**2020级地理空间信息工程专业本科培养方案**

# **一、专业基本信息**

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| --- | --- | --- | --- |
| 英文名称 | [Geospatial Information](http://www.airitilibrary.com/Publication/PublicationIndex/dlkjxx) Engineering | | |
| 专业代码 | **081205T** | 学科门类 | 工学 |
| 学 制 | 四年 | 授予学位 | 工学学士 |

# **二、培养目标及特色**

**培养目标：**

本专业培养思想政治素质高，基础理论扎实，实践能力强，具有社会责任感，德、智、体、美、劳全面发展的地理空间信息复合型工程技术人才，具备数理基础和人文社科知识，掌握自然地理学和地理信息系统的基础知识、基本理论、分析方法和应用技能，接受科学思维和工程实践训练，具备利用测绘、遥感、卫星定位导航等技术获取地理数据的能力，掌握一定的数理统计分析和计算机技术，具有定量分析、研究地理问题的能力。能够胜任城市规划、地理国情、资源管理、环境保护、测绘、农林、城建、交通等领域地理信息系统的设计、生产、研发及管理工作，具有较强的组织管理能力、创新能力、继续学习能力和国际视野。毕业后经过5年左右的工作和学习，能够达到如下目标：

（1）掌握数学、自然科学、工程基础及先进的地理信息系统理论与技术，胜任地理空间信息工程设计、开发及管理等专业技术工作；

（2）具有良好专业素养、丰富的工程管理经验和极强工作责任心，成为地理信息企事业单位中的技术负责人或技术骨干；

（3）具有继续学习适应发展的能力，能够独立或协同承担地理空间信息科研工作；

（4）具有良好的团队意识、国际化视野和沟通能力，能够承担团队中的领导角色；

（5）具有良好的思想道德修养和科学文化素养，能够承担和履行社会责任。

**专业特色：**

本专业依托首都建设和学校土木建筑类学科优势，培养服务首都、面向全国的城市信息化建设的专业地理信息人才。适应地理信息高新科技发展，融教学、科研和生产为一体，强调理论与实践密切结合，突出城市空间信息特色，培养地理信息系统新技术、新方法的应用及软件设计开发的综合能力，满足城市空间信息化建设的地理信息系统人才需求。

# **三、主干学科**

测绘科学技术、地理学、计算机科学与技术。

# **四、主干课程**

1．主干基础课程（8门）

高等数学、测绘地理信息概论、C语言程序设计、地球科学概论、数字地形测量学、地图学、CAD基础与应用、地理信息系统原理（双语）、遥感原理与应用

2．主干专业课程（6门）

空间数据库、空间分析与建模、地理信息系统设计与开发、WebGIS技术与开发、城市空间信息学、误差理论与测量平差基础

# **五、主要实践教学环节（12门）**

数字地形测量学实习、地图学实习、C#程序实习、空间数据库实习、地理信息系统原理实习、遥感原理与应用实习、地理信息系统设计与开发实习、摄影测量基础实习、空间分析与建模实习、自然地理地貌及遥感图像解译实习、空间信息综合实习、毕业设计或论文

# **六、毕业学分要求**

参照北京建筑大学本科学生学业修读管理规定及学士学位授予细则，修满本专业最低计划学分应达到166学分，其中，理论课程130学分，实践教学环节36学分。

# **七、各类课程结构比例**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **课程类别** | **课程属性** | **学分** | **学时** | **学分比例** |
| 通识教育课 | 必修 | 41.5 | 816 | 26.15% |
| 选修 | 2 | 32 | 1.03% |
| 大类基础课 | 必修 | 43 | 756 | 24.23% |
| 选修 | 1 | 16 | 0.51% |
| 专业核心课 | 必修 | 16 | 256 | 8.21% |
| 专业方向课 | 必修 | 5 | 80 | 2.56% |
| 选修 | 21.5 | 344 | 11.03% |
| 独立实践环节 | 必修 | 34 | 780 | 25.00% |
| 选修 | 2 | 40 | 1.28% |
| 总计 | | 166 | 3120 | 100% |

