

地理空间信息工程专业培养方案

专业名称与代码：地理空间信息工程（081205 T）

专业培养目标：面向国民经济建设及社会发展的需要，地理空间信息专业将致力于培养学生德智体全面发展，掌握地理信息、遥感、测量、定位、人工智能、软件工程等理论与技术，具备地理空间信息获取、存贮、管理、分析、表达、可视化及分发的完整知识体系，掌握地理空间信息服务系统的设计、研发、集成、部署、维护及管理等方面的知识技能，使其能够胜任在企事业单位、政府机关部门、国防安全等部门的从事空间信息工程、空间信息服务、空间信息平台 and 空间信息系统集成技术的高级工程技术岗位，成为能开拓地理空间信息应用领域的创新创业人才。

毕业五年左右的毕业生应达到以下要求：

1. 从事生产的毕业生，能够独立或负责完成地理空间信息相关工程项目的设计、实施、组织和管理等专门技术工作，逐步发展成为所在单位地理空间信息方面的工程团队负责人、技术骨干和中坚力量；

2. 从事科研的毕业生，能把握和适应地理空间信息工程技术领域发展趋势，能够独立或负责完成地理空间信息领域相关科研项目的问题发现、路线设计、方法研究等工作并取得一定的创新性成果。培养具备良好综合素质和职业道德；

专业毕业要求：

本专业具有地理空间信息技术与现代软件工程技术相结合的专业特色。本专业学生在具备扎实的数理和外语知识的基础上，主要学习地理空间信息技术、软件工程技术的基本理论和基本知识，并接受地理空间信息服务系统分析、设计、研发、部署、管理与维护等方面的基本训练，具备设计、开发、集成及应用信息系统等方面的基本能力。

毕业生应满足以下培养要求：

1. **工程知识：**具有扎实的数学物理基础和良好的外语基础。掌握地理空间信息、测绘、地图学、遥感的工程基础理论和基础技能，具有将地理空间信息技术应用于土地、城市、规划、资源、环境、基础设施建设等工程领域的的能力；

2. **问题分析：**具备发现地理空间信息领域复杂工程问题的能力，能综合运用 3S（GIS、GNSS、RS）技术一体化的理论前沿以及人工智能大数据的技术方法去分析和解决相关领域的技术问题，并通过文献研究分析相关学科专业问题，以获得有效结论。

3. **设计与开发：**掌握计算机科学、软件工程的基本原理和方法，且能与地理空间信息技术相结合，能进行相关的软件项目设计和应用研发；

4. **科学研究：**能够熟练进行外文文献检索、归纳、整理；具备实验分析、科技写作和国际学术交流能力，具有国际化视野。能够综合运用所学习的科学原理和专业对地理空间信息领域的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

5. **使用现代工具：**能熟练运用测绘、地理信息科学、遥感等常用仪器与软件，并具备计算机科学的基础知识和开发能力，合理选择与应用恰当的仪器、技术对地理空间信息领域中的工程与科研问题开展预测和模拟，并解释其现象；

6. **工程与社会**:能够正确评估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进行合理的分析与评价,并理解应承担的责任;

7. **环境和可持续发展**:能够综合运用地理空间信息工程技术、工程管理等领域知识,研究全球环境变化、社会可持续发展等问题,并理解这些工程活动与环境和可持续发展的关系;

8. **职业规范**:具有正确的人生观,价值观,了解地理空间信息产业发展状况和应用前景,懂得本学科专业所应具有的职业道德和规范,明确自己在社会发展过程中所应承担的责任;

9. **个人和团队**:具有良好的个人综合素质,能够在工程实践过程中具有较强的团队合作意识;

10. **沟通**:能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流,包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令,并具备一定的国际视野,能够在跨文化背景下进行沟通和交流;

11. **项目管理**:具有从事工程与科研所需的相关自然科学知识以及一定的经济管理知识,具备一定的项目组织和管理能力;

12. **终生学习**:具有自主学习和不断学习以适应地理空间信息技术、遥感和测绘科学发展的能力。

序号	毕业要求	实现途径（教学过程）
1	具有扎实的数学物理基础和良好的外语基础。掌握地理空间信息、测绘、遥感、地图学的基本理论和基本技能，具有将地理空间信息技术应用于土地、城市、规划、资源、环境、基础设施建设等领域的能力；	<p>①课堂教学：高等数学 A、线性代数 A、概率论与数理统计 A、大学物理，物理实验 B、大学英语，地球科学概论，生态学概论，测绘学概论，计算科学基础，数字地形测量学，遥感原理与应用，地理信息系统原理，计算机图形学 A，数字制图学，数字地形测量教学实习，自然地理与地质学实习，数据库与空间数据库，GNSS 原理及其应用 B，地理空间信息系统设计与开发，互联网与移动 GIS 开发，GIS 项目管理。</p> <p>②课外学习：数学竞赛、物理竞赛，数学建模竞赛，参加托福、雅思、GRE、CET4、CET6 等英语竞赛，全国计算机等级考试、计算机软件资格、水平考试等相关认证考级。</p>
2	具备发现地理空间信息领域复杂工程问题的能力，能综合运用 3S（GIS、GNSS、RS）技术一体化的理论前沿以及人工智能大数据的技术方法去分析和解决相关领域的技术问题，并通过文献研究分析相关学科专业问题，以获得有效结论。	<p>①课堂教学：数据库与空间数据库，遥感图像处理，GNSS 原理及其应用 B，人工智能，空间信息高性能计算，空间统计与分析，空间数据挖掘与方法、大数据分析与应用，计算机视觉，物联网技术与应用，摄影测量原理，地理信息系统实习 B，遥感图像处理与解译实习，地理空间信息系统设计与开发实习，互联网与移动 GIS 开发实习。</p> <p>②课外学习：产学研项目，大学生创新创业项目，“挑战杯”竞赛等，通过相关媒体获取信息，定期邀请校内外专家来校做学术讲座。</p>
3	掌握计算机科学、软件工程的基本	① 课堂教学 ： 计算机高级语言程序设计

