0.25	4			考查 Term paper	5	
GR181018	形势与政策（6） Situation and Policy（6）	4	0.25	4			考查 Term paper	6	
GR181019	形势与政策（7） Situation and Policy（7）	4	0.25	4			考查 Term paper	7	
GR181020	形势与政策（8） Situation and Policy（8）	4	0.25	4			考查 Term paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301024	劳动教育与双创实践(1)Labor Education and Innovation and Entrepreneurship Practice(1)	16	1	16			考查 Term Paper	2	
GR303025	劳动教育与双创实践(2)Labor Education and Innovation and Entrepreneurship Practice(2)	16	1	16			考查 Term Paper	6	
GR301005	大学生心理素质教育（1）	16	1	16	0		考查	1	

	Mental Health (1)						Term Paper		
GR301006	大学生心理素质教育（2） Mental Health (2)	16	1	16	0		考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36	0		考试 Exam	1	
GR081071	大学英语（1） College English (1)	64	4	64			考试 Exam	1	
GR081072	大学英语 （2） College English (2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)(series of courses)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education (2) (series of courses)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education (3) (series of courses)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education (4) (series of courses)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	41	492	222	16			

2、通识教育选修课程（Selective Courses of General Education）：192 学时（192 hours），12 学分（12 Credits）

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，

	(Inc. Online courses)					《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and health courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类 Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics And art Courses	见附件 6	2	考查 Term Paper	2-4	
总计 Total			12			

3、学科基础课程（Disciplinary Fundamental Courses）：1000 学时(1000 hours)，61.5 学分(6.5 Credits)

课程代码 Course Code	课程 名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR191001	高 等 数 学 A（1） Advanced Mathematics A (1)	96	6	96			考试 Exam	1	
DR191002	高 等 数 学 A（2） Advanced Mathematics A (2)	96	6	96			考试 Exam	2	
DR191101	大学物理A（1） College Physics A (1)	64	4	64			考试 Exam	2	
DR192102	大学物理A（2） College Physics A (2)	64	4	64			考试 Exam	3	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	

DR122001	测量学 A Surveying A	40	2.5	24	16		考试 Exam	4	
DR011036	地球科学概论 Geosciences	64	4	32	32		考试 Exam	2	
DR012039	综合地质学 Synthetic Geology	64	4	32	32		考试 Exam	4	
DR192018	复变函数与积分变换 Complex Variable Functions and Integral Transformations	48	3	48			考试 Exam	3	
DR102101	地球物理数学物理方程 A Equation of Mathematical Physics in Geophysics A	48	3	48			考试 Exam	4	
DR102102	数字信号处理 A Digital Signal Processing A	64	4	48	16		考试 Exam	4	
DR103103	地球物理场论 A Theory of Geophysical Field A	64	4	64			考试 Exam	5	
DR103104	地球物理计算方法A Calculation Methods in Geophysics A	48	3	48			考试 Exam	5	
DR042127	电工电子技术 B Electrical and Electronic Technology B	48	3	34	14		考试 Exam	3	
DR103005	弹性动力学 A Elastic Dynamics A	48	3	48			考试 Exam	5	
DR102105	岩石物理学 A Rock Physics A	32	2	32			考试 Exam	4	
DR100032	地球物理学专业导论课 Introduction to Geophysics	16	1	16			考查 Term Paper	1	
总计 Total		1000	61.5	890	110				

4、**专业核心课程**（Specialized Core Courses）：272 **学时**(272hours)，17 **学分**(17Credits)

课程代码	课程名称	总学时	学分	讲课学时	实验	线上	考核	开课	备注

Course Code	Courses Name	Hours	Credits	Lec.	学时 Exp.	学时 Online	方式 Assessment	学期 Semester	Notes
SR103106	地震学 Seismology	32	2	32			考试 Exam	6	
SR103107	重力学与重力勘探 Gravity and Gravity Prospecting	48	3	48			考试 Exam	6	
SR103108	地磁学与磁法勘探 Geomagnetism and Magnetic Prospecting	48	3	48			考试 Exam	6	
SR103109	地电学与电法勘探 Geoelectrics and Electrical Prospecting	48	3	48			考试 Exam	6	
SR103110	空间物理学 Space Physics	32	2	28	4		考试 Exam	6	
SR103111	地震勘探与测井 Seismic Exploration and Well-logging	48	3	48			考试 Exam	6	
SR102112	科技写作与沟通A Scientific Writing and Communication	16	1	16			考查 Term Paper	3	
总计 Total		272	17	268	4				

5、专业拓展课程（Specialized Development Courses）：至少选修 32 学时(32 hours)，2 学分(2 Credits)

课程代码 Course Code	课程 名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS100057	地球深部电性结构研究进展 Advances of electrical structure in the Earth	16	1	16			考查 Term Paper	7	
SS100058	水文环境工程地球物理技术 Geophysical technology for hydrological environment and engineering	16	1	16			考查 Term Paper	7	
SS104118	地球导电性及应用 Conductivity of the Earth and its applications	16	1	16			考查 Term Paper	7	
SS104119	韧性城市探测技术 Exploration for resilient city	16	1	16			考查 Term Paper	7	

SS104120	地震与地震灾害 Earthquake and its disaster	32	2	32			考查 Term Paper	7	
SS104113	地震各向异性理论与方法 Theory and method of seismic anisotropy	16	1	16			考查 Term Paper	7	
SS104114	海洋地震勘探 Seismic survey of marine	16	1	16			考查 Term Paper	7	
SS104115	海洋地球物理 Marine Geophysics	32	2	32			考查 Term Paper	7	
SS100090	地球物理与高性能计算 Geophysics and High Performance Computing	16	1	16			考查 Term Paper	7	
SS100061	现代电磁探测技术新进展 New Development of Modern Electromagnetic Detection Technology	16	1	16			考查 Term Paper	7	
SS100059	地震各向异性理论与多分量地震技术 Seismic anisotropy theory and multi-component seismic technology	16	1	16			考查 Term Paper	7	
SS104121	环境与辐射 Environment and radiation	16	1	16			考查 Term Paper	7	
SS104116	地震和地球内部结构研究新进展 Advances of study on earthquake inner structure of the Earth	16	1	16			考查 Term Paper	7	
SS104117	地球物理成像 Geophysical tomography	16	1	16	0	0	考查 Term Paper	7	

6、**课程实践**（Course Practice）：32 **周**+112 **学时**(32 weeks and 112 hours)，31 **学分**(31 Credits)

课程代码 Course Code	课程名称 Courses Name	周数（学时） Week（hour）	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践	32 学时	2	考查 Term	1 夏	

	Political Social Practice			Paper		
PR191045	实验物理一 Physics Experiments（1）	24 学时	1	考试 Exam	2	
PR191046	实验物理二 Physics Experiments（2）	24 学时	1	考试 Exam	3	
PR122059	测量实习 Surveying Practice	1 周	1	考查 Term Paper	4	
PR011044	北戴河地质实习 Geological Survey Field Trip in Beidaihe	2 周	2	考查 Term Paper	1 夏	
PR012046	周口店地质教学实习 Geological Survey Field Trip in Zhoukoudian	5 周	5	考查 Term Paper	2 夏	
PR102118	MATLAB 程序设计 A MATLAB Programming A	32 学时	2	考查 Exam	3	
PR103051	专业实习 Professional Practice	6 周	6	考查 Term Paper	3 夏	
PR104052	重磁数据处理与解释A Gravity and Magnetic Data Processing and Interpretation A	2 周	2	考查 Term Paper	7	至少选 4 学分
PR104053	地电数据处理与解释 Geoelectric Data Processing and Interpretation	2 周	2	考查 Term Paper	7	
PR104054	地震数据处理与解释 A Seismological Data Processing and Interpretation A	4 周	4	考查 Term Paper	7	
PR104056	毕业设计（论文） Graduation Design (Thesis)	12 周	6	考查 Term Paper	8	
总计 Total		32 周+112 学时	31			

7、课外实践（Extracurricular practice）：6 学分（6 Credits）

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and

Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

测控技术与仪器专业培养方案

一、专业培养目标

本专业为适应国民经济发展需求，培养爱国、爱党、爱岗、敬业、品德高尚，具有高度社会责任感和良好的科学、文化素养，具备测量、控制和仪器领域的基础理论、专业知识及技能，具有创新意识、自主学习能力和实践能力，具备广阔的专业视野，能够在测量控制与仪器，特别是智能地学仪器与装备等领域从事科学研究、技术开发、设计制造和生产管理等方面工作的宽口径、复合型工程技术人才。毕业后可在能在国民经济各部门、世界著名学术机构或企业从事仪器制造、信息探测、系统调控及运行管理等方面的高级技术人才和行业专家，成为带动国内外技术、经济和社会创新的创业者。

学生毕业五年左右预期具有如下能力：

（1）职业和专业素养：具有人文社会科学素养、职业道德、社会责任感和创新意识；

（2）专业知识：掌握以测量为中心，信息流为主线，传感、测量与控制相互支撑的知识体系；

（3）专业能力：具有开展包括地球物理仪器、地学分析仪器、工业控制等在内的测量控制仪器综合设计、实现和应用能力；

（4）沟通、交流与管理能力：具备团队协作能力、组织管理能力、沟通及交流能力，能从事本专业相关的技术与管理工作；

（5）学习与发展能力：胜任岗位职责，具有终身学习和适应发展的能力。

二、毕业要求

（1）工程知识：掌握扎实的数学与自然科学、电子电路、光学、机械、计算机、控制等专业基础以及传感、测试、仪器等专业知识，并能用于解决复杂测控仪器工程问题。能熟练运用数学与自然科学知识进行问题表述。熟练掌握电子电路、光学、机械、计算机、控制等基本技能，能采用工程基础与专业知识对传感、测试、仪器问题进行推演和分析。能够将相关理论知识和专业技能用于仪器系统方案的比较与综合。

（2）问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析复杂测控仪器工程问题，以获得有效结论。能够应用科学原理，识别仪器设计工程问题的关键环节，并使用理论分析和参数设计加以表达。能够通过文献研究，分析仪器设计工程问题，寻求解决问题的多种备选方案。通过运用测控相关专业知识和原理，分析影响因素，获得有效的工程问题解决方案。

（3）设计/开发解决方案：能够设计针对复杂测控仪器工程问题的解决方案，设计满足特定需求的系统和单元（部件），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。能够使用测控仪器系统基本设计技术，了解影响设计的因素。能够针对测控仪器系统的特定需求完成传感器、信号提取与处理、数据处理等信号链单元的设计。能够进行测控仪器系统设计，在设计与实践环节中体现创新意识。能够在安全、健康、法律、文化和环境等因素的约束下，对设计方案的可行性进行分析。

（4）研究：能够基于测量和控制的基本原理，采用科学方法对复杂工程问题进行研究。能够根据工程基础知识与科学原理，分析测控仪器复杂工程问题的解决方案。能够运用专业理论和技术，选择研究路线，设计、构建和实施测控专业实验。针对测控仪器工程问题，能够通过信息分析与综合得到结果，并科学解释数据。验、分析与解释数据、并通过信息综合得到合理有效的结论。

（5）使用现代工具：能够针对复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。了解测控专业常用测试仪器、信息技术工具、工程工具和模拟软件的使用原理和方法，并理解其适用范围和局限性。针对测控仪器复杂工程问题，能够选择软件仿真工具，进行满足特定需求的系统和单元

（部件）的分析、计算与设计。能够设计实验系统，对测控仪器工程问题进行模拟和预测，并分析其局限性。

（6）工程与社会：能够基于工程相关背景知识进行合理分析，评价专业工程实践和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。了解测控仪器工程相关领域的方针政策和法律法规，理解社会文化对工程活动的影响。能够认知所设计方案对社会、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：能够理解和评价针对复杂测控仪器工程问题的工程实践对环境、社会可持续发展的影响。树立科学发展观，了解国家环境保护相关政策法规，理解社会可持续发展的重要性、内涵和意义。能够评价测控仪器工程实践对环境保护、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，能够在测控仪器实践中理解并遵守工程职业道德和规范，履行责任。形成正确的世界观、人生观，理解个人与社会的关系，了解中国国情。具有人文社会科学素养、工程职业道德和规范，具备社会责任感。

（9）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。了解多学科背景下团队的构成以及不同角色成员的职责，能与其他成员有效沟通。具有团队合作意识，能听取、协调、综合成员意见，并形成合理决定。

