

地理信息科学专业培养方案

专业名称与代码：地理信息科学（070504）

专业培养目标：本专业培养具备地理信息科学专业基本知识、基础理论、工作方法、基本技能，具有扎实的地理学、地球空间信息科学、测绘科学和计算机科学等复合知识结构，能够在国土、资源、环境、城建、交通、公安、国防、人口、互联网、社会经济等领域从事与地理信息科学有关的科学研究、项目设计、技术开发、工程管理和信息服务等工作的地理信息科学创新型人才。

专业毕业要求：本专业学生在牢固掌握数理基础和外语基础上，系统学习地理学、地图学、空间信息科学、遥感技术、测绘科学和计算机科学的基础理论和知识，系统学习空间数据采集、处理、存储、管理、分析、可视化与应用的理论与方法，学会地理信息系统软件和专业应用软件设计方法，接受系统开发技能和应用实践的实际训练，具备较强的系统开发、维护和管理能力以及利用地理信息科学专业技能从事各种科学研究、工程开发和项目应用的能力。毕业生应获得以下几方面的知识和能力：

1. 掌握数学、物理学、地理学与计算机科学的基础理论和基础知识，具有从事地理信息建模、分析、服务及应用的能力；

2. 掌握地理信息科学的基本理论、基本知识和基本技能，以及地理信息系统技术的基本原理和开发方法，了解地理信息科学发展前沿关键技术。具有从事地理信息系统及应用软件的分析、设计、研发及维护的能力；

3. 掌握空间数据处理、集成、建模、分析、统计及可视化的原理与方法。具有熟练运用 GIS、RS、GPS 对国土、资源、环境等领域问题进行建模、监测、评价和决策的能力；

4. 掌握地理信息科学专业的原理、技术、方法，并通过一定的科学研究训练，具有开展地理信息科学相关的研究能力，以及撰写科学论文与研究报告的能力；

5. 掌握空间信息获取、提取和应用分析技术，能够利用这些技术和相关工具（全站仪、RTK/GPS、MapGIS、ArcGIS 等）解决地理信息相关的科学与工程问题，并能够理解技术工具的局限性；

6. 能够基于地理信息学科专业相关背景知识进行合理分析，评价问题解决方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响，并理解应承担的责任；

7. 具有较高的思想觉悟、崇高的道德修养、全面的文化素质。社会责任感强，能够自觉遵守职业道德；

8. 具有在多学科背景下的团队中承担个体、团队成员以及负责人角色的能力；

9. 理解并掌握相关管理与决策方法，能够就地理信息科学专业问题与业界同行及社会公众进行有效沟通和交流，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流；

10. 具有自主学习和终身学习的意识，有不断学习和适应地理信息科学发展的能力。

毕业要求实现及途径：

序号	毕业要求	实现途径（教学过程）
1	掌握数学、物理学、地理学与计算机科学的基础理论和基础知识，具有从事地理信息建模、分析、服务及应用的能力。	<p>①课程学习：高等数学 A、线性代数 A、概率论与数理统计 A、大学物理 C、自然地理学、人文地理学、地理信息系统原理、数据库与空间数据库、计算机高级语言程序设计（C++）、面向对象程序设计 B、数据结构、计算机图形学等课程。</p> <p>②课外学习：参与 GIS 应用技能大赛、开发大赛、挑战杯、机器人足球、软件设计大赛、数学竞赛、数学建模等活动，鼓励学生参加计算机等级考试和软件工程师考试。</p>
2	掌握地理信息科学的基本理论、基本知识和基本技能，以及地理信息系统技术的基本原理和开发方法，了解地理信息科学发展前沿关键技术。具有从事地理信息系统及应用软件的分析、设计、研发及维护的能力；	<p>①课堂教学：自然资源信息导论、人文地理学、自然地理、普通地质学、地图学、数字测量学、数据库与空间数据库、遥感原理与应用、遥感图像处理、地理信息系统原理、地理信息系统设计与开发、空间统计与分析、地理信息系统应用实习、3S 综合实习、地理信息系统开发实习等课程。</p> <p>②课外学习：3S 论坛、校内外专家学术讲座，产学研、测绘技能大赛、科技活动、大学生创新创业训练计划等。</p>
3	掌握空间数据处理、集成、建模、分析、统计及可视化的原理与方法。具有熟练运用 GIS、RS、GPS 对国土、资源、环境等领域问题进行建模、监测、评价和决策的能力；	<p>①课堂教学：自然资源信息导论、地图学、数字测量学、数据库与空间数据库、遥感原理与应用、遥感图像处理、地理信息系统原理、地理信息系统设计与开发、高级空间分析与建模、数字测量学实习、地图学实习、地理信息系统应用实习、3S 综合实习、地理信息系统开发实习、地理信息系统生产工程实践、GIS 算法设计与实现等课程。</p> <p>②课外学习：3S 论坛、邀请校内外专家来校做学术讲座，产学研、测绘技能大赛、科技活动、大学生创新创业训练计划等。</p>
4	掌握地理信息科学专业的原理、技术、方法，并通过一定的科学研究	<p>①课程教学：开设科技写作、文献信息检索等、计算机高级语言程序设计（C++）、面向</p>