序号	毕业要求	实现途径（教学过程）
	原理和方法，且能与地理空间信息技术相结合，能进行相关的软件项目设计和应用研发；	<p>(C++)，数据结构，计算机组成与体系结构，数据库与空间数据库，操作系统原理 B，算法设计与分析，地理空间信息系统设计与开发，互联网与移动 GIS 开发，智能终端软件开发，GIS 项目管理，计算机高级语言课程设计 (C++)，数据结构课程设计 A，互联网与移动 GIS 开发实习，地理空间信息系统设计与开发实习。</p> <p>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，组织学生参加“蓝桥杯”、GIS 软件二次开发大赛，互联网+等比赛。</p>
4	能够熟练进行外文文献检索、归纳、整理；具备实验分析、科技写作和国际学术交流能力，具有国际化视野。能够综合运用所学习的科学原理和专业对地理空间信息领域的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。	<p>①课堂教学：所有专业课和专业选修课的学习例如：空间统计与分析，空间数据挖掘与方法、大数据分析与应用，人工智能，课堂讨论题，专业前沿文献阅读，文献检索，毕业设计（论文）</p> <p>②课外学习：课外科技活动小组，产学研项目，大学生创新创业项目，“挑战杯”竞赛等，通过相关媒体获取信息，定期邀请校内外专家来校做学术讲座、交流，发表学术论文，参加学术会议。</p>
5	能熟练运用遥感、测绘、地理信息科学常用仪器与软件，并具备计算机科学的基础知识和开发能力，合理选择与应用恰当的仪器、技术对地理空间信息领域中的工程与科研问题开展预测和模拟，并解释其现象；	<p>①课堂教学：数字地形测量学、地理信息系统原理、计算机组成与体系结构、空间数据库原理、算法设计与分析、数字制图学、GNSS 原理及其应用 B、地理空间信息系统设计与开发、互联网与移动 GIS 开发、人工智能、GIS 项目管理等课程实验；计算机高级语言课程设计 (C++)、数字地形测量教学实习、数据结构课程设计 A、地理信息系统实习 B、自然地理与地质学实习、地理空间信息系统设计与开发实习、遥感图像处理与解译实习、互联网与移动 GIS 开发实习、计算机图形学</p>

序号	毕业要求	实现途径(教学过程)
		实习、数字制图学实习等中涉及的实验仪器、设备、专业软件。 ②课外学习： 课外科技活动、产学研项目、大学生创新创业项目、各类大学生竞赛等
6	能够正确评估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进行合理的分析与评价，并理解应承担的责任；	①课堂教学： 地球科学概论，生态学概论，测绘学概论，马克思主义基本原理、毛泽东思想与中国特色社会主义理论体系概论、中国近现代史纲要、思想道德修养与法律基础、大学英语(ABC)、计算机高级语言程序设计(C++)、跨学科选修课等。 ②课外学习： 开展新生入学教育和毕业生系列教育主题活动；课外阅读本专业开办的公众号“地理空间信息工场”。开展大学生“暑假社会实践”活动，社会调查和社会实践活动，就业教育等
7	能够综合运用地理空间信息工程技术、工程管理等领域知识，研究全球环境变化、社会可持续发展等问题，并理解这些工程活动与环境可持续发展的关系；	①课堂教学： 地球科学概论，生态学概论，自然地理与地质学、地理信息系统原理与方法、遥感原理与应用等。 ②课外学习： 开展新生入学教育和毕业生系列教育主题活动；课外阅读本专业开办的公众号“地理空间信息工场”。开展大学生“暑假社会实践”活动，社会调查和社会实践活动，就业教育等
8	具有正确的人生观，价值观，了解地理空间信息产业发展状况和应用前景，懂得本学科专业所应具有的职业道德和规范，明确自己在社会发展过程中所应承担的责任；	①课堂教学： 马克思主义基本原理概论，毛泽东思想和中国特色社会主义理论体系概论，中国近现代史纲要，思想道德修养与法律基础，形势与政策，军事理论 ②课外学习： 开展新生入学教育和毕业生系列教育主题活动；课外阅读本专业开办的公众号“地理空间信息工场”。开展大学生“暑假社会实践”活动，社会调查和社会实践活动，就业教育等

序号	毕业要求	实现途径(教学过程)
9	具有良好的个人综合素质,能够在工程实践过程中具有较强的团队合作意识;	<p>①课堂教学: 马克思主义基本原理、毛泽东思想与中国特色社会主义理论体系概论、中国近现代史纲要、思想道德修养与法律基础、体育、军事理论、创新创业选修课, 课堂讨论课和小组实验课。</p> <p>②课外学习: 课外科技活动小组, 各类竞赛小组, 产学研小组</p>
10	能够就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, 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;	<p>①课堂教学: 大学英语, 马克思主义基本原理、毛泽东思想与中国特色社会主义理论体系概论、中国近现代史纲要、思想道德修养与法律基础、跨学科选修课、社会调查、其他(学科竞赛、发明创造、科研报告)、GIS项目管理、面向对象分析与设计(UML-设计模式)、课堂讨论课等。</p> <p>②课外学习: 课外科技活动小组, 各类竞赛小组, 产学研小组, 参加国际学术会议, 社会实践活动、英语、计算机、普通话考试、本学科专业领域的论文发表、宣读或者艺术作品的发表、PCT国际专利、国家发明专利以及各类知识产权申请、科学研究活动或创业实践活动、科技成果转化、以及自主创业。</p>
11	具有从事工程与科研所需的相关自然科学知识以及一定的经济管理知识, 具备一定的项目组织和管理能力;	<p>①课堂教学: GIS项目管理, 课堂讨论题</p> <p>②课外学习: 学科竞赛、发明创造、如组织学生参加各类竞赛(如挑战杯、大学生创新创业等)、产学研、科技活动、毕业设计等、社会实践活动、PCT国际专利、国家发明专利以及各类知识产权申请、科学研究活动或创业实践活动、科技成果转化、以及自主创业。</p>
12	具有自主学习和不断学习以适应	① 课堂教学 : 所有专业基础课的学习和专业课的学习