# **八、教学进程表**

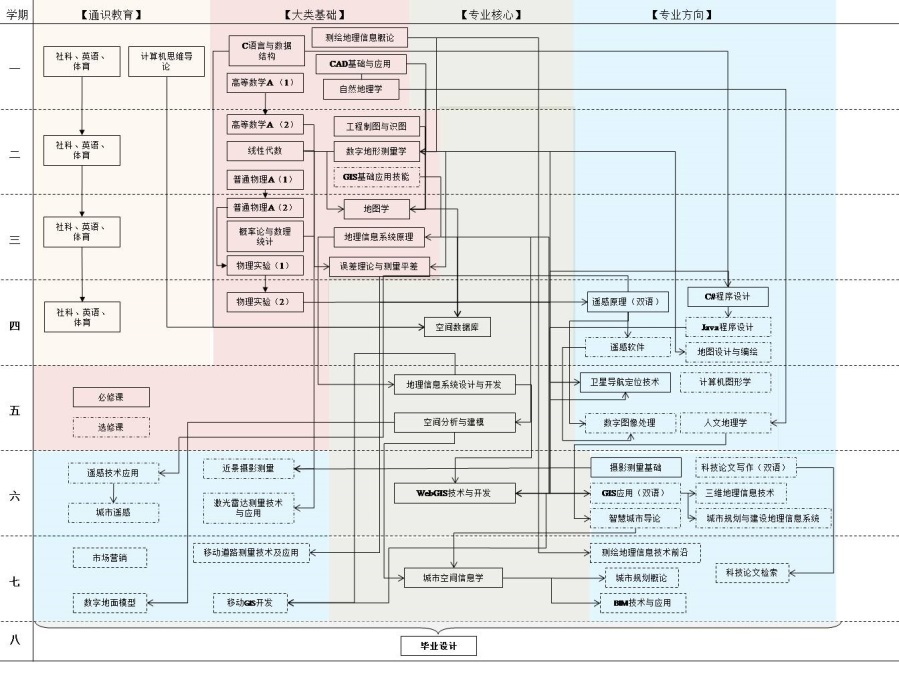
|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 学期 | 教学周 | 考试 | 实践 | 学期 | 教学周 | 考试 | 实践 |
| 1 | 4-19周 | 20周 | 1-3 | 2 | 1-16周 | 17周 | 18-20周 |
| 3 | 1-15周 | 16周 | 17-20周 | 4 | 1-15周 | 16周 | 17-20周 |
| 5 | 1-15周 | 16周 | 17-20周 | 6 | 1-14、16-19周 | 20周 | 15周 |
| 7 | 7-20周 |  | 1-6周 | 8 | 1-16毕业设计/实习 17周答辩 | | |