（10）沟通：能够就复杂测控仪器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。针对测控仪器工程问题，能够以口头或书面方式准确表达自己观点，并能与业界同行、社会公众进行不同领域的有效交流。能知悉和跟踪测控学科国内外发展趋势，具备跨文化背景下的语言文字表达与专业沟通能力。

（11）项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。了解测控仪器工程项目实施的流程，能够理解并运用工程管理方法。了解测控仪器工程项目的成本构成，能够在工程项目方案设计过程中考虑和融入经济因素。

（12）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。具备自主和终身学习的意识，以及持续学习的健康体魄以及一定的军事本领，掌握科学锻炼身体的基本技能，养成良好的体育锻炼和卫生习惯，受到必要的军事训练，达到国家规定的大学生军事训练合格标准，能履行建设祖国和保卫国家的神圣义务。能适应社会发展，具备自主学习的能力，能主动理解、归纳与提出问题。

三、主干学科

控制科学与工程、仪器科学与技术。

四、学制与学位

学制四年。学生修满规定的最低毕业学分，达到毕业要求后，授予工学学士学位。

五、核心课程

核心课程：模拟电子技术、数字电子技术、高频电子线路、单片机原理及接口技术、测控原理、信号与系统、数字信号处理、电子测量原理、传感器原理及应用、智能仪器仪表设计基础、新型单片机应用与实践、可编程片上系统等。

实践课程：新型单片机应用与实践、模拟电路设计与实践、测控仪器设计与开发等。

Undergraduate Program in Measurement and Control Technology and Instrumentation

1. Academic Objectives

This professional is to meet the needs of national economic development, cultivate patriotic, love the party, dedication, good character, a highly social sense of responsibility and good scientific and cultural quality, have the basic theory in the field of measurement, control and instrumentation, professional knowledge and skills, has innovation consciousness, independent learning ability and practical ability, have a wide range of professional, wide caliber, compound engineering and technical talents who can be engaged in scientific research, technology development, design and manufacturing and production management in the field of measurement, control and instrument, especially intelligent geoscience instrument and equipment.

After graduation, he can become a senior technical personnel and industry expert in instrument manufacturing, information detection, system regulation and operation management in various departments of national economy, world famous academic institutions or enterprises, and become an entrepreneur driving technological, economic and social innovation at home and abroad.

After graduation, with about 5 years' continual work or study, they should:

（1）Professional and professional literacy: humanistic and social science literacy, professional ethics, social responsibility and innovation consciousness;

(2)Professional knowledge: master the knowledge system with measurement as the center, information flow as the main line, sensing, measurement and control supporting each other;

(3)Professional ability: capable of comprehensive design, implementation and application of measurement and control instruments including geophysical instruments, geological analysis instruments and industrial control instruments;

(4)Communication, communication and management skills: capable of teamwork, organization and management, communication and communication skills, and able to engage in technical and management work related to the major;

(5)Learning and development ability: capable of job responsibilities, lifelong learning and adapting to development.

2. Graduation Requirements

(1) Engineering knowledge: master solid mathematics and natural science, electronic circuit, optics, machinery, computer, control and other professional knowledge of sensing, testing, instruments and other professional knowledge, and can be used to solve complex measurement and control instrument engineering problems. Proficient in using mathematics and natural science knowledge to express problems. Proficient in electronic circuit, optics, machinery, computer, control and other basic skills, can use engineering foundation and professional knowledge to deduce and analyze sensing, testing, instrument problems. Be able to apply relevant theoretical knowledge and professional skills to the comparison and synthesis of instrument system schemes.

(2) Problem analysis: Able to apply the basic principles of mathematics, natural science and engineering science to identify, express and analyze complex measurement and control instrument engineering problems through literature research to obtain effective conclusions. Be able to apply scientific principles to identify the key links of engineering problems in instrument design and express them by theoretical analysis and parameter design. Be able to analyze instrument design engineering problems and seek alternative solutions through literature research. Through the application of measurement and control related professional knowledge and principles, analysis of influencing factors, to obtain effective solutions to engineering problems.

(3) Design/develop solutions: Be able to design solutions to complex measurement and control instrument engineering problems, design systems and units (components) to meet specific needs, and be able to reflect innovation in the design process, taking into account social, health, safety, legal, cultural

and environmental factors. Be able to use the basic design technology of measurement and control instrument system and understand the factors affecting the design. It can complete the design of sensor, signal extraction and processing, data processing and other signal chain units according to the specific requirements of the measurement and control instrument system. Be able to design measurement and control instrument system, and embody innovation consciousness in design and practice. Be able to analyze the feasibility of the design scheme under the constraints of safety, health, law, culture and environment.

(4) Research: Able to use scientific methods to study complex engineering problems based on the basic principles of measurement and control. Able to analyze solutions to complex engineering problems of measurement and control instruments according to basic engineering knowledge and scientific principles. Be able to use professional theories and technologies to select research routes, design, construct and implement measurement and control experiments. For the engineering problems of measurement and control instruments, the results can be obtained through information analysis and synthesis, and the data can be explained scientifically. Verify, analyze and interpret data, and obtain reasonable and effective conclusions through information synthesis.

(5) Use of modern tools: Ability to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for complex engineering problems, including prediction and simulation of complex engineering problems, and to understand their limitations. Understand the principles and methods of using commonly used test instruments, information technology tools, engineering tools and simulation software in the field of measurement and control, and understand their applicable scope and limitations. For complex engineering problems of measurement and control instruments, software simulation tools can be selected to analyze, calculate and design systems and units (components) that meet specific requirements. Be able to design experimental systems, simulate and predict engineering problems of measurement and control instruments, and analyze their limitations.

(6) Engineering and society: Able to conduct reasonable analysis and evaluate the social, health, safety, legal and cultural impacts of professional engineering practices and solutions to complex engineering problems based on engineering related background knowledge, and understand responsibilities. Understand the policies, laws and regulations related to measurement and control instrument engineering, and understand the influence of social culture on engineering activities. Be able to understand the social, health, safety, legal and cultural impacts of the design scheme and understand the responsibilities to be assumed.

(7) Environment and sustainable development: able to understand and evaluate the impact of engineering practices on environmental and social sustainable development of complex measurement and control instrument engineering problems. Establish the scientific outlook on development, understand the relevant national environmental protection policies and regulations, understand the importance, connotation and significance of social sustainable development. Be able to evaluate the impact of measurement and control instrument engineering practice on environmental protection and social sustainable development.

(8) Professional norms: With humanistic and social science literacy and social responsibility, able to understand and comply with engineering professional ethics and norms in the practice of measuring and controlling instruments, and fulfill responsibilities. Form a correct world outlook and outlook on life, understand the relationship between individuals and society, and understand the national conditions of China. Humanities and social science literacy, engineering professional ethics and norms, with a sense of social responsibility.

(9) Individuals and teams: Able to assume the roles of individual, team member, and leader in a multidisciplinary team. Understand the structure of a multi-disciplinary team and the responsibilities of members in different roles, and be able to communicate effectively with other members. Have a sense of teamwork, can listen to, coordinate and synthesize members' opinions, and make reasonable decisions.

(10) Communication: Able to effectively communicate and communicate with industry peers and the public on complex measurement and control instrument engineering issues, including writing reports and design documents, presentation, clear expression or response to instructions. Besides, I have a certain international vision and am able to communicate and communicate in a cross-cultural context. For

measurement and control instrument engineering issues, can accurately express their views orally or in writing, and can effectively communicate with industry peers and the public in different fields. Be able to understand and track the development trend of measurement and control discipline at home and abroad, and have the ability of language expression and professional communication under cross-cultural background.

(11) Project management: understanding and mastering engineering management principles and economic decision-making methods, and applying them in a multidisciplinary environment. Understand the implementation process of measurement and control instrument engineering project, and be able to understand and apply engineering management methods. Understand the cost composition of measurement and control instrument engineering projects, and be able to consider and integrate economic factors in the design process of engineering projects.

(12) Lifelong learning: have the consciousness of self-learning and lifelong learning, and have the ability of continuous learning and adapting to development. Have the autonomy and the consciousness of lifelong learning and continuous learning of physical fitness as well as certain military ability, to master the basic skills of scientific exercise, form good habits of physical training and health, is the necessary military training, to reach the college students' military training qualified standard prescribed by the state, can fulfill the construction of country and sacred obligation to defend the country. Can adapt to the social development, have the ability of independent learning, can actively understand, summarize and ask questions.

3. Main disciplines

Control science and engineering, Instrument science and technology.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Major core courses: Analog electronic technology, digital electronic technology, high-frequency electronic circuit, SCM principle and interface technology, measurement and control principle, Signal and System, digital Signal processing, Electronic measurement principle, Sensor Principle and Application, intelligent instrument and meter design foundation, Application and practice of new type single chip microcomputer, Programmable system on chip etc.

Practical courses: application and practice of new single-chip microcomputer, design and practice of analog circuit, design and development of measurement and control instruments, etc.

六、最低毕业总学分要求及学分分配（Minimum Required Credits and Distribution）

课程模块 Course Module	课程类别 Course Classification	学时数 Hours	学分 Credits	学 期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	41	12	13	0	4	5	1	2	1	0	0	2
	通识教育选修课程 Selective Courses of General Education	192	12	0	0	0	0	2	0	0	0	0	0	10
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	1024	64	10.5	17	0	15.5	14	0	7	0	0	0	0
	专业核心课程 Specialized Fundamental Courses	320	20	0	0	0	1	5	0	10	4	0	0	0
	专业拓展课程 Specialized Development	48	3	2	0	0	0	0	0	0	0	0	0	0
实践教育 Practical Education	课程实践 Course Practice	192+27 周	31	1	2	3	2	0	8	0	4	6	0	6
	课外实践 Extracurricular practice		6											
必修课总学分 Required course credits				156										
选修课总学分 Elective course credits				21										
最低毕业总学分 Total Credits				177										

七、课程设置（Curriculum）

1、通识教育必修课程（Required Courses of General Education）：730 学时(654 hours)，41 学分(41 Credits)

课程代码 Course Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课 学时 Lec.	实验 学时 Exp.	线上 学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR182024	毛泽东思想和中国特色社会主义理论体系概论Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	32	2	32			考试 Exam	4	
GR182022	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策（1） Situation and Policy（1）	4	0.25	4			考查 Term paper	1	
GR181014	形势与政策（2） Situation and Policy（2）	4	0.25	4			考查 Term paper	2	
GR181015	形势与政策（3） Situation and Policy（3）	4	0.25	4			考查 Term paper	3	
GR181016	形势与政策（4） Situation and Policy（4）	4	0.25	4			考查 Term paper	4	

GR181017	形势与政策（5） Situation and Policy（5）	4	0.25	4			考查 Term paper	5	
GR181018	形势与政策（6） Situation and Policy（6）	4	0.25	4			考查 Term paper	6	
GR181019	形势与政策（7） Situation and Policy（7）	4	0.25	4			考查 Term paper	7	
GR181020	形势与政策（8） Situation and Policy（8）	4	0.25	4			考查 Term paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301024	劳动教育与双创实践(1)Labor Education and Innovation and Entrepreneurship Practice(1)	16	1	16			考查 Term Paper	2	
GR303025	劳动教育与双创实践(2)Labor Education and Innovation and Entrepreneurship Practice(2)	16	1	16			考查 Term Paper	6	
GR301005	大学生心理素质教育（1） Mental Health (1)	16	1	16	0		考查 Term Paper	1	
GR303005	大学生心理素质教育（2） Mental Health (2)	16	1	16	0		考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36	0		考试 Exam	1	
GR081071	大学英语（1）	64	4	64	0		考试	1	

	College English (1)						Exam		
GR081072	大学英语 （2） College English (2)	32	2	32	0		考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32	0		考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)(series of courses)	32	1	0	32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education (2) (series of courses)	32	1	0	32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education (3) (series of courses)	32	1	0	32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education (4) (series of courses)	32	1	0	32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	41	492	222	16			

2、通识教育选修课程（Selective Courses of General Education）：192 学时（192 hours），12 学分（12 Credits）

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	

3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and health courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类 Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 6	2	考查 Term Paper	2-4	
总计 Total			12			

3、**学科基础课程**（Disciplinary Fundamental Courses）：1024 **学时**(hours)，64 **学分**(Credits)