序号	毕业要求	实现途径(教学过程)
	地理空间信息技术、遥感和测绘科学发展的能力。	②课外学习: 课外阅读和课外专业文献阅读

主干学科:

测绘科学与技术, 信息学科, 计算机科学技术

专业核心课程:

测绘学概论、数字地形测量学、遥感原理与应用、地理信息系统原理、计算机组成与体系结构、空间数据库原理、操作系统原理 B、计算机图形学 A、GIS 算法设计与分析、数字制图学、GNSS 原理及其应用 B、地理空间信息系统设计与开发、互联网与移动 GIS 开发、人工智能、GIS 项目管理、数字制图学。

主要专业实验:

计算机高级语言课程设计 C/ (C++)、GIS 算法设计与实现、数字制图学、地理空间信息工程设计与开发、互联网与移动 GIS 开发、人工智能。

主要实践性教学环节:

计算机高级语言课程设计 C/ (C++)、数字地形测量教学实习、数据结构课程设计 A、计算机图形学课程设计、数字制图学课程设计、地理信息系统实习、遥感原理与应用课程实习, 自然地理与地质学实习、计算机组成与体系结构课程设计、空间数据库原理课程设计、GIS 算法设计与实现课程设计、地理空间信息系统设计与开发实习、互联网与移动 GIS 开发实习、GNSS 原理及其应用 B 实习、GIS 项目管理课程设计、地理空间数据生产应用实践、毕业设计。

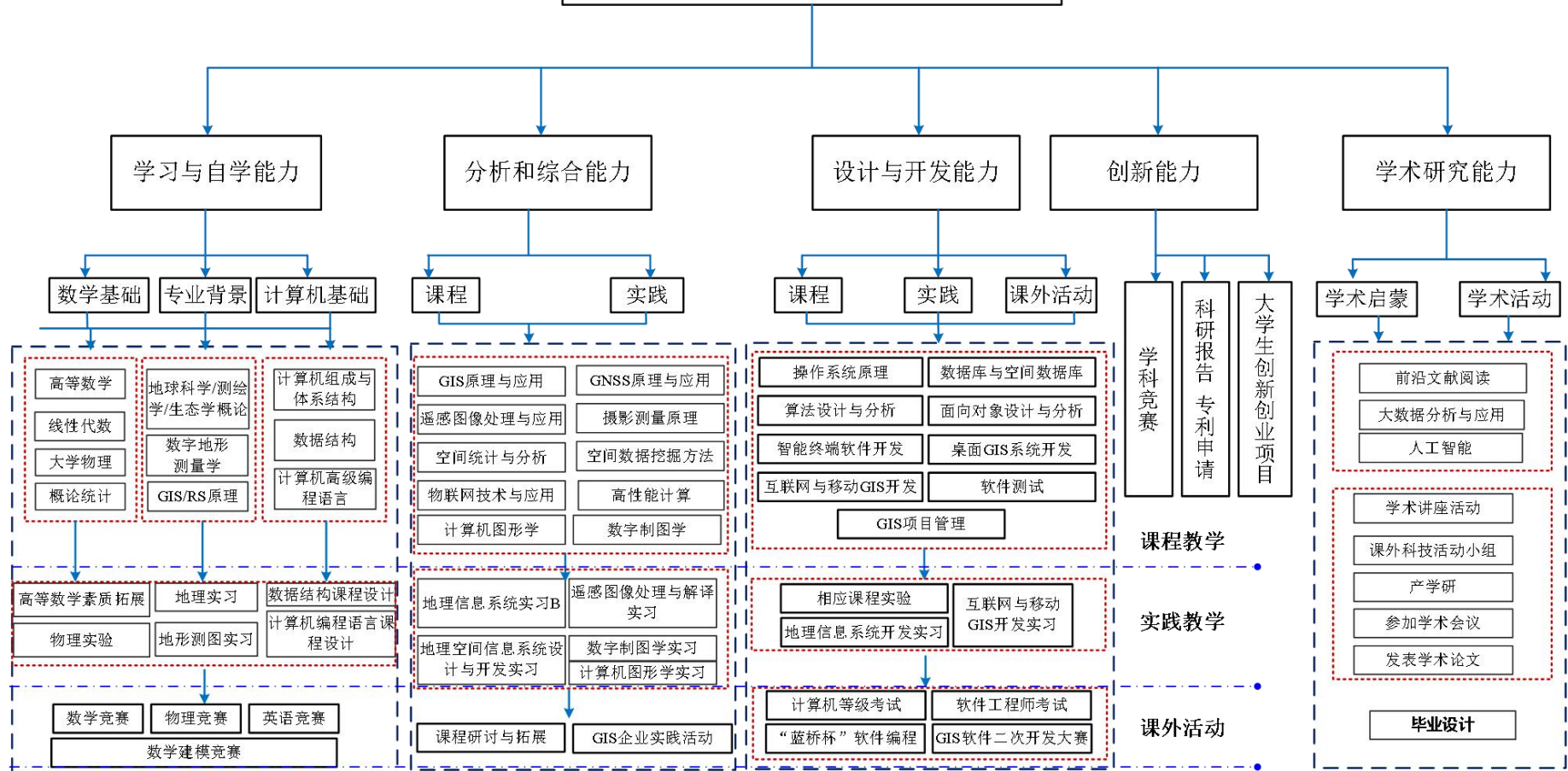
毕业学分要求: 170。

学制与学位: 四年, 工学学士。

本专业学生可以辅修的其他专业: 地理信息科学, 计算机科学与技术等。

相近专业(楷体小四): 地理信息科学, 计算机科学与技术, 测绘工程。

地理空间信息工程专业培养目标及定位



Program for Geospatial Information Engineering

Specialty and Code: Geospatial Information Engineering (081205 T)

Education Objective:

Facing the needs of national economic construction and social development, The major of geospatial information engineering is dedicated to cultivating students to master knowledge and skill of geographical information, remote sensing, surveying and mapping, positioning, artificial intelligence, software engineering, etc., Having a complete knowledge system of geographic spatial information acquisition, storage, management, analysis, expression, visualization and distribution, Master the knowledge and skills of the design, research and development, integration, deployment, maintenance and management of geospatial information service system, which will enable them to possess wisdom power to roam freely in the sea of geospatial big data; display their abilities in the areas of our society including internet firms, government offices, science sectors, defense security department; and create a wonderful career and achieve a beautiful dream.