序号	毕业要求	实现途径（教学过程）
	训练，具有开展地理信息科学相关的研究能力，以及撰写科学论文与研究报告的能力；	对象程序设计、数据库与空间数据库、数据结构、毕业设计等课程。 ② 课外学习 ：鼓励学生参加计算机等级考试和软件工程师考试，鼓励学生参加老师科技报告的撰写。
5	掌握空间信息获取、提取和应用分析技术，能够利用这些技术和相关工具解决地理信息相关的科学与工程问题，并能够理解技术工具的局限性；	① 课堂教学 ：数字测量学、数据库与空间数据库、遥感原理与应用、遥感图像处理、地理信息系统设计与开发、数字测量学实习、地理信息系统应用实习、3S 综合应用实习、地理信息系统开发实习、地理信息系统生产工程实践等课程。 ② 课外学习 ：3S 论坛、邀请校内外专家来校做学术讲座，产学研、测绘技能大赛、科技活动、大学生创新创业训练计划等。
6	能够基于地理信息学科专业相关背景知识进行合理分析，评价问题解决方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响，并理解应承担的责任；	① 课堂教学 ：地理信息系统设计与开发、地理信息系统应用实习、3S 综合应用实习、地理信息系统开发实习、地理信息系统生产工程实践、时空大数据分析与挖掘、社会地理计算等课程。 ② 课外学习 ：3S 论坛、邀请校内外专家来校做学术讲座、产学研、科技活动、大学生创新创业训练计划等。
7	具有较高的思想觉悟、崇高的道德修养、全面的文化素质。社会责任感强，能够自觉遵守职业道德；	① 课程教学 ：毛泽东思想和中国特色社会主义理论体系概论、马克思主义基本原理、思想道德修养与法律基础、军事理论、中国近现代史纲要、体育 I-IV、大学生就业指导、社会科学类、自然科学类、人文艺术类、经济管理类等。 ② 课外学习 ：开展“校园文化艺术节”、“社团活动”、“网络文化”等主题教育活动；开展运动会、一二九长跑等活动；开展新生入学教育和毕业生系列教育主题活动；开展大学生“暑假社会实践”活动；加强学务指导老师、辅导员队伍建设；加强学生党支部建设；加强学生干部队伍建设，提高对学生的

序号	毕业要求	实现途径（教学过程）
		教育引导。
8	具有在多学科背景下的团队中承担个体、团队成员以及负责人角色的能力；	① 课堂教学 ：通识选修课、专业选修课、自主学习等。 ② 课外学习 ：鼓励跨专业参与产学研、科技活动、大学生创新创业训练计划、挑战杯、机器人足球、软件设计大赛、数学竞赛、数学建模等活动等。
9	理解并掌握相关管理与决策方法，能够就地理信息科学专业问题与业界同行及社会公众进行有效沟通和交流，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流；	① 课堂教学 ：专业英文阅读、专业选修课、自主学习等。 ② 课外学习 ：邀请校内外专家来校做学术讲座，选派学生和老师到国外参加国际会议等。
10	具有自主学习和终身学习的意识，有不断学习和适应地理信息科学发展的能力。	① 课堂教学 ：专业英文阅读、专业选修课、自主学习等。 ② 课外学习 ：3S论坛、产学研、科技活动、大学生创新创业训练计划等。

主干学科（楷体小四）：地理学；测绘科学与技术；计算机科学与技术。

专业核心课程（楷体小四）：计算机高级语言程序设计（C++）、面向对象程序设计、数据结构、数据库与空间数据库、人文地理学、自然地理学、普通地质学、数字测量学、地图学、计算机图形学、遥感原理与应用、遥感图像处理、地理信息科学、地理信息系统设计与开发、GNSS原理及其应用、空间统计与分析。

主要专业实验（楷体小四）：无

主要实践性教学环节（楷体小四）：计算机高级语言课程设计（C++）、北戴河地质认知实习、秭归GIS野外实习、面向对象程序设计课程设计、数字测量学实习、数据结构与算法课程设计、数据库课程设计、地图学实习、地理信息系统应用实习、3S综合实习、地理信息系统开发实习、时空大数据分析课程实习、毕业设计（论文），约35学分。