课程代码 Course Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR100031	测控技术与仪器专业导论 Introduction to Measurement and Control Technology and Instrumentation	16	1	16			考查 Term Paper	1	
DR011036	地球科学概论 Introduction to Earth science	64	4	32	32		考试 Exam	2	
DR191001	高等数学 A（1）Advanced Mathematics A(1)	96	6	96			考试 Exam	1	
DR191002	高等数学 A（2） Advanced Mathematics A(2)	96	6	96			考试 Exam	2	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	
DR191101	大学物理 A（1） College Physics A(1)	64	4	64			考试 Exam	2	
DR192102	大学物理 A（2）	64	4	64			考试	3	

	College Physics A(2)						Exam		
DR021224	工程图学 Engineering Graphics	56	3.5	48	8		考试 Exam	1	
DR042079	电路分析基础 Circuit Analysis	48	3	48			考试 Exam	2	
DR192018	复变函数与积分变换 Complex Variable Functions & Integral Transformations	48	3	48			考试 Exam	3	
DR043084	数字电子技术 Digital Electronics Technique	48	3	48			考试 Exam	3	
DR042207	模拟电子技术 Analogue Electronics Technique	56	3.5	56			考试 Exam	3	
DR102006	电磁场理论 Electromagnetic Field Theory	48	3	48			考试 Exam	4	
DR102131	单片机原理及接口技术 Principle and Interface Technology of Single Chip Microcomputer	64	4	48	16		考试 Exam	4	
DR102132	信号与系统 Signals and Systems	64	4	56	8		考试 Exam	4	
DR103133	数字信号处理 C Digital Signal Processing C	64	4	56	8		考试 Exam	5	
DR103134	数字电路与系统设计 Digital Circuit and System Design	48	3	18	30		考试 Exam	5	
总计 Total		1024	64	922	102				

4、专业核心课程（Specialized Core Courses）：320 学时(hours)，20 学分(Credits)

课程代码 Course Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR043115	高频电子线路 High Frequency Electronic Circuit	48	3	42	6		考试 Exam	4	
SR102135	集成电路设计与实践 IC Design and Practice	32	2	10	22		考查 Term Paper	4	
SR103028	电子测量原理 Measurement and Instrumentation Principles	48	3	36	12		考试 Exam	5	
SR103030	测控原理 Measurement and Control theory	48	3	40	8		考试 Exam	5	
SR103031	新型单片机应用与实践 Application and Practice of New MCU	32	2	8	24		考查 Term Paper	5	
SR103032	传感器原理与应用 Principles and Applications of Sensors	32	2	24	8		考试 Exam	5	
SR103034	可编程片上系统 System-on-Program-Chip	32	2	16	16		考查 Term Paper	6	
SR103035	智能仪器仪表设计基础 Basis Intelligent Instrument Design	32	2	26	6		考试 Exam	6	
SR102112	科技写作与沟通 A Scientific Writing and Communication A	16	1	16			考查 Term Paper	3	
总计 Total		320	20	218	102				

5、**专业拓展课程**（Specialized Development Courses）：48 **学时**(hours)，3 **学分**(Credits)

课程代码 Course Code	课程 名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS100124	现代化生活中的测控技术与仪器 Measurement and control technology and instruments in modern life	16	1	16			考查 Term Paper	1	
SS101136	集成芯片那些事儿 Things about Integrated Chips	16	1	16			考查 Term Paper	1	
SS104137	现代天线技术 Modern Antenna Technology	16	1	16			考查 Term Paper	7	
总计 Total		48	3	48	0				

6、**课程实践**（Course Practice）：192 **学时**+27 **周** (weeks or hours)，31 **学分**(Credits)

课程代码 Course Code	课程名称 Courses Name	周数（学时） Week（hour）	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Practice	2 周	2	考查 Term Paper	2 夏	
PR181010	思想政治社会实践 Political Social Practice	32	2	考试 Exam	1 夏	
PR101138	金工实习 Metalworking	1 周	1	考查 Term Paper	1 夏	
PR191045	实验物理一 Physics Experiments（1）	24 学时	1	考试 Exam.	2	
PR192046	实验物理二 Physics Experiments（2）	24 学时	1	考试 Exam.	3	
PR102057	电子测量与电路设计	6 周	6	考查	2 夏	

	Electronic Measurement & Circuit Design			Term Paper		
PR103058	专业实习 Professional Practice Instrumentation)	6 周	6	考查 Term Paper	3 夏	
PR104059	毕业设计（论文） Graduation Design (Thesis)	12 周	6	考查 Term Paper	8	
PR103060	测控仪器设计与开发 Design and Development of Measurement & Control and Instrumentation	64 学时	4	考查 Term Paper	6	
PR042099	电路实验 Circuit Experiments	16 学时	1	考查 Term Paper	2	
PR042100	模拟电子技术实验 Analogue Electronics Technique Experiments	16 学时	1	考查 Term Paper	3	
PR043104	数字电子技术实验 Digital Electronics Technique Experiments	16 学时	1	考查 Term Paper	3	
PR104059	毕业设计（论文） Graduation Design（Thesis）	12	6	考查 Term Paper	8	
总计 Total		192+27 周	31			

7、课外实践（Extracurricular practice）

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

八、毕业要求与培养目标矩阵（工程教育认证类专业）

毕业要求	培养目标				
	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1	√	√	√		
毕业要求 2	√	√	√		
毕业要求 3	√	√	√		
毕业要求 4	√	√	√		
毕业要求 5	√	√	√		
毕业要求 6	√			√	
毕业要求 7	√				√
毕业要求 8	√			√	√
毕业要求 9	√			√	√
毕业要求 10	√			√	
毕业要求 11	√			√	
毕业要求 12	√				√

九、课程与毕业要求关系矩阵（工程教育认证专业类专业参考）

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计/开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
思想道德与法治						L	L	H	L	L		L
中国近现代史纲要						L	M		L	H		L
马克思主义基本原理						L	M		L	L		L
毛泽东思想和中国特色社会主义理论体系概论				L	L	L	M		L	L		L
习近平新时代中国特色社会主义思想概论						L	M		L	L		L
形势与政策				L	L	L	M		L	L		L
大学生职业生涯规划与就业指导（1）						L	M		L	L		L
大学生职业生涯规划与就业指导（2）						L	M		L	L		L
大学生心理素质教育（1）				L	L			L		M		M
大学生心理素质教育（2）				L	L			L		M		M
军事理论				L	L			L		M		
大学英语（1）					M	L			L	H		M
大学英语 （2）					M	L			L	H		M
大学英语素质拓展课					M	L			L	H		M
体育（1）（系列课程）									L	L		H
体育（2）（系列课程）									L	L		H
体育（3）（系列课程）									L	L		H
体育（4）（系列课程）									L	L		H
大学计算机					H							M
程序设计基础 A					H							M
人文社科类（含在线课程）		L		L		H						L

自然科学类（含在线课程）		L		L		H						L
自然文化类		L		L		H						L
体育与健康类		L		L		H						L
创新创业教育类		L		L		H						L
审美与艺术类		L		L		H						L
高等数学 A（1）	L	H	M	H					H			M
高等数学 A（2）	L	H	M	H					H			M
线性代数	L	H	M	H					H			M
概率论与数理统计	L	H	M	H					H			M
大学物理 A（1）	L	H	M	H					H			M
大学物理 A（2）	L	H	M	H					H			M
工程图学	H	M	M	L	H	L						L
电路分析基础	H	H	H	H	L	L						
现代天线技术	L	L	H	L		L						L
复变函数与积分变换	L	H	M	H					H			M
数字电子技术	H	H	H	H	L	L						
模拟电子技术	H	H	H	H	L	L						
电磁场理论	H	H	H	H	L	L						
单片机原理及接口技术	H	H	H	H	L	L						
信号与系统	H	H	H	H	L	L						
数字信号处理 C	H	H	H	H	L	L						
数字电路与系统设计	H	H	H	H	L	L						
高频电子线路	H	H	H	H	L	L						
集成电路设计与实践	H	H	H	H	L	L						
电子测量原理	H	H	H	H	L	L						
测控原理	H	H	H	H	L	L						
新型单片机应用与实践	H	H	H	H	L	L						
传感器原理与应用	H	H	H	H	L	L						
可编程片上系统	H	H	H	H	L	L						

智能仪器仪表设计基础	H	H	H	H	L	L						
科技写作与沟通 A				L	L			L		M		M
地球科学概论		L	L	M		M	M					
现代化生活中的测控技术与仪器	H	H	H	H	L	L						
集成芯片那些事儿	H	H	H	H	L	L						
军事技能训练						L	L	L	L			M
金工实习	H	H	H	H	H							
思想政治社会实践								H	H	L		
实验物理一	H	H	H	H	L	L						
实验物理二	H	H	H	H	L	L						
电子测量与电路设计	H	H	H	H	L	L						
专业实习	H	H	H	H	L	L						
毕业设计（论文）	H	H	H	H	L	L						
测控仪器设计与开发	H	H	H	H	L	L						
电路实验	H	H	H	H	L	L						
模拟电子技术实验	H	H	H	H	L	L						
数字电子技术实验	H	H	H	H	L	L						

注：H 表示课程对毕业要求指标支撑度高；M 表示课程对毕业要求指标支撑度中等；L 表示课程对毕业要求指标支撑度低。

勘查技术与工程专业培养方案

一、专业培养目标

勘查技术与工程专业面向我国全面建设社会主义现代化的需求，坚持以学生全面发展为宗旨，注重培养学生良好道德品质，提升学生科学与人文素养，激发学生潜能和创新创业精神，开拓学生国际化视野，锻炼学生的管理协作与交流表达能力，使学生具备扎实的数学、物理、计算机信息科学和地球科学知识，能系统掌握勘查技术与工程的理论和方法技术，培养成为能在资源勘查与开发、工程勘查、深部探测、灾害与环境监测防治、城市地下空间探测、信息服务等领域解决复杂问题的高素质应用创新型人才。

毕业后，通过 5 年左右的持续工作或学习深造，应该具备：

（1）德智体美劳全面发展，富有创新精神、实践能力，有良好的道德文化素养和社会责任感，有意愿且有能力服务社会；

（2）掌握多种地球物理勘探方法野外观测、数据采集、资料处理与综合地质解释基本技能，能发现和分析地球物理勘查过程中的关键科技问题，并提出合理的解决方案，具备合格的地球物理勘探工程师的素质和能力；

（3）能独立承担勘查技术与工程项目的设计、实施、应用研究和管理工作，能够从事资源勘查与开发利用、灾害与环境监测防治、城市地下空间探测及信息服务、工程建设等工程设计、应用研究和生产管理工作；

（4）能够在设计、研究或生产团队中担任技术骨干或负责人；

（5）能够通过自我学习等途径更新知识，提高能力，掌握相关领域发展前沿和新进展，能够开展国内外相关领域合作交流。

二、毕业要求

（1）工程知识：能够将数学、物理学、地质学、测量学和专业知识用于解决地球物理勘查领域的复杂工程问题。理解和掌握地球物理勘查实践所需要的数学知识，并具备将其应用到地球物理勘查领域复杂工程问题的能力。理解和掌握地球物理勘查实践所需要的物理知识，并具备将其应用到地球物理勘查领域复杂工程问题的能力。理解和掌握地球物理勘查实践所需要的地质学知识，并具备将其应用到勘查地球物理领域复杂工程问题的能力。理解和掌握勘查地球物理实践所需要的测量学、信号处理和计算机知识，并具备将其应用到勘查地球物理领域复杂工程问题的能力。 能够运用数学、自然科学和相关专业知识抽象、归纳勘查地球物理领域的复杂工程问题的本质，并理解其局限性。

（2）问题分析：能够应用数学、物理和地球物理勘查的基本原理，识别、表达、并结合文献研究分析地球物理勘查领域的复杂工程问题，以获得有效结论。能够应用数学及自然科学知识来识别复杂地球物理工程问题。能够识别和判断地球物理勘查方法、仪器、数据采集、处理和解释领域中复杂工程问题的关键环节和参数。能够正确表达一个勘查地球物理领域的工程问题及其解决方案。能运用地球物理勘查方法的基本原理并进行文献调研，分析地球物理勘查过程的影响因素，并寻求合理的解决方案，证实解决方案的合理性与实用性，获得有效结论。