Expectation for graduates within 5 years

1. Graduates engaged in the production have the ability to undertake or independently accomplish a special technical work of related geospatial information engineering projects including designing, implement, organization, and management, etc., and gradually become team leader, technological backbones, and dominant force in their work units.
2. Graduates engaged in scientific research should grasp and adapt developing trends in the field of geospatial information engineering technology. They should have the ability to undertake or independently complete research projects of geospatial information engineering such as identifying questions, designing route, and researching method; obtain certain innovative achievements; and cultivate their good comprehensive quality and professional ethics.

Graduation Requirements:

This major has the specialty characteristics of geospatial information technology combined with modern software engineering technology. Based on the knowledge of mathematics and English, the students majored in learning the basic theory and knowledge of geospatial information technology and software engineering, and getting the basic training of the geospatial information service system analysis, design, development, deployment,

management and maintenance. They should have the basic capabilities of using, designing, developing, and integrating the related information systems for industrial applications.

Graduates should satisfy the following training requirements:

- 1. Engineering Knowledge:** Have sound fundamentals of physics and mathematical knowledge, and foreign languages (e.g. English). Master the basic theory and skills of geospatial information, surveying and mapping, remote sensing and cartography. Have the ability to apply the geospatial information technology to the engineering fields of land, urban, planning, resource, environment, infrastructure construction, etc.
- 2. Problem Analysis:** Have the ability to find the complicated engineering problem in the field of geospatial information. Master the foreland of theory and techniques of the integration of GIS, GNSS and RS technology, artificial intelligence, and big data to analyse and solve the technical problems in relevant areas. Have the ability to study, analyse and solve the technical problems in the related subject areas through literature analysis and get effective conclusions.
- 3. Design and Development:** Master the basic principle and methods of computer science and software engineering, can combine them with geospatial information to design and develop the relevant software projects.
- 4. Scientific Research:** Able to skilfully retrieve, conclude, and manage foreign literatures. Have the ability of experiments analysing, scientific writing, and academic exchanges and have the international vision. Can comprehensively apply the scientific principles and specialized knowledge to study complex engineering problems in the field of geospatial information, including designing experiments, analysing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.
- 5. Using modern tools:** Proficiency in common instruments and software in the fields of surveying and mapping, geographic information science, and remote sensing. Possess the basic knowledge and development capabilities of computer science. Able to rationally select and apply appropriate instruments and technologies to forecast and model engineering and scientific research issues in the field of geospatial information, and explain the corresponding phenomena.
- 6. Engineering and Social:** Can correctly assess the impact of the practice of professional engineering and the solutions of complex engineering problem on social, health, safety, legal, and cultural; and understand the corresponding responsibilities.
- 7. Environment and sustainable development:** Can apply the comprehensive knowledge of geospatial information engineering techniques and engineering management to study global

environmental change and social sustainable development; and understand the relationship between these engineering activities and the environment and sustainable development.

8. **Occupation Criterion:** Have a correct outlook on life and values, learn the development status and application prospects of the geospatial information industry, understand the professional ethics and norms in this field, and clarify their responsibilities in the process of social development.

9. **Individual and groups:** Have a good personal comprehensive quality and a strong sense of teamwork in the process of engineering practice.

10. **Communication:** Be capable of effective communication with the industry peers and the public about the complicated engineering problems of this discipline, details include writing reports, design documents, presenting statements, articulating or responding commands. Have certain international vision and able to communicate with others in a cross-cultural context.

11. **Project management:** Have the relevant knowledge of natural science and economic management which is required for engineering and scientific research. Able to organize and manage the related projects.

12. **Lifelong learning:** Can adapt to the development trends of geospatial information technology, remote sensing and surveying science through self-learning and continuous learning.

Graduation requirements and ways to achieve:

No.	Graduation requirements	Ways to achieve (teaching process)
1	Have sound fundamentals of physics and mathematical knowledge, and foreign languages (e.g. English). Master the basic theory and skills of geospatial information, surveying and mapping, remote sensing and cartography. Have the ability to apply the geospatial information technology to the engineering fields of land, urban, planning, resource, environment, infrastructure construction, etc.	① Classroom Teaching : Advanced Mathematics A, Linear Algebra A, Probability and Statics A, College Physics, Physics Experiments B, College English, Introduction to Earth Sciences, Introduction to Ecology, Introduction to Surveying and Mapping , Digital Topographic Survey, Principles and Applications of Remote Sensing, Principles of Geographic Information Systems, Computer Graphics A, Digital Cartography, Digital topographic survey teaching practice, Practice of Physical Geography and Geology, Database and Geodatabase, GNSS Principles and Applications B, GeoInformation System Design & Development, Internet and mobile GIS software development, GIS Project