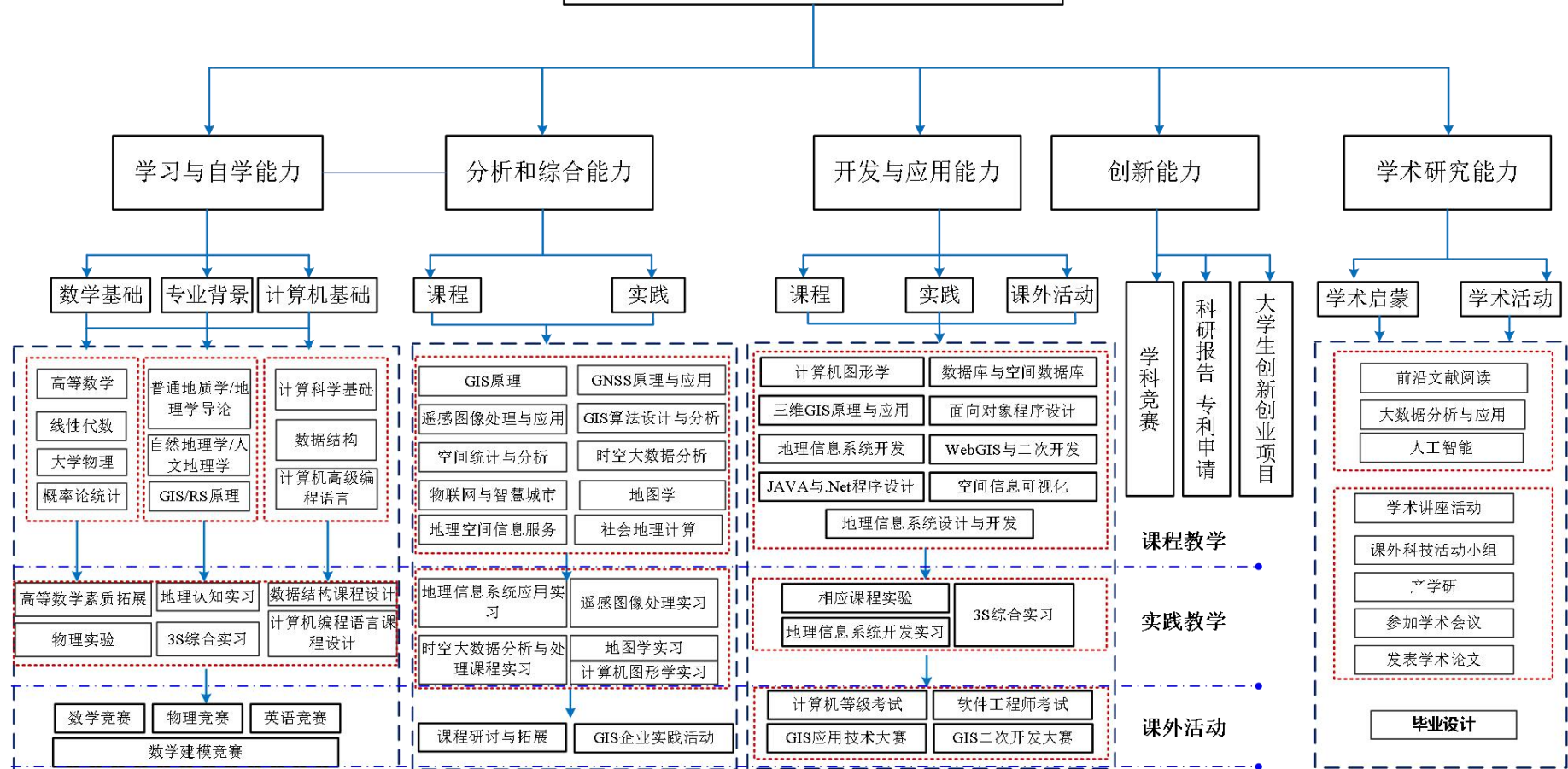
毕业学分要求（楷体小四）：170.5。

学制与学位（楷体小四）：四年，理学学士。

本专业学生可以辅修的其他专业（楷体小四）：人文地理与城乡规划、自然地理学、遥感科学与技术。

相近专业（楷体小四）：地理空间信息工程、地球空间信息技术

地理信息科学专业培养目标及定位



Educational Program of Geographic Information Science

Specialty and Code: Geographic Information Science (070504)

Education Objective: The Geographic Information Science graduates are required to master the basic knowledge, theories, methods and skills of GIS. They should be equipped with an interdisciplinary knowledge structure that combines geography, geospatial information science, surveying, and computer science, and become innovative talents which conduct GIS-related scientific research, project design, technical development, engineering management and information services in a variety of domains such as lands, resources, environment, planning, transportation, public security, national defense, demographics, Internet, and social economy.