（3）设计/开发解决方案：能够设计针对地球物理勘查领域复杂工程问题的解决方案，具有地球物理勘查野外数据采集、资料处理和地质解释等方案设计能力，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。针对油气勘探领域的复杂工程问题，设计地球物理勘查方法的采集、处理和解释的目标以及工程技术方案，能够在设计环节体现创新意识。针对固体矿产勘探领域的复杂工程问题，设计地球物理勘查方法的采集、处理和解释的目标以及工程技术方案，能够在设计环节体现创新意识。能够在设计环节考虑社会、健康、安全、法律、文化以及环境等因素。

（4）科学研究：能够基于科学原理并采用科学方法对地球物理领域勘查复杂工程问题进行

研究，包括地球物理勘查数据采集方案设计、数据资料分析与处理和地质地球物理综合解释，并通过多数据联合反演得出合理有效的结论。具备初步的科学研究能力。针对地球物理勘查专业领域的复杂工程问题，能够基于方法原理、数据采集、资料处理和综合解释的专业理论，结合工区特征，设计可行的技术方案；能够根据技术方案采用科学的技术手段、实验方法，安全的开展模拟实验和工程实践。能够正确采集、处理模拟实际数据，对处理结果进行分析和解释，并通过信息综合得到合理有效的结论。

（5）使用现代工具：能够针对地球物理勘查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，实现对地球物理领域勘查复杂工程问题的分析模拟和反演计算，并能够理解其多解性和局限性。能够理解掌握地球物理勘查的数据采集、处理和解释工具及软件，并理解其局限性。掌握计算机编程语言，并能设计开发用于解决复杂工程问题的工具。掌握数字信号特点及通用分析方法，并用于地球物理勘查领域的工程问题进行分析模拟。针对地球物理勘查等领域中的复杂工程问题，能够开发或选用恰当的仿真工具，研究复杂问题的正问题和反问题。

（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合理分析，评价地球物理勘查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。具有工程实习和社会实践的经历。能够合理评价勘查地球物理工程实践对社会、健康、安全、法律以及文化的潜在影响。

（7）环境和可持续发展：了解本专业的技术现状和发展动态，认识本专业与环境保护的关系，理解和评价针对地球物理勘查领域复杂工程问题的工程实践对环境、社会可持续发展的影响。理解环境保护和社会可持续发展的内涵和意义，了解勘查技术与工程专业的技术现状和发展动态，在解决工程问题的具体实践过程中，能充分考虑工程实践对环境的影响。能够正确理解和评价复杂工程问题的工程实践对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地球物理勘查工程领域职业道德和规范，履行责任。具备人文社会科学素养，树立正确的世界观、人生观和价值观，具有地球物理勘查工程师必备的身体素质和心理素质。理解工程伦理的核心理念，具备责任心和社会责任感，在地球物理勘查工程实践中能遵守职业道德和规范，具有法律意识。

（9）个人和团队：通过训练具有一定的组织管理能力，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。能够理解一个多学科背景下的团队中每个角色的作用和责任。能够在团队中承担成员的责任，完成自身的工作。作为团队成员，能与其他成员有效沟通，有团队意识，作为负责人，能够组织团队的工作，综合成员的意见，进行合理决策。

（10）沟通：能够就地球物理勘查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。能够撰写实验（实践）报告、设计报告、总结报告等。能够与业界同行及社会公众进行有效沟通和交流，包括陈述发言、清晰表达或回应指令。具备一定的国际视野，能够阅读并理解外文科技文献，较熟练地使用外语进行沟通和交流。

（11）项目管理：理解并掌握地球物理勘查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。理解地球物理勘查活动中涉及的工程管理与经济决策的一般知识。在多学科工程项目实施过程中，能够综合应用工程管理原理与经济决策方法。

（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。能正确认识自我探索和学习新知识的必要性。具有不断学习和适应发展的能力，能够关注地球物理勘查领域前沿和进展，并能及时追踪地球物理勘查的最新理论、技术及国际前沿动态，与时俱进。

三、主干学科

地质资源与地质工程（一级学科）,地球探测与信息技术（二级学科）。

四、学制与学位

学制四年。学生修满规定的最低毕业学分，达到毕业要求后，授予工学学士学位。

五、核心课程

专业核心课程：重力勘探、磁法勘探、电法勘探、地震勘探、核地球物理、地球物理测井、科技写作与沟通。

实践课程：思想政治社会实践、实验物理、测量实习、北戴河地质实习、周口店地质教学实习、MATLAB程序设计、地震数据采集设计、电法数据采集设计、重磁数据采集设计、专业实习、地震数据处理与解释、电法数据处理与解释、重磁数据处理与解释、毕业设计（论文）。

Undergraduate Program in Prospecting Technology and Engineering

1. Academic Objectives

The major of Prospecting Technology and Engineering, is oriented to the need of China to build comprehensively socialistic modernization, sticks to all-round development of students, focuses on fostering students to have good moral trait, boost student's accomplishment in science and humanities, stimulate students' potential and spirit of innovation and entrepreneurship, broaden their international horizons, exercise their skills in management collaboration and communication, and equip students with solid knowledge on mathematics, physics, computer information science and Earth science, in order that they are able to systematically master the theory, methodology and technologies on Prospecting Technology and Engineering, and they are cultivated to become high-quality applied innovative talents who can solve complex problems in the resource prospecting and development, project prospecting, deep detection, disaster and environmental monitoring and prevention, urban underground space detection, and information services.

After graduation, with about 5 years' continual work or study, they should:

(1) have received all-around development in moral, intellectual, physical, aesthetics and labour education, be full of innovative spirit and practical ability, have good moral and cultural literacy and a sense of social responsibility, and be willing and able to serve the society;

(2) Master multiple geological survey methods and basic techniques in field observation, data collection and processing, and integrated geological interpretation, be able to find and analysis critical scientific and technical problems in the process of geological survey and propose reasonable solutions, and own desired literacy and capabilities as geological survey engineer;

(3) Be able to design, implement, apply, research and manage projects of prospecting technology and engineering independently, and be able to engage in engineering design, applied research and production management in resource prospecting, development and utilization, disaster and environmental monitoring and prevention &control, and urban underground space detection and information service, and project construction etc.;

(4) Be able to serve as technical backbone or leader in the design, research or production team;

(5) Be able to update their knowledge and improve their abilities through self-study, grasp the development frontier and new progress in related fields, and be able to carry out domestic and foreign cooperation and exchange in related fields.

2. Graduation Requirements

(1) Engineering-related knowledge: they can apply their knowledge in mathematics, physics, geology, survey and their major to solve complex engineering problems in geological survey. They understand and master the mathematical knowledge required for the practice of geological survey, and have the ability to apply it to complex engineering problems in geological survey. They understand and master the physical knowledge required for the practice of geological survey, and have the ability to apply it to complex engineering problems in geological survey. They understand and master the geological knowledge required for the practice of geological survey, and have the ability to apply it to complex engineering problems in geological survey. They understand and master the surveying, signal processing and computer knowledge required for the practice of geological survey, and have the ability to apply it to complex engineering problems in geological survey. They are able to use mathematics, natural sciences, and related professional knowledge to abstract and summarize the nature of complex engineering problems in geophysics, and understand their limitations.

(2) Problem analysis: they are able to apply the basic principles in mathematics, physics and geophysical surveys to identify, express, and in combination with literature research, analyze complex engineering problems in geophysical surveys to obtain effective conclusions. They are able to apply knowledge in mathematics and physical sciences to identify complex geophysical engineering problems. They are able to identify and judge the key links and parameters of complex engineering problems in

geophysical survey methods, instruments, data acquisition, processing and interpretation. They can correctly express an engineering problem and its solution in geological survey. They are able to use the basic principles of geophysical survey methods and conduct literature research, analyze the influential factors in geophysical survey, seek reasonable solutions, demonstrate their rationality and practicability, and obtain effective conclusions.

(3) Design/develop solutions: they are able to design solutions to complex engineering problems in geophysical surveys, have the ability to design data collection and processing, and geological interpretation in this field, and be able to reflect the sense of innovation in the design process, and consider factors such as society, health, safety, law, culture and environment. Aiming at the complex engineering problems in oil and gas exploration, they can design the objectives of the collection, processing and interpretation in geophysical survey methods, as well as engineering technical solutions, and reflect the sense of innovation in the design process. Aiming at the complex engineering problems in solid mineral exploration, they can design the objectives of the collection, processing and interpretation in geophysical survey methods, as well as engineering technical solutions, and reflect the sense of innovation in the design process. They can consider factors such as society, health, safety, law, culture and environment in the design process.

(4) Scientific research: they can, based on scientific principles and using scientific methods, study complex engineering problems in geophysical survey, including design of schemes to collect data, analysis and processing of data and information, comprehensive geophysical interpretation, and draw reasonable and effective conclusions through joint reversion of data. They have initial ability to carry out scientific researches. Aiming at complex engineering problems in geophysical exploration, they can design feasible technical solutions based on method principles, data collection and data, and professional theories on comprehensive interpretation, and combined with the characteristics of the work area. They are able to use scientific technical means and experimental methods according to the technical scheme, to safely carry out simulation experiments and engineering practices. They are able to correctly collect and process simulated actual data, analyze and interpret the processed results, and obtain reasonable and effective conclusions through information synthesis.

（5）Use modern tools: they are able to develop, select and use appropriate technologies, resources, modern instruments and computers for complex engineering problems in geophysical survey, to realize analysis, simulation and inversion calculation of complex engineering problems in geophysics, and to understand its ambiguities and limitations. They able to understand and master tools and software for data acquisition, processing and interpretation in geophysical surveys, and understand their limitations. They master computer programming languages, and are able to design and develop tools to solve complex engineering problems. They master the characteristics of digital signals and general analysis methods, and use them to analyze and simulate engineering problems in geophysical survey. Aiming at complex engineering problems in geophysical survey, they are able to develop or select appropriate simulation tools to study the positive and inverse problems of complex problems.

(6)Engineering and society: Based on the geophysical theory and relevant background knowledge, they can conduct reasonable analysis, evaluate the impact of solutions to complex engineering problems in geophysical survey on society, health, safety, law, and culture, and understand the responsibilities that they should bear. The have experience in engineering internship and social practices. They are able to reasonably evaluate the potential impacts of engineering practices in geophysical survey on society, health, safety, law, and culture.

(7) Environment and sustainable development: they understand the current technical status and development trends of this major, understand the relationship between this major and environmental protection, understand and evaluate the impact of engineering practices about complex engineering problems on geophysical survey on environment and sustainable development of society. They understand the connotation and significance of environmental protection and sustainable development of society, understand the technical status and development trends of Prospecting Technology and Engineering, and are able to fully consider the impact of engineering practices on the environment in the specific practice of solving engineering problems. They are able to correctly understand and evaluate the impact of engineering practice of complex engineering problems on the sustainable development of society.

(8) Professional norms: they have literacy in humane and social sciences, and a sense of social responsibility, be able to understand and abide by the professional ethics and norms in geophysical survey in their engineering practice, and perform their responsibilities. They have the literacy of humanities and social sciences, have established a correct world outlook, outlook on life and values, and possessed the physical and psychological qualities necessary as geophysical survey engineer. They understand the core concept of engineering ethics, have a sense of responsibility and social responsibility, abide by professional ethics and norms in the practice of geophysical survey engineering, and have legal awareness.

(9) Individual and team: through training, they have certain organizational and management ability, strong team consciousness and cooperation spirit, and can assume the role of individual, team member and leader in a multi-disciplinary team. They are able to understand the roles and responsibilities of everyone in a multidisciplinary team. They are able to take responsibility as a member of a team and complete their own work. As a team member, they can effectively communicate with other members and have a sense of teamwork. As a leader, they can organize the work of the team, synthesize the comments of members and make reasonable decisions.

(10) Communication: they are able to effectively communicate and exchange with peers and the public on complex engineering problems in geophysical survey, including writing reports and design documents, presenting and making a statement, and clearly expressing or responding to instructions, and have an international horizon and are able to communicate and exchange in a cross-cultural context. They are able to write experiment (practice), design and summary reports etc. They are able to effectively communicate and exchange with peers and the public, including presenting and making a statement, and clearly expressing or responding to instructions. They have a certain international horizon, are able to read and understand foreign scientific and technological literature, and are proficient in communicating and exchanging in foreign languages.

(11) Project management: they understand and master the common sense and decision-making methods in project management in geophysical survey, and are able to apply it in a multidisciplinary environment. They understand the general knowledge of project management and economic decision-making involved in geophysical survey activities. In the implementation of multi-disciplinary engineering projects, the can comprehensively apply the principles of engineering management and economic decision-making methods.