# **九、毕业生应具备的知识能力及实现矩阵**

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| --- | --- | --- |
| 毕业生应具备的知识能力 | 相关知识领域 | 实现途径（课程支撑） |
| 1.工程知识: 能够将数学、自然科学、工程基础和专业知识用于解决复杂地理空间信息工程问题。 | 1.1能够将数学、自然科学、工程科学的语言工具用于地理空间信息工程问题的表述 | 计算思维导论、C语言与数据结构、CAD基础与应用、工程制图与识图、高等数学A(1-2)、概率与数理统计B、普通物理A(1-2)、物理实验（1-2）、线性代数、土木工程概论、地图学、地球科学概论、计算机图形学等、数字图像处理。 |
| 1.2能针对具体的地理空间对象建立数学模型并求解 | 高等数学A(1-2)、线性代数、数字地形测量学、地理信息系统原理（双语）、摄影测量基础、误差理论与测量平差基础、  空间分析与建模、城市地理学**CIM技术与应用、大数据与地理信息系统、人工智能在地理信息系统中的应用。** |
| 1.3能够将相关知识和数学模型方法用于推演、分析地理信息系统专业复杂工程问题 | 计算思维导论、CAD基础与应用、工程制2图与识图、线性代数、卫星导航定位技术、激光雷达测量技术与应用、计算机图形学、城市空间信息学、**CIM技术与应用**等。 |
| 1.4能够将相关知识和数学模型方法用于地理信息工程专业复杂工程问题解决方案的比较与综合 | C语言程序设计、数据结构、c#程序设计、Java程序设计、Python程序设计、概率与数理统计B、三维地理信息技术、近景摄影测量、数字地形测量实习、地图学实习、摄影测量基础实习、空间信息综合实习、毕业设计等。 |
| 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地理信息工程问题，以获得有效结论。 | 2.1能够将数学、自然科学与工程科学的基本理论运用到识别、分析与表达 | 计算思维导论、C语言程序设计、高等数学A(1-2)、概率与数理统计B、物理实验（1-2）、线性代数、C#程序设计、地图学、地理信息系统原理（双语）、地球科学概论、空间分析与建模、摄影测量基础实习、空间分析与建模等。 |
| 2.2能够基于相关科学原理和数学模型方法正确表达复杂地理空间信息工程问题 | CAD基础与应用、数字地形测量学、误差理论与测量平差基础、激光雷达测量技术与应用、三维地理信息技术、GIS基础应用技能等。 |
| 2.3能够认识到解决问题有多种方案可选择，会通过文献研究寻求可替代的解决方案 | C语言程序设计、数据结构、科技文献检索、摄影测量基础、地理信息系统原理实习、空间信息综合实习等。 |
| 2.4能运用基本原理，借助文献研究，分析过程的影响因素，获得有效结论 | 普通物理A(1-2)、科技文献检索、卫星导航定位技术、毕业设计等。 |
| 3.设计/开发解决方案：能够设计针对复杂地理空间信息工程问题的解决方案，设计满足特定需求的系统、生产流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。 | 3.1掌握地理信息系统设计/开发全周期、全流程的基本设计/开发方法和技术，了解影响设计目标和技术方案的各种因素 | 计算思维导论、CAD基础与应用、GIS基础应用技能、智慧城市导论、空间分析与建模、地理信息系统设计与开发、空间数据库、WebGIS概论、摄影测量基础实习、空间信息综合实习等。 |
| 3.2能够设计开发满足特定地理空间信息工程需求的生产流程及系统 | C语言程序设计、数据结构、CAD基础与应用、遥感原理、地理信息系统原理（双语）、地理信息系统设计与开发、空间数据库、WebGIS概论、摄影测量基础、卫星导航定位技术、激光雷达测量技术与应用、地图设计与编绘、地图学实习、地理信息系统原理实习等。 |
| 3.3能够在地理空间信息工程解决方案设计中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素 | 测绘地理信息概论、WebGIS概论、地理信息系统设计与开发、数字地形测量学、**大数据与地理信息系统、人工智能在地理信息系统中的应用、**创新实践（GIS大赛）、数字地形测量实习、创新创业类、毕业设计等。 |
| 4.研究：能够基于科学原理并采用科学方法对复杂地理空间信息工程问题、地理问题进行研究，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。 | 4.1能够运用科学原理对复杂地理空间信息工程问题、地理问题提出研究方案 | 地球科学概论、地图学、地理信息系统原理（双语）、智慧城市导论、遥感原理实习、地图学实习等。 |
| 4.2能够基于专业理论知识对研究方案进行设计、论证与预测 | 计算思维导论、**大数据与地理信息系统、人工智能在地理信息系统中的应用、**工程制图与识图、遥感原理、摄影测量基础、卫星导航定位技术、空间信息综合实习等。 |
| 4.3能够采用科学方法实施数据采集与分析处理 | C#程序设计、C语言程序设计、数据结构、空间数据库、误差理论与测量平差基础、激光雷达测量技术与应用、遥感数字图像处理、摄影测量基础实习等。 |
| 4.4能够对实验结果进行信息综合与评判，取得合理有效结论 | 科技文献检索、地图学、科技论文写作（双语）、空间分析与建模、空间信息综合实习、毕业设计等。 |
| 5.使用现代工具：能够针对复杂地理空间信息工程问题，开发、选择与使用恰当的地理信息系统技术、资源、数据采集设备和信息技术，包括对复杂理空间信息工程问题的预测与模拟，并能够理解其局限性。 | 5.1 能够针对复杂地理空间信息工程问题，选择恰当的数据获取方法与技术 | 大学英语（1-2）、计算思维导论、卫星导航与定位、C语言与数据结构、CAD基础与应用、C#程序设计、数字地形测量学、激光雷达测量技术与应用、三维地理信息技术、计算机图形学、GIS基础应用技能、智慧城市导论、测绘地理信息技术前沿、数字地形测量实习、遥感原理实习、地图学实习、GIS软件开发大赛实训等。 |
| 5.2能够使用现代数据采集设备和信息技术软件完成地理信息系统数据采集、数据处理与精度分析 | 空间分析与建模、空间数据库、工程制图与识图、高等数学A（1-2）、概率与数理统计B、数字地形测量学、遥感原理、地图学、摄影测量基础、卫星导航定位技术、误差理论与测量平差基础、遥感数字图像处理、数字地形测量实习、遥感原理实习、地理信息系统原理实习、空间信息综合实习、毕业设计、测绘技能大赛实训、GIS软件开发大赛实训等。 |