Graduation Requirements:

Besides the fundamental knowledge and skills of mathematics and foreign languages, the students majoring in GIS should systematically study the principles and theories of geography, mapping, geospatial information, remote sensing, surveying, and computer science, including the theories and methods of spatial data collection, processing, management, analysis, visualization and application. They should have strong abilities of system development, maintenance, and management, and applying GIS in a variety of academic research, engineering development and project applications. Graduates should acquire the following knowledge and abilities:

1. To grasp the basic principles, theories, knowledge and skills of mathematics, physics, geography, computer science, and have the ability to conduct GIS modeling, analysis and applications;
2. To grasp the basic theories, knowledge and skills of GIS, and the basic principles and methods of GIS engineering development; to understand the key and frontier technologies of GIS, and have abilities of analyzing, designing, developing and maintaining computer systems and GIS;
3. To grasp the principles and methods of geospatial data processing, integration, modeling, analysis, statistics and visualization, and have the proficient abilities of applying the GIS , RS, and GPS in lands, resources and environments for evaluation, monitoring and decision making;
4. To master the principles, techniques, and methods of GIS, and have the ability to conduct research related to GIS, and the ability to write scientific papers and research reports through certain scientific research training;

5. To master the spatial information acquisition, extraction and application analysis techniques, and use these technologies and related tools (total station, RTK/GPS, MapGIS, ArcGIS, etc.) to solve scientific and engineering problems of GIS, and to understand the limitations of these technical tools.
6. To master the ability to conduct the rational analysis based on the relevant background knowledge of GIS, and evaluate the impact of problem solutions on society, environment, health, safety, law, culture and sustainable development, and understand the responsibilities;
7. To have high political consciousness, lofty morality, comprehensive cultural quality, strong sense of social responsibility and good professional ethics;
8. To have the ability to assume the roles of individuals, team members, and leader in a multidisciplinary team;
9. To understand and master the relevant management and decision-making methods, and have the ability to effectively communicate with industry peers and the social public on GIS professional issues, and have the international vision to communicate in a cross-cultural background;
10. Have the awareness of independent learning and lifelong learning, and have the ability to continuously learn and adapt to the development of GIS.

Graduation requirements and ways to achieve:

No.	Graduation requirements	Ways to achieve (teaching process)
1	To grasp the basic principles, theories, knowledge and skills of mathematics, physics, geography, computer science, and have the ability to conduct GIS modeling, analysis and applications;	<p>① Classroom Teaching : Advanced Mathematics A, Linear Algebra A, Probability and Statics A, College Physics C, Physical Geography, Human Geography, Principle of Geographic Information System, Database and Spatial Database, Programming of Advanced Computer Language(C++), Object-Oriented Programming , Data Structure, Computer Graphics, etc.</p> <p>② Out-of-class Learning : To participate the “GIS Application Skills Competition”, “Development Competition”, “Challenge Cup”, “Soccer”, “Software Design Contest”, “Math Competition”, “Mathematical</p>

No.	Graduation requirements	Ways to achieve (teaching process)
		Modeling” and other activities. To encourage students to complete the examinations such as “Computer Grade”, “Software engineer”.
2	To grasp the basic theories, knowledge and skills of GIS, and the basic principles and methods of GIS engineering development; to understand the key and frontier technologies of GIS, and have abilities of analyzing, designing, developing and maintaining computer systems and GIS;	<p>① Classroom Teaching : Introduction to Natural Resources Information, Human Geography, Physical Geography, General Geology, Cartography, Digital Surveying, Database and Spatial Database, Principles and Applications of Remote Sensing, Remote Sensing Image Processing, Principle of Geographic Information System, Design and Development of Geographic Information Systems, Spatial Statistics and analysis, Practice of Geographic Information Systems Application, Practice of 3S Integration, Practice of Geographic information Systems Development, etc.</p> <p>② Out-of-class Learning: To organize the 3S forum, especially invite the famous experts to the school for the academic lectures. In addition, to set up the Production-Study-Research integrated activity, surveying and mapping skill competition, technological activities and college students innovation and entrepreneurship Training Program, etc.</p>
3	To grasp the principles and methods of geospatial data processing, integration, modeling, analysis, statistics and visualization, and have the proficient abilities of applying the GIS , RS, and GPS in lands,	① Classroom Teaching : Introduction to Natural Resources Information, Cartography, Digital Surveying, Database and Spatial Database, Principles and Applications of Remote Sensing, Remote Sensing Image Processing, Principle of Geographic Information System, Design and Development