(12) learning: The have the consciousness of independent and lifelong learning, are able to continually learn new methods and technologies in geophysics, and have the ability to continue learning and adapting to development. They are able to correctly understand the necessity of self-exploration and learning new knowledge. They have the ability to continue learning and adapting to development, and are able to pay attention to the frontiers and progress in geophysical survey, and track the latest theories, technologies and international frontier trends in geophysical exploration in time, keeping pace with the times.

3. Main disciplines

Geological resources and geological engineering (first-level discipline),Earth detection and Information Technology (second-level discipline).

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Specialized Core Courses: Electrical Prospecting, Seismic Prospecting, Gravity Prospecting, Magnetic Prospecting, Geophysical Well Logging, Nuclear Geophysics,. Scientific Writing and Communication.

Practice courses: Physics Experiments, Surveying Practice, Geological Survey Field Trip in Beidaihe, Geological Survey Field Trip in Zhoukoudian, Professional Practice, MATLAB Programming, Data Acquisition and Design of Seismic Prospecting, Data Acquisition and Design of Electrical Prospecting, Data Acquisition and Design of Gravity and Magnetic, Gravity and Magnetic Data Processing and Interpretation, Electrical Data Processing and Interpretation, Seismic Data Processing and Interpretation, Well Logging Data Processing and Interpretation, Graduation Design (Thesis).

六、最低毕业总学分要求及学分分配（Minimum Required Credits and Distribution）

课程模块 Course Module	课程类别 Course Classification	学时数 Hours	学分 Credits	学期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	41	11	13		4	5	1	3	1			2
	通识教育选修课程 Selective Courses of General Education	192	12					2						10
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	1032	64.5	7	14		14	12.5		17				
	专业核心课程 Specialized Fundamental Courses	368	23								21		2	
	专业拓展课程 Specialized Development	32	2										2	
实践教育 Practical Education	课程实践 Course Practice	37 周+80 学时	34/36		1	6	1	3	5		3	6	4/6	6
	课外实践 Extracurricular practice		6											
必修课总学分 Required course credits				162.5/164.5										
选修课总学分 Elective course credits				20										
最低毕业总学分 Total Credits				182.5/184.5										

七、课程设置（Curriculum）

1、通识教育必修课程（Required Courses of General Education）：730 学时(654 hours)，41 学分(41 Credits)

课程代码 Course Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR182024	毛泽东思想和中国特色社会主义理论体系概论Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	32	2	32			考试 Exam	4	
GR182022	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策（1） Situation and Policy（1）	4	0.25	4			考查 Term paper	1	
GR181014	形势与政策（2） Situation and Policy（2）	4	0.25	4			考查 Term paper	2	
GR181015	形势与政策（3） Situation and Policy（3）	4	0.25	4			考查 Term paper	3	
GR181016	形势与政策（4） Situation and Policy（4）	4	0.25	4			考查 Term paper	4	

GR181017	形势与政策（5） Situation and Policy（5）	4	0.25	4			考查 Term paper	5	
GR181018	形势与政策（6） Situation and Policy（6）	4	0.25	4			考查 Term paper	6	
GR181019	形势与政策（7） Situation and Policy（7）	4	0.25	4			考查 Term paper	7	
GR181020	形势与政策（8） Situation and Policy（8）	4	0.25	4			考查 Term paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育（1） Mental Health (1)	16	1	16	0		考查 Term Paper	1	
GR303005	大学生心理素质教育（2） Mental Health (2)	16	1	16	0		考查 Term Paper	5	
GR301024	劳动教育与双创实践(1)Labor Education and Innovation and Entrepreneurship Practice(1)	16	1	16			考查 Term Paper	2	
GR303025	劳动教育与双创实践(2)Labor Education and Innovation and Entrepreneurship Practice(2)	16	1	16			考查 Term Paper	6	
GR302008	军事理论 Military Theory	36	1	36	0		考试 Exam	1	
GR081071	大学英语（1） College English (1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2）	32	2	32			考试	2	

	College English (2)						Exam		
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)(series of courses)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education (2) (series of courses)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education (3) (series of courses)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education (4) (series of courses)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	41	492	222	16			

2、通识教育选修课程（Selective Courses of General Education）：192 学时（192 hours），12 学分（12 Credits）

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and health courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类	见附件 5	3	考查	2-8	选修 3 个学分，其中

	Innovation and Entrepreneurship Courses (Inc. Online Courses)			Term Paper		《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 6	2	考查 Term Paper	2-4	
总计 Total			12			

3、学科基础课程（Disciplinary Fundamental Courses）：1032 学时(1032 hours)，64. 5 学分(64. 5Credits)

课程代码 Course Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR100033	勘查技术与工程专业导论 Introduction to Prospecting Technology and Engineering	16	1	16			考查 Term Paper	1	
DR191001	高等数学 A（1） Advanced Mathematics A（1）	96	6	96			考试 Exam	1	
DR191002	高等数学 A（2） Advanced Mathematics A（2）	96	6	96			考试 Exam	2	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	
DR191101	大学物理 A（1） College Physics A（1）	64	4	64			考试 Exam	2	
DR192102	大学物理 A（2） College Physics A（2）	64	4	64			考试 Exam	3	
DR122001	测量学 A Surveying A	40	2.5	24	16		考试 Exam	4	
DR042127	电工电子技术 B	48	3	34	14		考试	3	

	Electrical and Electronic Technology B						Exam		
DR011036	地球科学概论 Introduction to Earth science	64	4	32	32		考试 Exam	2	
DR192018	复变函数与积分变换 Complex Variable Functions & Integral Transformation	48	3	48			考试 Exam	3	
DR102119	地球物理数学物理方程 B Equations of Mathematical Physics in Geophysics B	48	3	48			考试 Exam	4	
DR012039	综合地质学 Synthetic Geology	64	4	32	32		考试 Exam	4	
DR063005	石油地质学 Petroleum Geology	32	2	32			考试 Exam	5	
DR103120	地球物理场论 B Theory of Geophysical Fields B	64	4	64			考试 Exam	5	
DR103121	数字信号处理 B Digital Signal Processing B	64	4	56	8		考试 Exam	5	
DR103014	弹性动力学 B Elastic Dynamics B	64	4	64			考试 Exam	5	
DR102122	岩石物理学 B Rock Physics B	32	2	32			考试 Exam	3	
DR103123	地球物理计算方法 B Calculation Methods in Geophysics B	48	3	48			考试 Exam	5	
总计 Total		1016	64.5	914	102				

4、专业核心课程（Specialized Core Courses）：368 学时(368hours)，23 学分(23Credits)

课程代码 Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验 学时 Exp.	线上 学时 Online	考核 方式 Assessment	开课 学期 Semester	备注 Notes
SR103124	电法勘探 Electrical Prospecting	72	4.5	58	14		考试 Exam	6	
SR103125	地震勘探 B Seismic Prospecting B	72	4.5	66	6		考试 Exam	6	
SR103041	重力勘探 Gravity Prospecting	48	3	40	8		考试 Exam	6	
SR103042	磁法勘探 Magnetic Prospecting	48	3	38	10		考试 Exam	6	
SR103043	地球物理测井 B Geophysical Well Logging B	48	3	44	4		考试 Exam	6	
SR103044	核地球物理 Nuclear Geophysics	48	3	34	14		考试 Exam	6	
SR104126	科技写作与沟通 B Scientific Writing and Communication B	32	2	32			考查 Term Paper	7	
总计 Total		368	23						

5、专业拓展课程（Specialized Development Courses）：224 学时(224hours)，14 学分(14Credits)

课程代码 Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验 学时 Exp.	线上 学时 Online	考核 方式 Assessment	开课 学期 Semester	备注 Notes
SS100090	地球物理与高性能计算 Geophysics and High Performance Computing	16	1	16			考查 Term Paper	7	
SS104115	海洋地球物理 Marine Geophysics	32	2	32			考查 Term Paper	7	

SS100061	现代电磁探测技术新进展 New Development of Modern Electromagnetic Detection Technology	16	1	16			考查 Term Paper	7	
SS100059	地震各向异性理论与多分量地震技术 Seismic anisotropy theory and multi-component seismic technology	16	1	16			考查 Term Paper	7	
SS100058	水文环境工程地球物理技术 Geophysical technology for hydrological environment and engineering	16	1	16			考查 Term Paper	7	
SS104121	环境与辐射 Environment and radiation	16	1	16			考查 Term Paper	7	
SS100057	地球深部电性结构研究进展 Advances of electrical structure in the Earth	16	1	16	0	0	考查 Term Paper	7	
SS104118	地球导电性及应用 Conductivity of the Earth and its application	16	1	16	0	0	考查 Term Paper	7	
SS104119	韧性城市探测技术 Exploration for resilient city	16	1	16	0	0	考查 Term Paper	7	
SS104127	无人机探测技术 UAV detection technology	16	1	16	0	0	考查 Term Paper	7	
SS104128	地物物理人工智能前沿 Frontier of Geophysical Artificial Intelligence	16	1	16	0	0	考查 Term Paper	7	
SS104120	地震与地震灾害 Earthquake and its disaster	32	2	32	0	0	考查 Term Paper		全校任选
总计 Total		224	14	224					

6、课程实践（Course Practice）37 周+80（学时）(weeks or hours)，34 学分(Credits)

课程代码 Code	课程名称 Courses Name	周数（学时） Week（hour）	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理一 Physics Experiments（1）	24 学时	1	考试 Exam	2	
PR191046	实验物理二 Physics Experiments（2）	24 学时	1	考试 Exam	3	
PR122059	测量实习 Surveying Practice	1 周	1	考查 Term Paper	4	
PR011044	北戴河地质实习 Geological Survey Field Trip in Beidaihe	2 周	2	考查 Term Paper	1 夏	
PR012046	周口店地质教学实习 Geological Survey Field Trip in Zhoukoudian	5 周	5	考查 Term Paper	2 夏	
PR102129	MATLAB 程序设计 B MATLAB Programming B	32 学时	2	考试 Exam	4	
PR103062	专业实习 Professional Practice	6 周	6	考查 Term Paper	3 夏	
PR103064	地震数据采集设计 Data Acquisition and Design of Seismic Prospecting	1 周	1	考查 Term Paper	6	
PR103065	电法数据采集设计 Data Acquisition and Design of Electrical Prospecting	1 周	1	考查 Term Paper	6	
PR103066	重磁数据采集设计 Data Acquisition and Design of Gravity &Magnetic	1 周	1	考查 Term Paper	6	

PR104052	重磁数据处理与解释 B Gravity and Magnetic Data Processing and Interpretation B	2 周	2	考试 Exam	7	四选二
PR104068	电法数据处理与解释 Electrical Data Processing and Interpretation	2 周	2	考试 Exam	7	
PR104130	地震数据处理与解释 B Seismic Data Processing and Interpretation B	4 周	4	考试 Exam	7	
PR104070	测井数据处理与解释 Well Logging Data Processing and Interpretation	2 周	2	考试 Exam	7	
PR104073	毕业设计(论文) Undergraduate Project (Thesis)	12 周	6	考查 Term Paper	8	
总计 Total		37 周+80 学时	34/36			

7、课外实践（Extracurricular practice）：6 学分（6 Credits）

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

八、毕业要求与培养目标矩阵（工程教育认证类专业）

毕业要求	培养目标				
	目标 1	目标 2	目标 3	目标 4	目标 5
毕业要求1	√	√		√	
毕业要求2	√			√	
毕业要求3	√		√		√
毕业要求4	√		√	√	
毕业要求5	√	√		√	
毕业要求6	√			√	√
毕业要求7	√			√	
毕业要求8	√				√
毕业要求9	√			√	√
毕业要求10	√		√	√	√
毕业要求11	√	√			√
毕业要求12	√	√	√	√	√

九、课程与毕业要求关系矩阵（工程教育认证专业类专业参考）

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计/开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(1 终身
道德与法制								H				H
近现代史纲要						M						
思主义基本原理		H					L					M
平新时代中国特色社会思想		H					L					M
东思想和中国特色社会理论体系概论		H				M						
与政策		M					M					
生心理素质教育（1）										H	L	
生心理素质教育（2）										H	L	
理论							L		H	M		
英语（1）				H								M
英语（2）				H								
生英语素质拓展课								L		H		
（1）									H	M		
（2）									H	M		
（3）									H	M		
（4）									H	M		
计算机			M		H						L	
设计基础 A		H		L								
生职业生涯规划与就业（1）		L				M			H			
生职业生涯规划与就业（2）		L				M			H			
社科类（含在线课程）		H					L	H				M
科学类（含在线课程）		H					L					M
文化类							H	M			H	M
与健康类							M	L				H
创业教育类							H	L				M
与艺术类							H	L		L		M
数学 A（1）		H		M								
数学 A（2）		H		M								
代数		H										
论与数理统计			M									
物理 A（1）	M				L							
物理 A（2）	M				L							