| 5.3 能够使用现代工具，对复杂地理空间信息工程问题、地理问题进行预测与模拟，并理解其局限性 | 概率与数理统计B、普通物理（1-2）、线性代数、科技文献检索、误差理论与测量平差基础、大数据与地理信息系统、人工智能在地理信息系统中的应用、摄影测量基础实习、毕业设计、创新实践（GIS技能大赛、测绘技能大赛、测绘科技论文大赛）等。 |
| 6.工程与社会：能够基于工程相关背景知识进行合理分析，评价地理空间信息工程实践和复杂地理空间信息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。 | 6.1熟悉地理信息系统专业相关技术标准、法律法规及管理规定，能够基于工程相关背景知识进行合理分析 | 思想道德修养与法律基础、数字地形测量学、遥感原理、空间分析与建模、城市地理学、卫星导航定位技术、数字地形测量实习、地理信息系统原理实习、工程实践类、毕业设计等。 |
| 6.2能够评价地理空间信息工程实践和复杂地理空间信息工程问题、地理问题的解决方案对社会、健康、安全、法律以及文化的影响，以及这些制约因素对项目实施的影响，并理解应承担的责任 | 中国近现代史纲要、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体系理论概论、军事理论、工程测量学、城市空间信息学、城市地理学、经典赏析与文化传承、哲学视野与文明对话、科技革命与社会发展、建筑艺术与审美教育、生态文明与未来城市等。 |
| 7.环境和可持续发展：能够理解和评价针对复杂地理空间信息问题的地理空间信息工程实践对环境、社会可持续发展的影响。 | 7.1知晓和理解环境保护和可持续发展的理念和内涵 | 物理实验（1-2）、测绘地理信息概论、地球科学概论、遥感数字图像处理、形势与政策（1-2）等。 |
| 7.2能够从环境保护和可持续发展的角度认知地理空间信息工程实践活动的可持续性，以及评价测绘工程生产实践中可能对环境及社会造成的损害和隐患 | 地球科学概论、智慧城市导论、**城市地理学**、城市空间信息学、大数据与地理信息系统、遥感原理、复合培养类、毕业设计等。 |
| 8.职业规范：具有人文社会科学素养、社会责任感，能够在地理空间信息工程实践中理解并遵守地理信息系统行业职业道德和规范，履行责任。 | 8.1具有人文社会科学素养，树立正确的世界观、人生观和价值观 | 思想道德修养与法律基础、中国近现代史纲要、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体系理论概论、军事理论、体育（1-4）、军训等。 |
| 8.2理解诚实公正、诚信守则的测绘行业职业道德和规范，并能在地理空间信息工程实践中自觉遵守 | 思想道德修养与法律基础、中国近现代史纲要、毛泽东思想和中国特色社会主义体系理论概论、大学生职业生涯与发展规划、测绘地理信息概论、地理信息系统设计与开发、WebGIS概论、形势与政策（1-2）、数字地形测量实习、空间信息综合实习等。 |
| 8.3理解地理空间信息工程工作人员对公众的安全、健康、福祉、环境保护的社会责任，能够在地理空间信息工程实践中自觉履行责任 | 马克思主义基本原理概论、大学生职业生涯与发展规划、测绘地理信息概论、地球科学概论、毕业设计等。 |
| 9.个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及责任人的角色。 | 9.1能与建筑、土木等学科的成员有效沟通，合作共事 | 大学生职业生涯与发展规划、体育（1-4）、工程力学、城市地理学、C#程序设计、毕业设计等。 |
| 9.2能够在团队中独立或合作开展工作 | 军事理论、军训、创新实践（测绘技能大赛、测绘科技论文大赛）、数字地形测量实习、遥感原理实习、测绘技能大赛实训、GIS软件开发大赛实训等。 |
| 9.3能够组织、协调和指挥团队开展工作 | 中国近现代史纲要、军事理论、地图学实习、地理信息系统原理实习、空间信息综合实习、激光雷达测量技术实习、毕业设计等。 |
| 10.沟通：能够就复杂地理空间信息工程问题与地理信息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。 | 10.1能够在撰写设计书、技术报告以及陈述发言中，就复杂地理空间信息工程问题与地理信息同行及社会公众进行有效沟通和交流 | 地图学实习、地理信息系统设计与开发、WebGIS概论、空间信息综合实习、毕业设计等。 |
| 10.2具备一定的国际视野，了解测绘领域的国际前沿发展趋势和研究热点 | 大学英语（1-2）、遥感原理、地理信息系统原理（双语）、空间信息综合实习、大学英语拓展系列课程（1-8）、GIS基础应用技能、遥感应用前景等。 |
| 10.3具有跨文化交流的语言和书面表达能力，能够就地理空间信息问题在跨文化背景下进行沟通和交流 | 大学英语（1-2）、科技论文写作（双语）、大学英语拓展系列课程（1-8）等。 |
| 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。 | 11.1掌握工程项目中涉及的管理与经济决策方法 | 地理信息系统设计与开发、地理信息系统原理（双语）、毕业设计等。 |
| 11.2了解地理信息系统生产的成本构成，理解其中涉及的工程管理与经济决策问题 | 地理信息系统设计与开发、地理信息系统原理（双语）毕业设计等。 |
| 11.3能在多学科环境下，在设计开发的过程中，运用工程管理与经济决策方法 | 空间信息综合实习、不动产测量与管理实习、地理信息系统设计与开发、城市地理学、毕业设计等。 |
| 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。 | 12.1具有自主学习和终身学习的意识 | 思想道德修养与法律基础、大学生职业生涯与发展规划、大学英语（1-2）、测绘地理信息概论、误差理论与测量平差基础、测绘管理与法律法规、测绘地理信息技术前沿、大学英语拓展系列课程（1-8）等。 |
| 12.2具有不断学习和适应发展的能力 | 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体系理论概论、测绘地理信息概论、科技论文写作（双语）、智慧城市导论、测绘地理信息技术前沿、毕业设计、创新实践（测绘技能大赛、测绘科技论文大赛、GIS技能大赛）等。 |