No.	Graduation requirements	Ways to achieve (teaching process)
		<p>Management, Object-Oriented Software Engineering Analysis & Design (UML profile design)</p> <p>② Out-of-class Learning : Mathematical competitions, Physics competitions, Mathematical modeling competitions, English competitions and English Test, e.g. TOEFL, IELTS, GRE, CET4, CET6, etc., National computer rank examination, Computer software qualification, and other related certification examinations.</p>
2	<p>Have the ability to find the complicated engineering problem in the field of geospatial information. Master the foreland of theory and techniques of the integration of GIS, GNSS and RS technology, artificial intelligence, and big data to analyse and solve the technical problems in relevant areas. Have the ability to study, analyse and solve the technical problems in the related subject areas through literature analysis and get effective conclusions.</p>	<p>① Classroom Teaching : Database and Geodatabase, Remote Sensing Image Processing, GNSS Principles and Applications B, Artificial intelligence, Spatial information high performance computing, Spatial Statistics and Analysis, Spatial Data Mining Method, Big Data Analysis & Application, Computer Vision, Technologies and Applications of Internet of Things, The Principles of Photogrammetry, Practice of Geographic Information Systems B, Practice of Remote Sensing Image Processing and Interpretation, Practice of Geospatial Information System Design & Development, Practice of Internet and mobile GIS software development.</p> <p>② Out-of-class Learning : Production-Study-Academic Research Projects, Undergraduate innovation and entrepreneurship project, 'Challenge Cup' competition, Obtaining information through the relevant media, Inviting experts who come from within and outside school for giving academic lecture.</p>
3	<p>Master the basic principle and methods of computer science and software engineering, can combine them with geospatial information to</p>	<p>① Classroom Teaching: Course Design for Computer Advanced Language (C++), Data Structure, Computer organization and architecture, Database and Geodatabase, Operating Systems B, Algorithms Design and</p>

No.	Graduation requirements	Ways to achieve (teaching process)
	design and develop the relevant software projects.	<p>Analysis, GeoInformation System Design & Development, Internet and mobile GIS software development, Intelligence Terminal Software Development, GIS Project Management, Software Testing, Course Design for Computer Advanced Language (C++), Course Projects of Data Structure A, Practice of Internet and mobile GIS software development , Practice of Geospatial Information System Design & Development.</p> <p>② Out-of-class Learning : Encourage students to take the computer grade exams and software engineer exams, organize students to participate the competition such as “Blue Bridge Cup”, GIS software secondary development, and “Internet +”, etc.</p>
4	<p>Able to skilfully retrieve, conclude, and manage foreign literatures. Have the ability of experiments analysing, scientific writing, and academic exchanges and have the international vision. Can comprehensively apply the scientific principles and specialized knowledge to study complex engineering problems in the field of geospatial information, including designing experiments, analysing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.</p>	<p>①Classroom Teaching: Learn all specialized courses and specialized optional courses, e.g. Spatial Statistics and Analysis, Spatial Data Mining Method, Big Data Analysis &Application, Class discussion questions, Up-to-date Specialized Paper Reading, Literature search, Graduation project (Thesis).</p> <p>② Out-of-class Learning : Extracurricular science and technology activity group, Production-Study-Academic Research Projects, Undergraduate innovation and entrepreneurship project, ‘Challenge Cup’ competition, Obtaining information through the relevant media, Inviting experts who come from within and outside school for giving academic lecture and exchange, Publish scientific papers.</p>
5	Proficiency in common instruments and software in the fields of surveying and mapping, geographic information science, and remote	① Classroom Teaching : Curriculum experiment including Digital Topographic Survey, Principles of Geographic Information Systems, Principles of Geographic Information Systems, Computer organization and architecture, Database and Geodatabase,

No.	Graduation requirements	Ways to achieve (teaching process)
	<p>sensing. Possess the basic knowledge and development capabilities of computer science. Able to rationally select and apply appropriate instruments and technologies to forecast and model engineering and scientific research issues in the field of geospatial information, and explain the corresponding phenomena.</p>	<p>Algorithms Design and Analysis, Digital Cartography, GNSS Principles and Applications B, GeoInformation System Design & Development, Internet and mobile GIS software development, Artificial intelligence, GIS Project Management, etc., Experimental instrument, equipment, and professional software for Course Design for Computer Advanced Language (C++), Digital topographic survey teaching practice, Course Projects of Data Structure A, Practice of Geographic Information Systems B, Practice of Physical Geography and Geology, Practice of Geospatial Information System Design & Development, Practice of Remote Sensing Image Processing and Interpretation, Practice of Internet and mobile GIS software development, Practice of Computer Graphics, Practice of Digital Cartography.</p> <p>② Out-of-class Learning : Extracurricular scientific activities, Production-Study-Academic Research Projects, Undergraduate innovation and entrepreneurship project, Various undergraduates competition, etc.</p>
6	<p>Can correctly assess the impact of the practice of professional engineering and the solutions of complex engineering problem on social, health, safety, legal, and cultural; and understand the corresponding responsibilities.</p>	<p>①Classroom Teaching : Introduction to Earth Sciences, Introduction to Ecology, Introduction to Surveying and Mapping, Principles of Marxism, Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics, The Essentials of Modern Chinese History, Morality Education and Fundamentals of Law, College English, Computer Advanced Language Programming (C++), Transdisciplinary optional course.</p> <p>② Out-of-class Learning : Carry out the new student enrollment and graduates education theme activities; Extracurricular reading of Wechat “Geospace information workshop” established by this major. Carry out activities for college students like “summer social</p>

No.	Graduation requirements	Ways to achieve (teaching process)
		practice” activities, social investigation, social practice activities, and employment education, etc.
7	Can apply the comprehensive knowledge of geospatial information engineering techniques and engineering management to study global environmental change and social sustainable development; and understand the relationship between these engineering activities and the environment and sustainable development.	<p>① Classroom Teaching: Introduction to Earth Sciences, Introduction to Ecology, Physical Geography and Geology, Principles of Geographic Information Systems, Principles and Applications of Remote Sensing, etc.</p> <p>② Out-of-class Learning: Carry out the new student enrollment and graduates education theme activities; Extracurricular reading of Wechat “Geospace information workshop” established by this major. Carry out activities for college students like “summer social practice” activities, social investigation, social practice activities, and employment education, etc.</p>
8	Have a correct outlook on life and values, learn the development status and application prospects of the geospatial information industry, understand the professional ethics and norms in this field, and clarify their responsibilities in the process of social development.	<p>① Classroom Teaching : Principles of Marxism, Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics, The Essentials of Modern Chinese History, Morality Education and Fundamentals of Law, Situation and Policy, Military Theory</p> <p>② Out-of-class Learning: Carry out the new student enrollment and graduates education theme activities; Extracurricular reading of Wechat “Geospace information workshop” established by this major. Carry out activities for college students like “summer social practice” activities, social investigation, social practice activities, and employment education, etc.</p>
9	Have a good personal comprehensive quality and a strong sense of teamwork in the process of engineering practice.	<p>① Classroom Teaching : Principles of Marxism, Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics, The Essentials of Modern Chinese History, Morality Education and Fundamentals of Law, Physical Education, Military Theory, Optional courses of innovative and</p>