学 A	H											
电子技术 B	M				H							
科学概论	H											
函数与积分变换		H		M								
物理数学物理方程 B		H		M								
地质学	H											
地质学	H											
物理场论 B	H											
信号处理 B		L		M	H							
动力学 B		L		M	H							
物理学 B		L		M	H							
AB 程序设计 B	H			M	L							
物理计算方法 B		L		M	H							
勘探	M	L	H									
勘探 B	M	L	H									
勘探	M	L	H									
勘探	M	L	H									
物理测井 B	M	L	H									
球物理	M	L	H									
写作与沟通 B										H		M
理论及训练								M	M			
政治社会实践			L			M		H				
物理一	L			M	H							
物理二	L			M	H							
实习	H					M						
河地质实习	H					M						
店地质教学实习	H					M						
实习	H					M				M	M	
数据采集设计		H	M	L	M							
数据采集设计		H	M	L	M							
数据采集设计		H	M	L	M							
数据处理与解释 B		H	L	H								
数据处理与解释		H	L	H								
数据处理与解释 B		H	L	H								
数据处理与解释		H	L	H								
设计		M	H							M		
实践								L	M	M		
训练		M		H								
创业活动								L	M	M		

注：H 表示课程对毕业要求指标支撑度高；M 表示课程对毕业要求指标支撑度中等；L 表示课程对毕业要求指标支撑度低。

智能地球探测专业培养方案

一、专业培养目标

智能地球探测专业坚持以学生全面发展为宗旨，面向未来国家经济建设和科学研究需要，推进“人工智能+”教育，培养学生科学的人生观和价值观，提升学生科学与人文素养，培养具有独立思考、终身学习、创新意识和独立担负科学技术或工程管理工作能力，具备数理科学、地球探测技术和人工智能交叉专业领域知识，增强地学智能探测能力的复合型人才。具备从事地球探测基础理论研究、人工智能应用技术研究、矿产及油气资源智能勘查、地质环境工程及地质灾害智能探测与监测等能力，培养适应国家战略需求的资源、环境、灾害、国土规划、海洋开发、人工智能研发、应急管理以及国民经济其它相关领域方面的研究型人才。 学生毕业后可继续在地球探测、人工智能和地学大数据等相关学科领域继续深造，或在相关的科研教学单位、国家机关管理部门及企业、公司等领域，从事基础科学研究、教学、管理与规划和前沿技术开发等工作。

通过 4 年的专业学习，本专业学生应熟练掌握勘查技术与工程、地球物理学、人工智能和大数据分析等交叉学科知识，在学习地球探测和人工智能基本理论技术的基础上，接受智能化地球物理勘查的数据采集、数理和解释的基本训练，能够创新实践应用于能源及矿产勘查，地质环境、工程与灾害的探测和监测，自然资源与应急管理等领域。毕业生应具备以下素质、知识和能力：

（1）具有较高的人文科学修养，具备扎实的数理知识、地球科学基础、智能计算基础和工程应用技术的综合素质；

（2）掌握地球物理勘查与人工智能领域的宽厚理论基础知识和专业知识；

（3）具有良好的智能勘查工程的实践能力，能有效解决智能勘查工程中工程技术问题；

（4）具备广博的社会知识、智能勘查工程领域的发展前沿及国家有关产业政策、法律法规等；

（5）具有良好的职业道德。理解并遵守职业道德、伦理责任以及工程实践的规范；

（6）具备独立工作与团队协作能力，具有国际视野、跨文化交流、竞争与沟通合作能力

（7）具有创新意识和思想，掌握智能勘查工程中所运用的创新方法，并具有终身自我教育的意识、不断学习和适应发展的能力。

二、毕业要求

（1）工程知识：能够将人工智能、数学、物理学、地质学、测量学和专业知识用于解决地球物理勘查领域的复杂工程问题。理解和掌握地球物理勘查实践所需要的数学知识，并具备将其应用到地球物理勘查领域复杂工程问题的能力。理解和掌握人工智能理论和技术，并具备利用其解决勘地球物理领域复杂工程问题的能力。理解和掌握地球物理勘查实践所需要的物理知识，并具备将其应用到地球物理勘查领域复杂工程问题的能力。理解和掌握地球物理勘查实践所需要的地质学知识，并具备将其应用到勘查地球物理领域复杂工程问题的能力。理解和掌握勘查地球物理实践所需要的测量学、信号处理和计算机知识，并具备将其应用到勘查地球物理领域复杂工程问题的能力。 能够运用数学、自然科学和相关专业知识抽象、归纳勘查地球物理领域的复杂工程问题的本质，并理解其局限性。

（2）问题分析：能够应用人工智能、数学、物理和地球物理勘查的基本原理，识别、表达、并结合文献研究分析地球物理勘查领域的复杂工程问题，以获得有效结论。能够应用人工智能和大数据分析手段来分析地球物理工程问题。能够应用数学及自然科学知识来识别复杂地球物理工程问题。能够识别和判断地球物理勘查方法、仪器、数据采集、处理和解释领域中复杂工程问题的关键环节和参数。能够正确表达一个勘查地球物理领域的工程问题及其解决方案。能运用地球物理勘查方法的基本原理并进行文献调研，分析地球物理勘查过程的影响因素，并寻求合理的解决方案，证实解决方案的合理性与实用性，获得有效结论。

（3）设计/开发解决方案：能够设计针对地球物理勘查领域复杂工程问题的解决方案，具有

地球物理勘查野外数据采集、资料处理和地质解释等方案设计能力，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。针对油气勘探领域的复杂工程问题，设计地球物理勘查方法的采集、处理和解释的目标以及工程技术方案，能够在设计环节体现创新意识。针对固体矿产勘探领域的复杂工程问题，设计地球物理勘查方法的采集、处理和解释的目标以及工程技术方案，能够在设计环节体现创新意识。能够在设计环节考虑社会、健康、安全、法律、文化以及环境等因素。

（4）科学研究：能够基于科学原理并采用科学方法对地球物理领域勘查复杂工程问题进行研究，包括地球物理勘查数据智能采集方案设计、智能数据资料分析与处理和地质地球物理综合解释，并通过人工智能和物理双驱动反演得出合理有效的结论。具备初步的科学研究能力。针对地球物理勘查专业领域的复杂工程问题，能够基于方法原理、数据采集、资料处理和综合解释的专业理论，结合工区特征，设计可行的技术方案；能够根据技术方案采用科学的技术手段、实验方法，安全的开展模拟实验和工程实践。能够正确采集、处理模拟实际数据，对处理结果进行分析和解释，并通过信息综合得到合理有效的结论。

（5）使用现代工具：能够针对地球物理勘查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，实现对地球物理领域勘查复杂工程问题的分析模拟和反演计算，并能够理解其多解性和局限性。能够理解掌握地球物理勘查的数据采集、处理和解释工具及软件，并理解其局限性。掌握计算机编程语言，并能设计开发用于解决复杂工程问题的工具。掌握数字信号特点及通用分析方法，并用于地球物理勘查领域的工程问题进行分析模拟。针对地球物理勘查等领域中的复杂工程问题，能够开发或选用恰当的仿真工具，研究复杂问题的正问题和反问题。

（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合理分析，评价地球物理勘查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。具有工程实习和社会实践的经历。能够合理评价勘查地球物理工程实践对社会、健康、安全、法律以及文化的潜在影响。

（7）环境和可持续发展：了解本专业的技术现状和发展动态，认识本专业与环境保护的关系，理解和评价针对地球物理勘查领域复杂工程问题的工程实践对环境、社会可持续发展的影响。理解环境保护和社会可持续发展的内涵和意义，了解勘查技术与工程专业的技术现状和发展动态，在解决工程问题的具体实践过程中，能充分考虑工程实践对环境的影响。能够正确理解和评价复杂工程问题的工程实践对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地球物理勘查工程领域职业道德和规范，履行责任。具备人文社会科学素养，树立正确的世界观、人生观和价值观，具有地球物理勘查工程师必备的身体素质和心理素质。理解工程伦理的核心理念，具备责任心和社会责任感，在地球物理勘查工程实践中能遵守职业道德和规范，具有法律意识。

（9）个人和团队：通过训练具有一定的组织管理能力，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。能够理解一个多学科背景下的团队中每个角色的作用和责任。能够在团队中承担成员的责任，完成自身的工作。作为团队成员，能与其他成员有效沟通，有团队意识，作为负责人，能够组织团队的工作，综合成员的意见，进行合理决策。

（10）沟通：能够就地球物理勘查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。能够撰写实验（实践）报告、设计报告、总结报告等。能够与业界同行及社会公众进行有效沟通和交流，包括陈述发言、清晰表达或回应指令。具备一定的国际视野，能够阅读并理解外文科技文献，较熟练地使用外语进行沟通和交流。

（11）项目管理：理解并掌握地球物理勘查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。理解地球物理勘查活动中涉及的工程管理与经济决策的一般知识。在多学科工程

项目实施过程中，能够综合应用工程管理原理与经济决策方法。

（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。能正确认识自我探索和学习新知识的必要性。具有不断学习和适应发展的能力，能够关注地球物理勘查领域前沿和进展，并能及时追踪地球物理勘查的最新理论、技术及国际前沿动态，与时俱进。

三、主干学科

地质资源与地质工程（一级学科）,地球探测与信息技术（二级学科）。

四、学制与学位

学制四年，实现弹性修业年限，修满规定的最低毕业学分，完成规定的实践必修课，通过毕业论文答辩，授予工学学士学位。鼓励学生根据自身发展需求，选择进行后续的研究生阶段学习。

五、核心课程

（1）总体思路

课程设置采取“通识教育课+学科基础课+专业核心课+实践创新课”的分段组合方式，坚持“特色加精品”办学理念，以人为本，培养“品德优良、基础厚实、知识广博、专业精深”的高素质创新人才，培养适应当代地球物理学科与技术发展特点和需要的专业人才。

（2）基本原则

体现智能地球探测专业的交叉性和应用性，体现“教育面向现代化、面向世界、面向未来”的时代精神和“人工智能+”培养方式，重点加强学生的扎实的数理基础，宽广的专业知识面，注重学生应用能力的培养和综合素质的提供。

（3）核心课程

开设的核心课程包括通识基础、学科基础、专业核心及实践类课程等方面。

1）通识基础课程：思想道德修养与法律基础、马克思主义基本原理、大学英语、体育、大学计算机、计算机语言程序设计、大学生职业生涯规划与就业指导等。

2）学科基础课程：智能地球探测专业导论、高等数学、线性代数、Python程序设计、概率论与数理统计、地球科学概论、综合地质学、复变函数与积分变换、地球物理计算方法、地球物理数学物理方程等。

3）专业核心课程：人工智能与机器学习、深度学习、智能探测数据采集、数据结构、重磁探测原理与智能化、电法探测原理与智能化、地震探测原理与智能化、测井原理与智能化、智能地球探测数据处理解释技术、大数据分析与高性能计算等。

4）实践类课程：智能探测专业实习、智能探测大数据分析实践、智能数据处理与解释实践、北戴河地质实习、周口店地质教学实习、地球物理野外工作方法、毕业设计(论文)等。

Undergraduate Program in Intelligent Prospecting Technology and Engineering

1. Academic Objectives

The major of Intelligent Prospecting Technology and Engineering adheres to the aim of comprehensive student development, aiming at the future needs of national economic construction and scientific research, promoting 'Artificial Intelligence plus' education, cultivating students with a scientific outlook on life and values, enhancing students' scientific and humanistic literacy, and fostering talents with independent thinking, lifelong learning, innovation awareness, and the ability to independently undertake scientific and technological or engineering management work. They possess interdisciplinary knowledge in mathematical sciences, earth exploration technology, and artificial intelligence, and enhance the comprehensive capabilities of intelligent earth exploration. They are capable of engaging in basic theoretical research on earth exploration, application technology research of artificial intelligence, intelligent exploration of mineral and oil and gas resources, geological environmental engineering, and intelligent detection and monitoring of geological disasters. They are trained to adapt to national strategic needs in fields such as resources, environment, disasters, land planning, marine development, artificial intelligence research and development, emergency management, and other related areas of the national economy. After graduation, students can continue their studies in related disciplines such as earth exploration, artificial intelligence, and geoscience big data, or work in research and teaching units, national government departments, enterprises, and companies engaged in basic scientific research, teaching, management and planning, and frontier technology development.