# **十、指导性教学计划（见附表）**

# **十一、主要课程逻辑关系结构图**



2020 Undergraduate Program for Specialty in Geospatial Information Engineering

# **I. Specialty Name and Code**

|  |  |  |  |
| --- | --- | --- | --- |
| English Name | [Geospatial Information](http://www.airitilibrary.com/Publication/PublicationIndex/dlkjxx) Engineering | | |
| Code | **081205T** | Disciplines | Bachelor of Engineering |
| Length of Schooling | 4 years | Degree | Bachelor of Engineering |

**II. Educational Objectives and Features**

**Objectives:** This program is to cultivate geospatial information inter-disciplinary engineering talents, fully developed in morality, intelligence and physique, well equipped with mathematical science and social science, and highly skilled in basic knowledge, theory, analysis method and application skills of physical geography and geographical information system. The students are required to have the systematic training of scientific thinking and engineering practice, have the ability to use surveying and mapping, remote sensing, satellite positioning and navigation and other technologies to acquire geographic data, master mathematical statistical analysis and computer technology, and have the ability of quantitative analysis and geographical research, so that they are competent in design, production, R&D and management of geographical information system, including urban planning, geographical conditions, resource management and environmental protection. Besides, the graduates have a good ability of organizing, innovation, learning, and international vision as well. After about 5 years of work and study after graduation, the graduates can achieve the following goals:

(1) the knowledge of mathematics, natural science, engineering foundation and advanced theory and technology of geographic information system (GIS), competent in geospatial information engineering design, development and management, and other professional and technical work;

(2) Have good professional quality, rich engineering management experience and strong sense of responsibility, and become the technical leader or technical backbone of surveying and mapping geographic information enterprises and institutions;

(3) Have the ability to continue learning and adapt to development, and can independently or jointly undertake the research work of surveying and mapping geographic information;

(4) Good team awareness, international vision and communication skills, capable of taking the leading role in the team;

(5) Have good ideological and moral cultivation, scientific and cultural literacy, and can assume and fulfill social responsibilities.