No.	Graduation requirements	Ways to achieve (teaching process)
		<p>entrepreneurship, Class discussion and Experimental group courses</p> <p>② Out-of-class Learning : Groups of extracurricular scientific activities, various competitions, and Production-Study-Academic Research.</p>
10	<p>Be capable of effective communication with the industry peers and the public about the complicated engineering problems of this discipline, details include writing reports, design documents, presenting statements, articulating or responding commands. Have certain international vision and able to communicate with others in a cross-cultural context.</p>	<p>① Classroom Teaching : College English, Principles of Marxism, Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics, The Essentials of Modern Chinese History, Morality Education and Fundamentals of Law, Interdisciplinary courses, Social investigation, other projects (e.g. subject competition, inventions, scientific report), GIS Project Management, Object-Oriented Software Engineering Analysis & Design (UML profile design), Class discussion, etc.</p> <p>② Out-of-class Learning : Groups of extracurricular scientific activities, various competitions, and Production-Study-Academic Research, Participate in international academic meetings, social practice, English, Computer, Mandarin proficiency exam, Publish papers in the field of geospatial information engineering, Read out or publish art pieces, PCT international patent, National invention patent, Intellectual property application, scientific research activities or practical activities of enterprise, Science & technology achievements, and being a startup</p>
11	<p>Have the relevant knowledge of natural science and economic management which is required for engineering and scientific research. Able to organize and manage the related projects.</p>	<p>① Classroom Teaching : GIS project management, class discussions</p> <p>② Out-of-class Learning : Academic competitions, inventions, scientific report, Organize students to participate in various competitions (e.g. ‘Challenge Cup’ competition, Undergraduate innovation and entrepreneurship project), Production-Study-Academic Research, Scientific activities, Graduate Project (Thesis),</p>

No.	Graduation requirements	Ways to achieve (teaching process)
		Social practice, PCT international patent, National invention patent, Intellectual property application, scientific research activities or practical activities of enterprise, Science & technology achievements, and being a startup
12	Can adapt to the development trends of geospatial information technology, remote sensing and surveying science through self-learning and continuous learning.	<p>① Classroom Teaching : Study all, professional basic courses and professional courses</p> <p>② Out-of-class Learning : Outside reading and outside professional literature reading</p>

Major Disciplines: Surveying and mapping, Information science, Computer Science and Technology

Core Curricula: Computer structure and composition, Spatial Database, Operating Systems B, Computer Graphics A, Algorithm Design and Analysis, Digital Cartography, GNSS principles and applications B, Geospatial Information System design & development, Internet and mobile GIS development, Artificial Intelligence, GIS Project Management

Main Lab Experiments: Programming of Advanced Computer Language C/ (C++), GIS Algorithms Design and Implementation, Digital Cartography, GeoInformation Engineering Design & Development, Internet and mobile GIS development, Artificial intelligence

Main Practical Work: Programming of Advanced Computer Language C/ (C++), Practice of Digital topographic surveying, Projects of Data Structure A, Practice of Geographic Information Systems, Practice of Principles and Applications of Remote Sensing, Practice of Physical Geography and Geology, Course Projects of Computer organization and architecture, Course Projects Geodatabase, Course Projects of Computer Graphics, Course Projects of Digital Cartography, Course Projects of GIS Algorithms Design and Implementation, GNSS Principles and Applications B, Course Projects of GIS Project Management, Practice of Geospatial Information System Design & Development, Practice of Internet and mobile GIS software development, Practice of Geospatial data production and application, Graduation Project (Thesis)

Requirements for Graduation Credits: 170

Duration& Degree Granted: Four years, Bachelor of Engineering

Recommended minor: Remote Sensing Science and Technology, Surveying and Mapping Engineering, Geographic Information Science, Computer Science and Technology

Related Specialties: Surveying and Mapping Engineering, Geographic Information Science, Computer Science and Technology

地理空间信息工程专业课程教学计划表
Course Descriptions of Geospatial Information Engineering

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Cr	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits								
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th	
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp										
通识教育课 Liberal Education Courses	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、生态学概论等两门必修课程总计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		11	7	4	5				
	大类专业课 Platform Courses	21121100	测绘学概论 Introduction to Geomatics	1	16	16						1							
21130500		计算科学基础 Fundamentals of Computational Science	2	32	32						2								
21930900		计算机高级语言程序设计 C/(C++) Programming of Advanced Computer Language C/ (C++)	3	48	48			16			3								
21944800		数据结构 Data Structure	3	48	48							3							

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp									
	21131200	数字地形测量学 Digital Topographic Surveying	2.5	40	40							2.5						
	21131300	遥感原理与应用 Principles and Applications of Remote Sensing	2.5	40	40				8			2.5						
	21130702	地理信息系统原理 B Principles of Geographic Information System B	2	32	32							2						
	小计 Sum		16	256	256			16	8			3	3	10				
学科基础课 Disciplinary Fundamental Courses	212127*1	高等数学 A Advanced Mathematics A	11.5	184	184						5	6.5						
	21212801	线性代数 A Linear Algebra A	3.5	56	56						3.5							
	212130*3	大学物理 C College Physics C	6	96	96						3.5	2.5						
	21216902	物理实验 B Physics Experiments B	1.5	48	4	44						1.5						
	21213501	概率论与数理统计 A Probability and Statics A	3.5	56	56							3.5						
	小计 Sum		26	440	396	44						8.5	11.5	6				
专业主干课 Main Specialty Courses	21140100	计算机组成与体系结构* Computer organization and architecture	2.5	40	40									2.5				
	21140200	空间数据库原理 Spatial Database	2.5	40	40									2.5				
	21140300	操作系统原理 Principle of Operating Systems	3	48	48									3				
	21131803	计算机图形学 C Computer Graphics A	2	32	32									2				
	21134100	GIS 算法设计与实现 GIS Algorithms Design and Implementation	2	32	20	12									2			
	21140400	数字制图学 Digital Cartography	2.5	40	32	8									2.5			
	21140500	地理空间信息工程设计与开发 GeoInformation Engineering Design & Development	2.5	40	32	8					地理信息系 统原理				2.5			
	21135202	GNSS 原理及其应用 B GNSS Principles and Applications B	2	32	32											2		
	21134600	互联网与移动 GIS 开发 Internet and mobile GIS development	2.5	40	32	8					地理信息系 统原理					2.5		
	21133500	人工智能 Artificial intelligence	2	32	24	8	8									2		
21140600	GIS 项目管理 GIS Project Management	2	32	32												2		