Through four years of professional study, students in this major should be proficient in exploration technology and engineering, geophysics, artificial intelligence, and big data analysis. They should receive basic training in data collection, mathematical analysis, and interpretation of intelligent geophysical exploration based on the basic theory and technology of earth exploration and artificial intelligence. They should be able to innovate and apply their knowledge in energy and mineral exploration, geological environment, engineering and disaster detection and monitoring, natural resources, and emergency management. Graduates should possess the following qualities, knowledge, and abilities:

(1) Have a high level of humanistic literacy and possess solid knowledge in mathematics, basic earth sciences, intelligent computing, and engineering application technology.

(2) Master the broad theoretical foundation and professional knowledge in the fields of geophysical exploration and artificial intelligence.

(3) Possess practical abilities in intelligent exploration engineering and effectively solve engineering technical problems in intelligent exploration projects.

(4) Have extensive knowledge of social sciences, the development frontier of intelligent exploration engineering, and relevant national industrial policies, laws, and regulations.

(5) Have good professional ethics. Understand and abide by professional ethics, ethical responsibilities, and norms of engineering practice.

(6) Have the ability to work independently and collaborate in teams, with an international perspective, cross-cultural communication, competitiveness, and communication and cooperation skills.

(7) Have innovation awareness and thoughts, master innovative methods used in intelligent exploration engineering, and have the consciousness of lifelong self-education, continuous learning, and adaptability to development.

2. Graduation Requirements

(1) Engineering-related knowledge: they can apply their knowledge in Artificial Intelligence, mathematics, physics, geology, survey and their major to solve complex engineering problems in geological survey. They understand and master the artificial intelligence knowledge and have the ability to solve complex engineering problems in geological survey. They understand and master the mathematical knowledge required for the practice of geological survey, and have the ability to apply it to

complex engineering problems in geological survey. They understand and master the physical knowledge required for the practice of geological survey, and have the ability to apply it to complex engineering problems in geological survey. They understand and master the geological knowledge required for the practice of geological survey, and have the ability to apply it to complex engineering problems in geological survey. They understand and master the surveying, signal processing and computer knowledge required for the practice of geological survey, and have the ability to apply it to complex engineering problems in geological survey. They are able to use mathematics, natural sciences, and related professional knowledge to abstract and summarize the nature of complex engineering problems in geophysics, and understand their limitations.

(2) Problem analysis: they are able to apply the basic principles in Artificial Intelligence, mathematics, physics and geophysical surveys to identify, express, and in combination with literature research, analyze complex engineering problems in geophysical surveys to obtain effective conclusions. They are able to apply knowledge in artificial intelligence and physical sciences to identify complex geophysical engineering problems. They are able to apply knowledge in mathematics and physical sciences to identify complex geophysical engineering problems. They are able to identify and judge the key links and parameters of complex engineering problems in geophysical survey methods, instruments, data acquisition, processing and interpretation. They can correctly express an engineering problem and its solution in geological survey. They are able to use the basic principles of geophysical survey methods and conduct literature research, analyze the influential factors in geophysical survey, seek reasonable solutions, demonstrate their rationality and practicability, and obtain effective conclusions.

(3) Design/develop solutions: they are able to design solutions to complex engineering problems in geophysical surveys, have the ability to design data collection and processing, and geological interpretation in this field, and be able to reflect the sense of innovation in the design process, and consider factors such as society, health, safety, law, culture and environment. Aiming at the complex engineering problems in oil and gas exploration, they can design the objectives of the collection, processing and interpretation in geophysical survey methods, as well as engineering technical solutions, and reflect the sense of innovation in the design process. Aiming at the complex engineering problems in solid mineral exploration, they can design the objectives of the collection, processing and interpretation in geophysical survey methods, as well as engineering technical solutions, and reflect the sense of innovation in the design process. They can consider factors such as society, health, safety, law, culture and environment in the design process.

(4) Scientific research: they can, based on scientific principles and using scientific methods, study complex engineering problems in geophysical survey, including intelligent design of schemes to collect data, intelligent analysis and processing of data and information, comprehensive geophysical interpretation, and draw reasonable and effective conclusions through artificial intelligent analysis and inversion of data. They have initial ability to carry out scientific researches. Aiming at complex engineering problems in geophysical exploration, they can design feasible technical solutions based on method principles, data collection and data, and professional theories on comprehensive interpretation, and combined with the characteristics of the work area. They are able to use scientific technical means and experimental methods according to the technical scheme, to safely carry out simulation experiments and engineering practices. They are able to correctly collect and process simulated actual data, analyze and interpret the processed results, and obtain reasonable and effective conclusions through information synthesis.

（5）Use modern tools: they are able to develop, select and use appropriate technologies, resources, modern instruments and computers for complex engineering problems in geophysical survey, to realize analysis, simulation and inversion calculation of complex engineering problems in geophysics, and to understand its ambiguities and limitations. They able to understand and master tools and software for data acquisition, processing and interpretation in geophysical surveys, and understand their limitations. They master computer programming languages, and are able to design and develop tools to solve complex engineering problems. They master the characteristics of digital signals and general analysis methods, and use them to analyze and simulate engineering problems in geophysical survey. Aiming at complex engineering problems in geophysical survey, they are able to develop or select appropriate simulation tools to study the positive and inverse problems of complex problems.

(6)Engineering and society: Based on the geophysical theory and relevant background knowledge, they can conduct reasonable analysis, evaluate the impact of solutions to complex engineering problems in geophysical survey on society, health, safety, law, and culture, and understand the responsibilities that they should bear. The have experience in engineering internship and social practices. They are able to reasonably evaluate the potential impacts of engineering practices in geophysical survey on society, health, safety, law, and culture.

(7) Environment and sustainable development: they understand the current technical status and development trends of this major, understand the relationship between this major and environmental protection, understand and evaluate the impact of engineering practices about complex engineering problems on geophysical survey on environment and sustainable development of society. They understand the connotation and significance of environmental protection and sustainable development of society, understand the technical status and development trends of Prospecting Technology and Engineering, and are able to fully consider the impact of engineering practices on the environment in the specific practice of solving engineering problems. They are able to correctly understand and evaluate the impact of engineering practice of complex engineering problems on the sustainable development of society.

(8) Professional norms: they have literacy in humane and social sciences, and a sense of social responsibility, be able to understand and abide by the professional ethics and norms in geophysical survey in their engineering practice, and perform their responsibilities. They have the literacy of humanities and social sciences, have established a correct world outlook, outlook on life and values, and possessed the physical and psychological qualities necessary as geophysical survey engineer. They understand the core concept of engineering ethics, have a sense of responsibility and social responsibility, abide by professional ethics and norms in the practice of geophysical survey engineering, and have legal awareness.

(9) Individual and team: through training, they have certain organizational and management ability, strong team consciousness and cooperation spirit, and can assume the role of individual, team member and leader in a multi-disciplinary team. They are able to understand the roles and responsibilities of everyone in a multidisciplinary team. They are able to take responsibility as a member of a team and complete their own work. As a team member, they can effectively communicate with other members and have a sense of teamwork. As a leader, they can organize the work of the team, synthesize the comments of members and make reasonable decisions.

(10) Communication: they are able to effectively communicate and exchange with peers and the public on complex engineering problems in geophysical survey, including writing reports and design documents, presenting and making a statement, and clearly expressing or responding to instructions, and have an international horizon and are able to communicate and exchange in a cross-cultural context. They are able to write experiment (practice), design and summary reports etc. They are able to effectively communicate and exchange with peers and the public, including presenting and making a statement, and clearly expressing or responding to instructions. They have a certain international horizon, are able to read and understand foreign scientific and technological literature, and are proficient in communicating and exchanging in foreign languages.

(11) Project management: they understand and master the common sense and decision-making methods in project management in geophysical survey, and are able to apply it in a multidisciplinary environment. They understand the general knowledge of project management and economic decision-making involved in geophysical survey activities. In the implementation of multi-disciplinary engineering projects, the can comprehensively apply the principles of engineering management and economic decision-making methods.

(12) learning: The have the consciousness of independent and lifelong learning, are able to continually learn new methods and technologies in geophysics, and have the ability to continue learning and adapting to development. They are able to correctly understand the necessity of self-exploration and learning new knowledge. They have the ability to continue learning and adapting to development, and are able to pay attention to the frontiers and progress in geophysical survey, and track the latest theories, technologies and international frontier trends in geophysical exploration in time, keeping pace with the times.

3. Main disciplines

Geological resources and geological engineering (first-level discipline),Earth detection and Information Technology (second-level discipline).

4. Length of Schooling and Degree

The program is four years in duration, with flexibility in the length of study. Upon completion of the required minimum credits, fulfillment of designated practical courses, and passing the graduation thesis defense, students will be conferred the Bachelor of Engineering degree. Students are encouraged to pursue further studies at the graduate level according to their own development needs.

5. Core Courses

(1) Overall Approach

The curriculum adopts a segmented combination of "general education courses + disciplinary foundation courses + core professional courses + practical innovation courses," adhering to the educational philosophy of "distinctive features plus quality." It focuses on human-centered education to cultivate high-quality innovative talents with excellent character, solid foundation, broad knowledge, and profound expertise, who are adaptable to the characteristics and needs of contemporary geophysics discipline and technology development.

(2) Basic Principles

Reflecting the interdisciplinary and applicability of the Intelligent Earth Exploration program, embodying the spirit of the times of "education oriented towards modernization, the world, and the future," and the "AI+" training mode, the curriculum emphasizes strengthening students' solid mathematical and scientific foundations, broadening their professional knowledge, and cultivating their application capabilities and comprehensive qualities.

(3) Core courses

The core courses offered include general foundation, disciplinary foundation, professional core, and practical courses, covering various aspects:

General Foundation Courses: Ethics and Fundamentals of Law, Principles of Marxism, College English, Physical Education, College computer, Computer Language Programming, Career Planning and Employment Guidance for University Students, etc.

Disciplinary Foundation Courses: Introduction to Prospecting Technology and Engineering, Advanced Mathematics, Linear Algebra, Python Programming, Probability and Mathematics Statistic, Geosciences, Synthetic Geology, Complex Variable Functions and Integral Transformations, Calculation Methods in Geophysics, etc.

Professional Core Courses: Artificial Intelligence and Machine Learning, Deep Learning, Intelligent Detection Data Acquisition, Data Structures, Principles and Intelligentization of Gravimetric Detection, Principles and Intelligentization of Electrical Detection, Principles and Intelligentization of Seismic Detection, Principles and Intelligentization of Well Logging, Intelligent Earth Exploration Data Processing and Interpretation Technology, Big Data Analysis and High-Performance Computing, etc.

Practical Courses: Internship in intelligent prospecting, Practical Big Data Analysis in intelligent prospecting, Practical Data Processing and Interpretation in Intelligent prospecting, Geological Internship in Beidaihe, Geological Internship in Zhoukoudian, Fieldwork Methods in Geophysics, Graduation Project (Thesis), etc.