**Features:** This program features integrating the teaching, research and production together with the development of high-technology, stressing the combination of theory and practice, highlighting the urban spatial information characteristics, and pinpointing the comprehensive ability of application of new GIS technologies and software development. Based on the construction of Beijing and with the advantages of the civil construction disciplines of the University, this program aims to cultivate professional GIS talents for the urban informatization construction of Beijing and the whole country.

**III. Major Disciplines**

Surveying Science and Technology, Geography, [Computer](javascript:void(0);) A[pplication](javascript:void(0);)

**IV. Major Courses**

1. Basic Courses

Introduction to Geomatics, Engineering Drawing and Read Drawing, C Language Programming, Physical Geography, Digital Topographic Surveying, Cartography, CAD Basic and Application, The Principle of Geographic Information System (Bilingual), Principles of Remote Sensing

2. Specialty Courses

Spatial Database, Spatial Analysis and Modeling, Programming and Development for GIS, WebGIS Technology and Development, Urban Spatial Information Science, Fundamentals of Error Theory and Surveying Adjustment

**V. Major Practical Training**

Digital Topographic Surveying Practice, Cartography Practice, C# Programming Practice, Spatial Analysis and Modeling Practice, The Principle of Geographic Information System Practice, Principles of Remote Sensing Practice, Programming and Development of GIS Practice, Photogrammetry Fundamental Practice, Spatial Analysis and Modeling Practice, Natural Geography and Remote Sensing Practice, Comprehensive Practice, Graduation Project or Thesis

**VI. Graduation Requirements**

In accordance with "Management Regulations for the Undergraduate Students of Beijing University of Civil Engineering and Architecture" and "Bachelor's Degree Awarding Regulations", the minimum credits required by specialty for graduate is 166, including 130credits of theoretical courses and 36 credits of practice teaching.

**VII.Proportion of Course**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course [Category](http://www.baidu.com/link?url=T-sTAae63xKETLJd_N7nNsFUo4ds7VX1E0PW1OwBIazAjp1vVAUKLUIUFYxDzfyxsSDXgWReQf8aH7q_CabOr9251wtvAH6OwY8dszrOr2u" \t "https://www.baidu.com/_blank)** | **Course Type** | **Credits** | **Class Hour** | **Proportion** |
| General Education | Compulsory | 41.5 | 816 | 26.15% |
| Optional | 2 | 32 | 1.03% |
| Big Academic Subjects | Compulsory | 43 | 748 | 24.23% |
| Optional | 1 | 16 | 0.51% |
| Professional Core | Compulsory | 16 | 256 | 8.21% |
| Professional Direction | Compulsory | 5 | 80 | 2.56% |
| Optional | 21.5 | 344 | 11.03% |
| Practice | Compulsory | 34 | 780 | 25.00% |
| Optional | 2 | 40 | 1.28% |
| Total | | 166 | 3120 | 100% |

**VIII. Table of Teaching Program**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Semester | Teaching | Exam | Practice | Semester | Teaching | Exam | Practice |
| 1 | 4-19 | 20 | 1-3 | 2 | 1-16 | 17 | 18-20 |
| 3 | 1-15 | 16 | 17-20 | 4 | 1-15 | 16 | 17-20 |
| 5 | 1-15 | 16 | 17-20 | 6 | 1-16 | 17 | 18-20 |
| 7 | 7-20 |  | 1-6 | 8 | 1-16 Undergraduate Design or Thesis 17 Graduation reply | | |