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Cr	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp									
	小计 Sum		25.5	408	364	44	8					10	7	8.5				
专业选修课 Specialty Elective Courses		可按方向设课, 具体见专业选修课列表	14.5	232														
合计 Sub-total			123	2076	1612	88	32	56		22.5	21.5	20	15	7	8.5			
实践环节 Practical Work	44300400	军事训练 Military Training	2	2周						2								
	41931000	计算机高级语言课程设计 C/(C++) Projects of Advanced Computer Language C/(C++)	2	2周							2							
	41131400	数字地形测量教学实习 Practice of Digital Topographic survey	3	3周								3						
	41931300	数据结构课程设计 Projects of Data Structure	3	3周								3						
	41130800	地理信息系统实习 Practice of Geographic Information Systems	2	2周								2						
	41131500	遥感原理与应用课程实习 Practice of Principles and Applications of Remote Sensing	2	2周								2						
	41224100	自然地理与地质学实习 Practice of Physical Geography and Geology	2	2周								2						
	41140700	计算机组成与体系结构课程设计 Course Projects of Computer organization and architecture	1	1周									1					
	41140800	空间数据库原理课程设计 Course Projects Geodatabase	2	2周									2					
	41140900	GIS 算法设计与实现课程设计 Course Projects of GIS Algorithms Design and Implementation	1	1周										1				
	41141000	GNSS 原理及其应用实习 Practice of GNSS Principles and Applications	1	1周											1			
	41141100	GIS 项目管理课程设计 Course Projects of GIS Project Management	1	1周											1			
41141200	地理空间信息系统设计与开发实习 Practice of Geospatial Information System Design & Development	2	2周										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										
	41141300	互联网与移动 GIS 开发实习 Practice of Internet and mobile GIS software development	2	2 周													2		
	41141400	计算机图形学课程设计 Course Projects of Computer Graphics	1.5	1.5 周									1.5						
	41141500	数字制图学课程设计 Course Projects of Digital Cartography	1.5	1.5 周									1.5						
	41141600	地理空间数据生产应用实践 Practice of Geospatial data production and application	2	2 周									2						
	41132600	毕业设计(论文) Graduation Design (Thesis)	8	16 周															8
	小计 Sum		39	47 周									2	4	10	6.5	4.5	4	8
创新创业自主学习 Freedom study	ZZ35000S	社会调查 Social Investigation	2																
		创新创业实践 Innovation and Entrepreneurial practice	2																
		其他(学科竞赛、发明创造、科研报告) Others (Contest, Invention, Innovation and Research Presentation)	4																
	小计 Sum		8																
总计 Total			170	2076 +47 周	1612	88	32	56		24.5	25.5	30	21.5	11.5	12.5			8	
可开出专业选修课列表 Specialty Elective Courses	21129600	空间信息高性能计算 Spatial information high performance computing	2.5	40	24	16											2.5		
	21141700	地理数据建模与分析 Geographic Modeling and Analysis	2.5	40	24	16											2.5		
	21141800	虚拟地理环境 Virtual Geography Enviornments	2	32	24	8								2					
	21147700	专业前沿文献阅读与科学报告写作(GIE)* Up-to-date Specialized Paper Reading and Writing(GIE)	2	32	32													2	
	21141900	数据挖掘理论与方法 Data Mining Theory and Method	2.5	40	24	16												2.5	
	21131900	数字图像处理 Digital Image Processing	2	32	32									2					
	21134202	空间统计与分析 B Spatial Statistics and Analysis	1.5	24	24			8							1.5				

附：

“地理信息工作实践”与企事业单位联合培养阶段实施方案

培养目标：为了更好地加强理论与实践相结合，提高学生工程实践能力，缩短学校学习与行业需求的差距，弥补高校实践教学环节的不足，本专业培养方案安排了“地理信息工作实践”的教学环节，规定了相应的实习学分，要求学生在相关的企业中完成这个实践学分。旨在培养造就适应社会需要的高质量地理信息工程软件技术人才。

培训重点：该实践教学以培养地理空间信息工程专业学生的工程实践能力、工程设计能力和工程创新能力为重点。实践内容涵盖地理信息系统软件项目开发的全过程，涉及业务建模、需求、分析和设计、实现、测试以及部署、配置和变更管理、项目管理等工作流程，以提高学生地理信息软件开发知识的系统性，通过这种涉及软件生命周期全过程的企业实践，全面提升学生解决实际问题的能力、团队合作能力、组织协调能力和沟通能力，同时增强学生服务国家服务人民的社会责任感、勇于探索的创新精神。

培训阶段：该实践强调注重教学内容的实用性、实践性和创新性，分基础训练阶段和项目实训阶段，来保证培养目标的实现。

1) 基础训练课程：

基础训练以企业培训和企业导师指导下的自主学习相结合的方式开展，内容可涵盖业务学习、市场分析、产品规划、交互设计、前端/后端开发、平台工具使用、职业规范等。基础训练阶段的时间长短由企业根据本单位和学生的实际情况确定。