No.	Graduation requirements	Ways to achieve (teaching process)
	resources and environments for evaluation, monitoring and decision making;	<p>of Geographic Information Systems, Spatial Statistics and analysis, Practice of Digital Surveying, Practice of Cartography, Practice of Geographic Information Systems Application, Practice of 3S Integration, Practice of Geographic information Systems Development, Practice of Geographic Information Systems Production Engineering, etc.</p> <p>②Out-of-class Learning: To organize the 3S forum, especially invite the famous experts to the school for the academic lectures. In addition, to set up the Production-Study-Research integrated activity, surveying and mapping skill competition, technological activities and college students innovation and entrepreneurship Training Program, etc.</p>
4	To master the principles, techniques, and methods of GIS, and have the ability to conduct research related to GIS, and the ability to write scientific papers and research reports through certain scientific research training;	<p>① Classroom Teaching : Up-to-date Specialized Paper Reading and Writing, Programming of Advanced Computer Language(C++), Object-Oriented Programming , Database and Spatial Database, Data Structure, Graduation Design, etc.</p> <p>②Out-of-class Learning : To encourage the student to participate the computer grade and software engineer examinations, and to participate the science and technology report writing.</p>
5	To master the spatial information acquisition, extraction and application analysis techniques, and	<p>① Classroom Teaching : Digital Surveying, Database and Spatial Database, Principles and Applications of Remote Sensing, Remote Sensing Image Processing, Design and</p>

No.	Graduation requirements	Ways to achieve (teaching process)
	<p>use these technologies and related tools (total station, RTK/GPS, MapGIS, ArcGIS, etc.) to solve scientific and engineering problems of GIS, and to understand the limitations of these technical tools.</p>	<p>Development of Geographic Information Systems, Practice of Digital Surveying, Practice of Geographic Information Systems Application, Practice of 3S Integration, Practice of Geographic information Systems Development, Practice of Geographic Information Systems Production Engineering, etc.</p> <p>②Out-of-class Learning: To organize the 3S forum, especially invite the famous experts to the school for the academic lectures. In addition, to set up the Production-Study-Research integrated activity, surveying and mapping skill competition, technological activities and college students innovation and entrepreneurship Training Program, etc.</p>
6	<p>To master the ability to conduct the rational analysis based on the relevant background knowledge of GIS, and evaluate the impact of problem solutions on society, environment, health, safety, law, culture and sustainable development, and understand the responsibilities;</p>	<p>① Classroom Teaching : Design and Development of Geographic Information Systems, Practice of Geographic Information Systems Application, Practice of 3S Integration, Practice of Geographic information Systems Development, Practice of Geographic Information Systems Production Engineering, Spatio-temporal Big Data Analysis and Mining, Social Geography Computing, etc.</p> <p>②Out-of-class Learning: To organize the 3S forum, especially invite the famous experts to the school for the academic lectures. In addition, to set up the Production-Study-Research integrated activity, surveying and mapping skill competition,</p>

No.	Graduation requirements	Ways to achieve (teaching process)
		technological activities and college students innovation and entrepreneurship Training Program, etc.
7	To have high political consciousness, lofty morality, comprehensive cultural quality, strong sense of social responsibility and good professional ethics;	<p>① Classroom teaching: Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics, Principles of Marxism, Cultivation of Ethics and Fundamentals of Law, Military Theory, The Essentials of Modern Chinese History, Physical Education I - IV, College Students Career Guidance, Social sciences, Natural Sciences, Arts and Humanities, Economics and Management, etc.</p> <p>② Out-of-class Learning: To develop the educational activities, such as Campus Culture and Art Festival, Association Activities, Internet Culture, etc.; to carry out the physical activities, such as sport game, December 9th running, etc.; to conduct the specialized education for the freshmen and graduate; to promote the college students' summer social practice; to strengthen the instructors, counselors student party branches, student cadres' professional construction; to improve the guidance to students.</p>
8	To have the ability to assume the roles of individuals, team members, and leader in a multidisciplinary team;	<p>① Classroom teaching : General Knowledge Electives Courses, Specialized Elective Courses, and Independent Study, etc.</p> <p>② Out-of-class Learning : to encourage interdisciplinary participation in the Production-Study-Research integrated activity, technological activities, college students</p>