**IX. Table of Teaching Arrangement**

**幻灯片1**

X. **Graduate Abilities and Matrices**

|  |  |  |
| --- | --- | --- |
| **Graduate Abilities** | **Related Knowledge** | **Course Supports** |
| 1.Engineering knowledge: have the ability of solving complex engineering problems with mathematics, natural science, engineering foundation and professional knowledge. | 1.1 Be able to use the language tools of mathematics, natural science and engineering science to express geospatial information engineering problems. | Introduction to Computational Thinking, C Language and Data Structure, CAD Basic and Application, Engineering Drawing and Read Drawing, Advanced Mathematics A (1-2), Theory of Probability and Statistics (B), College physics B(1), Physics Experiment(1-2), Linear Algebra, Introduction to Civil Engineering, Cartography, Introduction to Geoscience, Computer Graphics, Remote Sensing Image Processing. |
| 1.2 Be able to build and solve mathematical model for specific geospatial objects. | Advanced Mathematics A (1-2), Linear Algebra, Digital Topographic Surveying, The Principle of Geographic Information System (Bilingual Education), Photogrammetry Fundamental, Fundamentals of Error Theory and Surveying Adjustment, Spatial Analysis and Modeling，Urban geography，CIM Technology and Application, Big Data and Geographic Information System, Application of Artificial Intelligence in GIS. |
| 1.3 Be able to apply relevant knowledge and mathematical model method to deduce and analyze complex engineering problems of GIS Specialty | Introduction to Computational Thinking, CAD Basic and Application, Engineering Drawing and Read Drawing, Linear Algebra, Satellite Navigation and Positioning Technology, Laser Radar Surveying Technology and Application, Computer Graphics, Urban Spatial Information Science, CIM Technology and Application. |
| 1.4 Be able to use the relevant knowledge and mathematical model method to compare and synthesize the solutions of complex engineering problems in Geographic Information Engineering Specialty | C Language Programming, Data Structure, C# Programming, Java Programming, Python Programming, Theory of Probability and Statistics B, Technology of 3D GIS, Close Range Photogrammetry, Digital Topographic Surveying Practice, Cartography Practice, Photogrammetry Fundamental Practice, Spatial Information Practice, Undergraduate Design, etc. |
| 2. Problem analysis: Be able to apply the basic principles of mathematics, natural science and Engineering Science, identify, express, and analyze the complex geographic information engineering problems through literature research to obtain the effective conclusion. | 2.1 Be able to apply the basic theories of mathematics, natural science and engineering science to identification, analysis and expression. | Introduction to Computational Thinking, C Language Programming, Advanced Mathematics A (1-2), Theory of Probability and Statistics (B), Physics Experiment (1-2), Linear Algebra, C# Programming, Cartography, The Principle of Geographic Information System (Bilingual Education), Introduction to Geoscience, Spatial Analysis and Modeling，Photogrammetry Fundamental Practice, Spatial Analysis and Modeling. |
| 2.2 Be able to correctly express complex geospatial information engineering problems based on relevant scientific principles and mathematical model method. | CAD Basic and Application, Digital Topographic Surveying, Fundamentals of Error Theory and Surveying Adjustment, Laser Radar Surveying Technology and Application, Technology of 3D GIS, GIS-based Application Skills, etc. |
| 2.3 Be able to recognize that there are multiple solutions to the problem, and seek alternative solutions through literature research | C Language Programming, Data Structure, Document Retrieval of Science and Technology, Photogrammetry Fundamental, The Principle of Geographic Information System Practice, Spatial Information Practice, etc. |
| 2.4 Be able to use the basic principles, with the help of literature research, analyze the influencing factors of the process, and obtain effective conclusions | College physics A (1-2), Document Retrieval of Science and Technology, Satellite Navigation and Positioning Technology, Undergraduate Design, etc. |
| 3. Design/Develop solutions: Be able to solve complex geospatial information engineering problems with design solutions. The design meets the specific needs of system, the unit (components) or process, and can embody the sense of innovation in the design process, considering the society, health, and safety, law, culture and environment factors. | 3.1 Master the basic design / development methods and technologies of the whole cycle and process of GIS design / development, and understand the various factors affecting the design objectives and technical solutions. | Introduction to Computational Thinking, CAD Basic and Application, GIS-based Application Skills, Introduction to Smart City, Spatial Analysis and Modeling, Programming and Development of GIS, Spatial Database, WebGIS Technology and Development, Photogrammetry Fundamental Practice, Spatial Information Practice, etc. |
| 3.2 Be able to design and develop production processes and systems to meet the needs of specific Geospatial Information Engineering | C Language Programming, Data Structure, CAD Basic and Application, Principles of Remote Sensing, The Principle of Geographic Information System (Bilingual Education), Programming and Development of GIS, Spatial Database, WebGIS Technology and Development, Photogrammetry Fundamental, Satellite Navigation and Positioning Technology, Laser Radar Surveying Technology and Application, Map Design and Compilation, Cartography Practice, The Principle of Geographic Information System Practice, etc. |