2) 项目实训课程：学生将根据合作企业研发部门的需要申请进入研发部门实习，研发部门有权依据学生基础训练阶段的行为表现和成绩选择学生。进入研发部门的实习生被安排到具体的项目团队中，以项目成员的身份承担研发任务，参与项目研发过程，并遵守相关制度和接受考核。考核原则上每月一次，对于不遵守纪律或不认真努力的学生，容许淘汰。

课程及学分设置：

“地理信息工作实践”主要利用寒暑假、大三及大四的时间进行，原则上每两周1个学分，学分最小计量单位为0.5。学生利用寒暑假零散开展的实习，由学生本人按学院规定提供相应证明材料，由学院教务科统一认定，少于1周不记学分，少于2周记0.5学分。

考核标准及成绩评定：

企业实习总评成绩=实习期间考核成绩*40%+报告评阅成绩*30%+验收成绩*30%，其中：

- (1) 实习期间考核成绩综合企业单位资质、平时考核成绩、企业导师反馈意见等评定；
- (2) 报告评阅成绩为总结报告评价标准中各项分值的累加；
- (3) 验收成绩由相应的校内指导老师检查给出。

验收评价细则及得分				
100~90	89~80	79~70	69~60	59~0
涉及内容丰富，有深度，设计方案合理，任务完成效果良好；有最终产品完整实现初期目标；PPT版式合理，格式规范等。	涉及比较内容丰富，有比较深度，设计方案比较合理，任务完成效果比较良好；有基本产品实现初期目标；PPT版式比较合理，格式比较规范等。	涉及内容基本丰富，有基本深度，设计方案基本合理，任务完成基本任务；PPT版式比较合理，格式基本规范等。	涉及简单内容，内容不多，完成部分内容和任务，PPT版式基本合理，格式基本规范等。	涉及简单内容，内容较少，没有完成任何任务；PPT版式不合理，基本格式不规范等。

工作、生活及安全保障管理：

1. 学院负责人是“地理信息工作实践”教学安全工作的第一责任人，主管教学的院长和学生主管书记是“地理信息工作实践”教学安全管理的具体负责人。
2. 教学系负责确定每届学生的“地理信息工作实践”课程负责人和校内指导教师，原则上每个班的课程负责人由班主任担任，负责审核和汇总学生提交的企业实习申请以及组织进行实习过程管理和考评，另每个班按师生比不低于1:10配备若干校内指导教师，与课程负责人共同完成学生“地理信息工作实践”过程管理和考评。
3. 学生参加“地理信息工作实践”期间，所在单位应与学生（及家长）、学院共同签署关于安全责任的三方协议（协议中必须有保障安全的详细条款，由学生辅导员保管）。在校内实训期间，按照中国地质大学学生管理条例，由学院指导教师进行管理。
4. 学生企业实习期间由所在单位参照单位员工管理办法予以管理，学生实习由企业导师与学院指派的校内指导教师共同指导和考核。实习期间，学生要每周向校内指导教师提交企业实习周记（电子版）。
5. 学生实习期满，由所在单位出具学生实习期间的考核意见并加盖公章。
6. 参加校内外企业实习后，须提交实习报告并参加答辩，审核通过后由教务科登记。
7. 外出实习学生要明确实习的离校和返校时间，要与辅导员保持联系，学生要严格遵守学校及企业的安全管理规定。
8. 如出现特殊情况，经学院核实审批并取得实习实训单位同意后可中断实习。

在外实习过程中所应遵守的安全条款：

1. 遵守《中国地质大学学生手册》，遵照《中国地质大学（武汉）本科学生实习安全管理办法（试行）》执行；
2. 按照《安全性原则》执行：
 - 1) 学生在出发前应有一定的心理准备，学生必须明确实习期间的艰苦。
 - 2) 学生在实习过程中的每一天的生活起居必须由自己独立完成。
 - 3) 如果有不适应当地生活条件，应当尽快自我调节，以免给身体造成不必要的伤害。
 - 4) 在身体不适的情况下应及时向指导老师反映，不能隐瞒病情。
 - 5) 牢记紧急电话：如当地的医院，公安局，政府和支持单位的电话号码和其它紧急号码（报警：110；急救：120；火警：119）。

地理空间信息工程专业辅修课程教学计划表
Course Descriptions of Geospatial Information Engineering (Minor)

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内 实验 Lab	实验/科 研实践 Lab/Res.	研讨 Dis	素质 拓展 Exp									
学科基础课 Disciplinary Fundamental Courses	21121100	测绘学概论 Introduction to Geomatics	1	16	16						1							
	21944800	数据结构 Data Structure	3	48	48					计算机高级 语言程序设 计(C++)		3						
	21131300	遥感原理与应用 Principles and Applications of Remote Sensing	2.5	48	40				8		2.5							
	21130702	地理信息系统原理 B Principles of Geographic Information Systems	2	32	32						2							
	21135202	GNSS 原理及其应用 B GNSS Principles and Applications B	2	32	32							2						
	小计 Sum		10.5	168	168						5.5	2	3					
专业主干课 Main Specialty Courses	21140200	空间数据库原理 Spatial Database	2.5	40	40						2.5							
	21140400	数字制图学 Digital Cartography	2.5	40	32	8						2.5						
	21140500	地理空间信息系统设计与开发 GeoInformation System Design & Development	2.5	40	32	8						2.5						
	21134600	互联网与移动 GIS 开发 Internet and mobile GIS software development	2.5	40	32	8							2.5					
	21140600	GIS 项目管理 GIS Project Management	2.5	40	32	8							2.5					
	小计 Sum		12.5	200	168	32						2.5	5	5				
	41140900	地理空间信息系统设计与开发实 习 Practice of Geospatial Information System Design & Development	2	2 周										2				
	小计 Sum		2	2 周										2				
总计 Total		25	368+2 周	336	32						5.5	4.5	8	7				

地理空间信息工程专业课程分类统计

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	168/10.5	200/12.5	2周/2	368+2周	25
学分所占比例	43.5%	50%	6.5%		

注明：凡选修本专业的学生需先修“计算机高级语言程序设计(C++)”48学时/3学分