No.	Graduation requirements	Ways to achieve (teaching process)
		innovation and entrepreneurship Training Program, “Challenge Cup”, “Soccer”, “Software Design Contest”, “Math Competition”, “Mathematical Modeling” and other activities.
9	To understand and master the relevant management and decision-making methods, and have the ability to effectively communicate with industry peers and the social public on GIS professional issues, and have the international vision to communicate in a cross-cultural background;	<p>① Classroom teaching: Professional English Reading, Specialized Elective Courses, and Independent Study, etc.</p> <p>② Out-of-class Learning : To invite the foreign experts for the professional lectures, and select the satisfied students and teachers go abroad for the international conferences.</p>
10	Have the awareness of independent learning and lifelong learning, and have the ability to continuously learn and adapt to the development of GIS.	<p>① Classroom teaching: Professional English Reading, Specialized Elective Courses, and Independent Study, etc.</p> <p>② Out-of-class Learning: To participate in the 3S forum, the Production-Study-Research integrated activity, technological activities and college students innovation and entrepreneurship Training Program, etc.</p>

Major Disciplines: Major Subjects: Geography, Science and Technology of Surveying and Mapping, Computer Science and Technology.

Main Courses: Programming of Advanced Computer Language(C++), Object-Oriented Programming , Data Structure, Database and Spatial Database, Human Geography, Physical Geography, General Geology, Digital Surveying, Cartography, Computer Graphics, Principles and Applications of Remote Sensing, Remote Sensing Image Processing, Principle of Geographic Information System, Design and Development of Geographic Information Systems, GNSS Principles and Applications, Spatial Statistics and Analysis.

Lab Experiments: N/A

Practical Work: Projects of Advanced Programming Language (C++) , Beidaihe Geological Cognition Practice, Zigui GIS Field Practice, Projects of Object-Oriented Programming, Practice of Digital Surveying, Projects of Data structure and Algorithm A, Projects of Database, Practice of Cartography, Practice of Geographic Information Systems Application A, Practice of 3S Integration, Practice of Geographic information Systems Development, Practice of Spatial Statistics and Analysis, Graduation Design, about 35 credits.

Requirements for Graduation Credits: 170.5

Duration& Degree Granted: Four years, Bachelor of Science

Recommended minor: Human geography and urban and rural planning, physical geography, remote sensing science and technology

Related Specialties: Geospatial Information Engineering, Geospatial Information Technology

地理信息科学专业课程教学计划表

Course Descriptions of Geographic Information Science

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits									
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th		
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res. Dis	研讨 Dis	素质拓展 Exp											
通识教育课 Liberal Education Courses	必修 Compulsory	11706200 马克思主义基本原理概论 Principles of Marxism	3	48	48						3									
		11706500 毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics	4	64	64									4						
		11711800 中国近现代史纲要 The Essentials of Modern Chinese History	2	32	32									2						
		12005200 思想道德修养与法律基础 Morality Education and Fundamentals of Law	3	48	48								3							
		12005300 形势与政策 Situation and Policy	2	32	32								每学期平均分配							
		113076*0 体育 Physical Education	4	144	144							1	1	1	1					
		109234*0 大学英语 College English	9	144	144					48		3	3	3						
		14300300 军事理论 Military Theory	2	36	36							2								
	选修 Elective	70100300 地球科学概论 Introduction to Earth Sciences	1.5	24	24			8												
		70400600 生态学概论 Introduction to Ecology	1.5	24	24															
		包括地球科学概论、生态学概论两门必修课程总计12学分,含创新创业选修课学分,跨学科选修课不低于4学分	9	144																
		小计 Sum		41	740	596		8	48		12	4	6	5						
	大类平台课 Platform Courses	21717600 地理学导论 Introduction to Geography	1	16	16							1								
212127*1 高等数学 A Advanced Mathematics B		11.5	184	184							5.5	6								
212130*3 大学物理 C College Physics C		6	96	96								3.5	2.5							
21216902 物理实验 B College Physics Experiment B		1.5	48	4	44							1.5								
21212801 线性代数 A Linear Algebra A		3.5	56	56							3.5									
21213501 概率论与数理统计 A Probability and Statistics A		3.5	56	56									3.5							