六、最低毕业总学分要求及学分分配（Minimum Required Credits and Distribution）

课程模块 Course Module	课程类别 Course Classification	学时数 Hours	学分 Credits	学期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	656	41	11	13		4	4		2	1			2
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	832	56	7	11		13	9		12				
	专业核心课程 Specialized Fundamental Courses	464	29					7		3	19			
	专业拓展课程 Specialized Development	528	8					2		6	5		20	
实践教育 Practical Education	课程实践 Course Practice	40 周+48 学时	37		1	4	1		5		5	6	8	6
	课外实践 Extracurricular practice		6											
必修课总学分 Required course credits				169										
选修课总学分 Elective course credits				20										
最低毕业总学分 Total Credits				189										

七、课程设置（Curriculum）

1、通识教育必修课程（Required Courses of General Education）：682 学时(682 hours)，41 学分(41 Credits)

课程代码 Course Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	48			考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	48			考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	48			考试 Exam	3	
GR182024	毛泽东思想和中国特色社会主义理论体系概论Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	32	2	32			考试 Exam	4	
GR182022	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	48	3	48			考试 Exam	5	
GR181013	形 势 与 政 策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形 势 与 政 策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形 势 与 政 策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形 势 与 政 策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形 势 与 政 策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	

GR181018	形 势 与 政 策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形 势 与 政 策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形 势 与 政 策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	16	1	16			考试 Exam	2	
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	16	1	16			考试 Exam	6	
GR301024	劳动教育与双创实践(1)Labor Education and Innovation and Entrepreneurship Practice(1)	16	1	16			考查 Term Paper	2	
GR303025	劳动教育与双创实践(2)Labor Education and Innovation and Entrepreneurship Practice(2)	16	1	16			考查 Term Paper	6	
GR301005	大学生心理素质教育（1） Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303006	大学生心理素质教育（2） Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36	0		考试 Exam	1	
GR081071	大学英语（1） College English (1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English (2)	64	4	64			考试 Exam	2	
GR081067	大学英语素质拓展课	32	2	32			考试	2	

	Competence-oriented Education for College English						Exam		
GR141005	体育（1）（系列课程） Physical Education (1)(series of courses)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education (2) (series of courses)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education (3) (series of courses)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education (4) (series of courses)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础A Fundamental of Programming A	64	4	32	32		考试 Exam	2	
总计 Total		682	41	506	176				

2、通识教育选修课程（Selective Courses of General Education）：192 学时（192 hours），12 学分（12 Credits）

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and health courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类 Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。

6	审美与艺术类 Aesthetics and Art Courses	见附件 6	2	考查 Term Paper	2-4	
总计 Total			12			

3、学科基础课程（Disciplinary Fundamental Courses）：832 学时(832 hours)，56 学分(56 Credits)

课程 代码 Course Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验 学时 Exp.	线上 学时 Online	考核方式 Assessment	开课 学期 Semester	备注 Notes
DR101136	智能地球探测专业导论 Introduction to Intelligent Prospecting Technology and Engineering	16	1	16			考查 Term Paper	1	
DR191001	高等数学 A（1） Advanced Mathematics A（1）	96	6	96			考试 Exam	1	
DR191002	高等数学 A（2） Advanced Mathematics A（2）	96	6	96			考试 Exam	2	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	
DR191101	大学物理 A（1） College Physics A（1）	64	4	64			考试 Exam	2	
DR192102	大学物理 A（2） College Physics A（2）	64	4	64			考试 Exam	3	
SS072225	Python 程序设计 Python Programming	32	2	16	16		考试 Exam	3	
DR011036	地球科学概论 Introduction to Earth science	64	4	32	32		考试 Exam	2	
DR192018	复变函数与积分变换	48	3	48			考试	3	

	Complex Variable Functions & Integral Transformation						Exam		
DR103172	地球物理计算方法 D Calculation Methods in Geophysics	48	3	48			考试 Exam	5	
DR102101	地球物理数学物理方程 A Equations of Mathematical Physics in Geophysics A	48	3	48			考试 Exam	4	
DR012039	综合地质学 Synthetic Geology	64	4	32	32		考试 Exam	4	
DR103140	地球物理场论 D Theory of Geophysical Fields D	48	3	48			考试 Exam	5	
DR103141	数字信号处理 D Digital Signal Processing D	48	3	32	16		考试 Exam	5	
DR103142	弹性动力学 D Elastic Dynamics D	48	3	48			考试 Exam	5	
DR102171	岩石物理学 D Rock Physics D	32	2	32			考试 Exam	3	
总计 Total		864	56	196	72				

4、专业核心课程（Specialized Core Courses）：464 学时(464 hours)，29 学分(29 Credits)

课程代码 Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR042300	人工智能与机器学习 Artificial Intelligence and Machine Learning	64	4	48	16		考试 Exam	4	
SR043301	深度学习 Deep Learning	48	3	32	16		考试 Exam	6	
SR103145	智能探测数据采集	32	2	24	8		考试	6	

	Intelligent geophysical data acquisition						Exam		
DR042006	数据结构 Data Structures	48	3	32	16		考试 Exam	4	
SR103146	重磁探测原理与智能化 Principles and Intelligent Applications of Gravity and Magnetic exploration	48	3	40	8		考试 Exam	6	
SR103147	电法探测原理与智能化 Principles and Intelligent Applications of Electrical Exploration	48	3	40	8		考试 Exam	6	
SR103148	地震探测原理与智能化 Principles and Intelligent Applications of Seismic Exploration	48	3	40	8		考试 Exam	6	
SR103149	测井原理与智能化 Principles and Intelligent Applications of Well Logging	32	2	28	4		考试 Exam	6	
SR103150	智能地球探测数据处理解释技术 Intelligent Geophysical Data Processing and Interpretation	48	3	24	24		考试 Exam	6	
SR043302	大数据分析与高性能计算 Big Data Analysis and High Performance Computing	48	3	32	16		考试 Exam	5	
总计 Total		464	29	340	124				

5、专业拓展课程（Specialized Development Courses）：528 学时(528 hours)，8 学分(8 Credits)

课程代码 Code	课程名称 Courses Name	总学时 Hours	学分 Credits	讲课学时 Lec.	实验学时 Exp.	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS100058	水文环境工程地球物理技术 Hydrogeophysics and Engneering Geopysics	16	1	16			考查 Term Paper	7	
SR043266	数据挖掘	48	3	32	16		考试	6	

	Data Mining						Exam		
SR043230	机器人导论 Robotics	48	3	32	16		考查 Term Paper	5	
SR043231	模式识别 Pattern recognition	48	3	32	16		考查 Term Paper	5	
SS044303	物联网原理 Principles of Internet of Things	32	2	16	16		考查 Term Paper	7	
SS042304	3S 技术及应用 3S Technology and Applications	32	2	16	16		考查 Term Paper	4	
SS104119	韧性城市探测技术 The Detection Technology of Resilient City	16	1	16			考查 Term Paper	7	
SS104151	背景噪音探测技术 Ambient noise exploration method	32	2	24	8		考查 Term Paper	7	全校任选
SS104120	地震与地震灾害 Earthquake and Disaster	32	2	32			考查 Term Paper	7	全校任选
SR043281	软件工程导论 Software Engineering	48	3	32	16		考查 Term Paper	7	
SR043233	知识工程与知识图谱 Knowledge Engineering and Knowledge Graph	48	3	32	16		考查 Term Paper	7	
SS100061	现代电磁探测技术新进展 New Development of Modern Electromagnetic Method	16	1	16			考查 Term Paper	7	
SS104121	环境与辐射	16	1	16			考查 Term Paper	7	

	Environment and Radiation								
SS104152	灾害地质学 Disaster Geology	16	1	16			考查 Term Paper	7	
SS104153	智能探测前沿 Frontiers of Intelligent exploration	16	1	16			考查 Term Paper	7	
SS103154	天-空探测原理与智能化 Principles and Intelligence in Air-space Exploration	32	2	24	8		考试 Exam	6	
SS104155	地震偏移与反演 Seismic migration and inversion	32	2	24	8		考查 Term Paper	7	
总计 Total		528	33	392	136				

6、课程实践（Course Practice）40 周+48（学时）(40 weeks and 48 hours)，37 学分(37 Credits)

课程代码 Code	课程名称 Courses Name	周数（学时） Week（hour）	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Training	2	1	考查 Term Paper	1	
PR181010	思想政治社会实践 Political Social Practice	2	2	考试 Exam	1 夏	
PR191045	实验物理（1） Experimental Physics(1)	24	1	考试 Exam	2	
PR191046	实验物理（2） Experimental Physics(2)	24	1	考试 Exam	3	
PR011044	北戴河地质实习 Geological Survey Field Trip in Beidaihe	2	2	考查 Term Paper	1 夏	
PR012046	周口店地质教学实习 Geological Survey Field Trip in Zhoukoudian	5	5	考查 Term Paper	2 夏	
PR102156	算法设计实习	2	2	考查	2 夏	

	Algorithm Design			Term Paper		
PR103157	智能探测专业实习 Intelligent explortion Professional Internship	6	6	考查 Term Paper	3 夏	
PR104158	智能探测大数据分析实践	1	1	考查 Term Paper	7	
PR104159	智能数据处理与解释实践 Practice on Intelligent Data Processing and Interpretation	3	3	考查 Term Paper	7	
PR103064	地震数据采集设计 Data Acquisition and Design of Seismic Prospecting	1	1	考查 Term Paper	6	
PR103065	电法数据采集设计 Data Acquisition and Design of Electrical Prospecting	1	1	考查 Term Paper	6	
PR103066	重磁数据采集设计 Data Acquisition and Design of Gravity &Magnetic	1	1	考查 Term Paper	6	
PR104052	重磁数据处理与解释 Gravity and Magnetic Data Processing and Interpretation	2	2	考试 Exam	7	至少选 4 学分
PR104068	电法数据处理与解释 Electrical Data Processing and Interpretation	2	2	考试 Exam	7	
PR104130	地震数据处理与解释 B Seismic Data Processing and Interpretation B	4	4	考试 Exam	7	
PR104070	测井数据处理与解释 Well Logging Data Processing and Interpretation	2	2	考试 Exam	7	
PR104160	毕业设计（论文） Undergraduate Project (Thesis)	12	6	考查 Term Paper	8	

总计 Total		40 周+48 学时	37			

7、课外实践（Extracurricular practice）：6 学分（6 Credits）

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

八、毕业要求与培养目标矩阵（工程教育认证类专业）

毕业要求	培养目标				
	目标1	目标2	目标3	目标4	目标5
毕业要求1	√	√		√	
毕业要求2	√			√	
毕业要求3	√		√		√
毕业要求4	√		√	√	
毕业要求5	√	√		√	
毕业要求6	√			√	√
毕业要求7	√			√	
毕业要求8	√				√
毕业要求9	√			√	√
毕业要求10	√		√	√	√
毕业要求11	√	√			√
毕业要求12	√	√	√	√	√

九、课程与毕业要求关系矩阵（工程教育认证专业类专业参考）

毕业要求 / 课程名称	(1) 工程知识	(2) 问题分析	(3) 设计/开发解决方案	(4) 研究	(5) 使用现代工具	(6) 工程与社会	(7) 环境和可持续发展	(8) 职业规范	(9) 个人和团队	(10) 沟通	(11) 项目管理	(12) 终身学习
思想道德修养与法律基础								H				H
中国近现代史纲要						M						
马克思主马克思主义基本原理概论		H					L					M
习近平新时代中国特色社会主义思想		H					L					M
毛泽东思想和中国特色社会主义理论体系概论		H				M						
形势与政策		M					M					
大学生心理素质教育										H	L	
大学英语（1）				H								M
大学英语（2）				H								H
体育（1）									H	M		
体育（2）									H	M		
体育（3）									H	M		
体育（4）									H	M		
计算机语言程序设计		H		L								
大学生职业生涯规划与就业指导（1）		L				M			H			
大学生职业生涯规划与就业指导（2）		L				M			H			
智能地球探测专业导论	H											

高数 A（1）		H		M								
高数 A（2）		H		M								
线性代数		H										
概率论与数理统计			M									
大学物理 A（1）	M				L							
大学物理 A（2）	M				L							
Python 程序设计		H		L								
地球科学概论	H											
综合地质学	H											
复变函数与积分变换		H		M								
地球物理计算方法		L		M	H							
地球物理数学物理方程 A		H		M								
数字信号处理 A		L		M	H							
地球物理场论	H											
弹性动力学		L		M	H							
人工智能与机器学习		H	M		M							
深度学习		H	M		M							
智能探测数据采集		H	M	L								
数据结构		H		L								
重磁探测原理与智能化	M		H		M							
电法探测原理与智能化	M		H		M							
地震探测原理与智能化	M		H		M							
测井原理与智能化	M		H		M							
智能地球探测数据处理解释技术		H	M		M							
大数据分析与高性能计算	M		L		H							

军事理论及训练								M	M			
思想政治社会实践			L			M		H				
实验物理一	L			M	H							
实验物理二	L			M	H							
北戴河地质实习	H					M						
地质教学实习	H					M						
算法设计实习		L	M		H							
智能探测专业实习		L	M		H							
智能探测大数据分析实践		H	M		H							
智能数据处理与解释实践		H	M		H							
毕业设计		M	H							M		
社会实践								L	M	M		
科研训练		M		H								
创新创业活动								L	M	M		

注：H 表示课程对毕业要求指标支撑度高；M 表示课程对毕业要求指标支撑度中等；L 表示课程对毕业要求指标支撑度低。