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp									
	21930800	数据结构 Data Structure	3	48	40	8	8				3							
	21931100	计算机高级语言程序设计 (C++) Programming of Advanced Computer Language (C++)	2	32	32		16				2							
	21130900	数据库与空间数据库 Database and Spatial Database	3	48	48		16				3							
	小计 Sum		35	584	532	52	40				10	13	12					
学科基础课 Disciplinary Fundamental Courses	21130600	自然地理学 Physical Geography	2.5	40	32	8					2.5							
	20105700	人文地理学 Human Geography	2.5	40	32	8					2.5							
	21130701	地理信息系统原理 A Principle of Geographic Information System A	2.5	40	24	16		8			2.5							
	20119600	普通地质学 Introduction to Earth Sciences	2.5	40	40		8			2.5								
	小计 Sum		10	160	128	32	8	8			2.5	5	2.5					
备注：专业主干课组成：专业基础课（12 学分）+ 所选专业方向主干课（12.5 学分）；学生按需个性化选择一方向，在课程不冲突的情况下，可以跨方向选课，并可抵作专业选修课																		
专业基础课																		
专业主干课 Main Specialty Courses	21134201	空间统计与分析 A（排在学期初） Spatial Statistics and Analysis	2	32	24	8	8						2					
	21135000	地图学 Cartography	2.5	40	32	8	12				2.5							
	21131801	计算机图形学 A Computer Graphics	3	48	32	16					3							
	21135100	遥感原理与应用 Principles and Applications of Remote Sensing	2.5	40	32	8	8					2.5						
	21135202	GNSS 原理及其应用 B GNSS Principles and Applications B	2	32	32										2			
	方向 1 GIS 理论与方法																	
	21135300	高级空间分析与建模（排在学期末） Advanced Spatial Analysis and Modeling	3	48	28	20							3					
	21134100	GIS 算法设计与实现 GIS Algorithm Design and Implementation	2	32	20	12							2					
21134400	地理空间信息服务 Geospatial Information Service	2.5	40	24	16	8								2.5				

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res. Dis	研讨 Dis	素质拓展 Exp									
	21134300	时空大数据分析与管理 Spatiotemporal Big Data Analysis and Mining	2	32	24	8	8											2
	21134500	三维地学建模与分析 Three-dimensional Geological Modeling and Analysis	3	48	32	16	8											3
方向2 GIS 开发与应用																		
	21135400	面向对象程序设计 Object-Oriented Programming	3	48	32	16												3
	21135500	人工智能与机器学习 Artificial Intelligence and Machine Learning	2	32	24	8	8											2
	21126100	地理信息系统设计与开发 Design and Development of Geographic Information Systems	3	48	28	20												3
	21135600	WebGIS 与二次开发 WebGIS and Secondary Development	2	32	16	16		8										2
	21135700	三维 GIS 原理与应用 Three-dimensional GIS Principle and Application	2.5	40	24	16												2.5
	小计 Sum		24.5	392	276	116	36	8										12.5 5.5 6.5
专业选修课 Specialty Elective Courses		可按方向设课, 具体见专业选修课列表	15.5	248														
合计 Sub-total			126	2124	1532	200	92	8	56		24.5	22	20.5	17.5	5.5	6.5		
实践环节 Practical Work	44300400	军事训练 Military Training	2	2周								2						
	41931200	计算机高级语言课程设计(C++) Projects of Advanced Programming Language (C++)	2	2周									2					
	41131100	北戴河地理认知实习 Beidaihe Geological Cognition Practice	2	2周									2					
	41135800	秭归 GIS 专业野外实习 Zigui GIS Field Practice	2	2周										2				
	41135900	面向对象程序设计课程设计 Projects of Object-Oriented Programming	2	2周										2				
	41123900	数字测量学实习 Practice of Digital Surveying	1	1周														1

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res. Dis	研讨 Dis	素质拓展 Exp									
	41136000	数据结构与算法课程设计 Projects of Data structure and algorithm	2.5	2.5 周										2.5				
	41131000	数据库课程设计 Projects of Database	2	2 周								2						
	41136100	地图学实习 Practice of Cartography	2.5	2.5 周										2.5				
	41136200	地理信息系统应用实习 Practice of Geographic Information Systems Application	2.5	2.5 周									2.5					
	41147600	3S 综合实习 Practice of 3S Integration	3	3 周												3		
	41136300	地理信息系统开发实习 Practice of Geographic information Systems Development	2.5	2.5 周									2.5					
	41136400	时空大数据分析处理课程实习 Practice of Spatio-Temporal Big Data Analysis and Processing	2.5	2.5 周									2.5					
	41132600	毕业设计(论文) Graduation Design (Thesis)	8	16 周														8
	小计 Sum		36.5	44.5 周								2	4	2	6.5	11	3	8
创新创业自主学习 Freedom study	ZZ35000S	社会调查 Social Investigation	2															
		其他(学科竞赛、发明创造、 科研报告) Others (Contest, Invention, Innovation and Research Presentation)	4															
		产学研	2															
	小计 Sum		8															
总计 Total			170.5	2124 学 时 +44.5 周	1532	200	92	8	56		26.5	26	22.5	24	16.5	9.5		8
可开出专业选修课 列表 Specialty	21130500	计算科学基础 Fundamentals of Computational Science	2	32	32						2							
	21136500	数字测量学 Digital Surveying	2	32	20	12							2					
	21136600	GIS 行业应用 GIS industry application	2	32	32											2		

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp									
Elective Courses	21136700	空间规划原理 Principles of Spatial Planning	2	32	32		8								2			
	21134700	遥感图像处理 Remote Sensing Image Processing	2	32	20	12									2			
	21136800	Java 和 .net 程序设计 Java & .net Software Development	2	32	20	12	8							2				
	21122900	空间信息可视化 Spatial Information Visualization	2	32	20	12								2				
	21136900	物联网与智慧城市 Internet of Things and Smart City	2	32	20	12	8								2			
	21137000	专业前沿文献阅读与科学报告写作(GIS)* Up-to-date Specialized Paper Reading and Writing (GIS)	2	32	32			16								2		
	21137100	自然资源信息导论 Introduction to Natural Resources Information	2	32	20	12									2			
	21120700	交通地理信息系统 Transportation Geographic Information Systems	2	32	16	16	8								2			
	21137200	社会地理计算* Social Geography Computing	2	32	20	12									2			
	21137300	遥感地学分析 Geo-analysis of Remote Sensing	2	32	20	12									2			
创新创业类课程																		
41137400	地理信息系统生产工程实践 (连续到实习单位实践不少于4周) Practice of Geographic Information Systems Production Engineering	3	4周														3	

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

地理信息科学专业课程分类统计

课程类别 统计	通识教育课程 Liberal Education Courses		大类平台课+学科基础课 Platform & Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	专业选修课 Specialty Elective Courses	实践环 节 Practical Work	创新创业自 主学习 Freedom Study	学时总计 Total Hour	学分总计 Total Credits
	必修	选修							
学时/学分	548/29	192/12	744/45	392/24.5	248/15.5	44.5 周 /36.5	8	2124 学时 +44.5 周	170.5
学分所占比 例	23.7%		26.7%	14.5%	9.2%	21.0%	4.8%		100%

附：

学校与企事业单位联合培养阶段实施方案（黑体三号）

（方案可包含而限于以下内容）

培养目标（楷体小四）： 主要介绍联合培养阶段的目标设定等。

培训重点（楷体小四）： 主要从知识和技能、分析和研究能力、过程和方法等方面介绍。

培训阶段（楷体小四）： 主要介绍联合培养阶段基础训练、生产实训等阶段实施情况。

课程及学分设置（楷体小四）： 主要介绍联合培养阶段的课程及学分如何设置。

考核标准及成绩评定（楷体小四）： 主要介绍联合培养阶段的考核标准及方法。

工作、生活及安全保障管理（楷体小四）： 主要介绍联合培养阶段学生的相关管理要求。

地理信息科学专业辅修课程教学计划表
 Course Descriptions of Geographic Information Science (Minor)
 (为免字体格式出错, 专业课程计划请直接在此表内填写)

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研 Lab/Res.	研讨 Dis	素质拓展 Exp									
Fundamental Courses 学科基础课	21130600	自然地理学 Physical Geography	2.5	40	32	8					2.5							
	20105700	人文地理学 Human Geography	2.5	40	32	8						2.5						
	21130701	地理信息系统原理 A Geographic Information System	2.5	40	24	16			8		2.5							
	小计 Sum		7.5	120	88	32			8		2.5	2.5	2.5					
Main Specialty Courses 专业主干课	21135000	地图学 Cartography	2.5	40	32	8	12				2.5							
	21134201	空间统计与分析 Spatial Statistics and Analysis	2	32	24	8	8				2							
	21126100	地理信息系统设计与开发 Design and Development of Geographic Information Systems	3	48	28	20						3						
	小计 Sum		7.5	120	84	36	20				4.5	3						
Practical Work 实践环节	41135900	面向对象程序设计课程设计 Projects of Object-Oriented Programming	2	2周									2					
	41136100	地图学实习 Practice of Cartography	2.5	2.5周								2.5						
	4136300	地理信息系统应用实习 Practice of Geographic Information Systems Application	2.5	2.5周									2.5					
	小计 Sum		7	7周								2.5	4.5					
总计 Total		22	240+7周	172	68	20		8		2.5	7	5.5	7					

地理信息科学辅修专业课程分类统计

课程类别 统计	学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	实践环节 Practical Work	学时总计 Total Hour	学分总计 Total Credits
学时/学分	120/7.5	120/7.5	7周	240+7周	22
学分所占比例	34%	34%	32%		100%