| 3.3 Be able to reflect innovation awareness in geospatial information engineering solution design, and consider social, health, safety, legal, cultural and environmental factors | Introduction to Geomatics, WebGIS Technology and Development, Programming and Development of GIS, Digital Topographic Surveying, Big Data and Geographic Information System, Application of Artificial Intelligence in GIS, Innovative practice (GIS Competition), Digital Topographic Surveying Practice, Innovation and Entrepreneurship, Undergraduate Design, etc. |
| 4. Study: Be able to study complex engineering problems, including the design of experiments, analysis and interpretation of data, and get a reasonable and effective conclusion through the comprehensive information by using scientific methods based on scientific theory. | 4.1 Be able to use scientific principles to put forward research plans for complex geospatial information engineering problems and geographic problems | Introduction to Geoscience, Cartography, The Principle of Geographic Information System (Bilingual Education), Introduction to Smart City, Principles of Remote Sensing Practice, Cartography Practice, etc. |
| 4.2 Be able to design, demonstrate and predict research plans based on professional theoretical knowledge | Introduction to Computational Thinking, Big Data and Geographic Information System, Application of Artificial Intelligence in GIS, Engineering Drawing and Read Drawing, Principles of Remote Sensing, Photogrammetry Fundamental, Satellite Navigation and Positioning Technology, Spatial Information Practice, etc. |
| 4.3 Be able to use scientific methods to collect and analyze data. | C# Programming, C Language Programming, Data Structure, Spatial Database, Fundamentals of Error Theory and Surveying Adjustment, Laser Radar Surveying Technology and Application, Remote Sensing Image Processing, Photogrammetry Fundamental Practice, etc. |
| 4.4 Be able to synthesize and evaluate the experimental results and get reasonable and effective conclusions. | Document Retrieval of Science and Technology, Cartography, Academic Writing (Bilingual Education), Spatial Analysis and Modeling, Spatial Information Practice, Undergraduate Design or Thesis, etc. |
| 5. Using modern tools: be able to develop, select and use appropriate GIS technology, resources, data collection equipment and information technology for complex geospatial information engineering problems, including prediction and Simulation of complex spatial information engineering problems, and understand their limitations. | 5.1 Be able to select appropriate data acquisition methods and technologies for complex geospatial information engineering problem. | College English (1-2), Introduction to Computational Thinking, Satellite Navigation and Positioning Technology, C Language and Data Structure, CAD Basic and Application, C# Programming, Digital Topographic Surveying, Laser Radar Surveying Technology and Application, Technology of 3D GIS, Computer Graphics, GIS-based Application Skills, Introduction to Smart City, Advanced Technology of Surveying, Mapping and GIS, Digital Topographic Surveying Practice, Principles of Remote Sensing Practice, Cartography Practice, GIS Software Development Competition Practical Training. |
| 5.2 Be able to use modern data acquisition equipment and information technology software to complete GIS data acquisition, data processing and accuracy analysis. | Spatial Analysis and Modeling, Spatial Database, Engineering Drawing and Read Drawing, Advanced Mathematics A (1-2), Theory of Probability and Statistics (B), Digital Topographic Surveying, Principles of Remote Sensing, Cartography, Photogrammetry Fundamental, Satellite Navigation and Positioning Technology, Fundamentals of Error Theory and Surveying Adjustment, Digital Topographic Surveying Practice, Principles of Remote Sensing Practice, The Principle of Geographic Information System Practice, Spatial Information Practice, Undergraduate Design or Thesis, Surveying and Mapping Skills Practice Contest, GIS Software Development Competition Practical Training, etc. |
| 5.3 Be able to use modern tools to predict and simulate complex geospatial information engineering problems and geographic problems, and understand their limitations. | Theory of Probability and Statistics (B), College physics (1-2), Linear Algebra, Document Retrieval of Science and Technology, Fundamentals of Error Theory and Surveying Adjustment, Big Data and Geographic Information System, Application of Artificial Intelligence in GIS, Photogrammetry Fundamental Practice, Undergraduate Design or Thesis, Innovative Practice (National University GIS Application Skills Contest，Surveying and Mapping Skills Contest，Surveying and Mapping Science and Technology Paper Contest)，etc. |
| 6. Engineering and society: be able to conduct reasonable analysis based on the relevant background knowledge of the project, evaluate the impact of geospatial information engineering practice and complex geospatial information engineering problem solutions on society, health, safety, law and culture, and understand the responsibilities to be undertaken. | 6.1 Be familiar with relevant technical standards, laws and regulations and management regulations of GIS, and be able to make reasonable analysis based on relevant engineering background knowledge. | Thought Morals Accomplishment and Basic Law, Digital Topographic Surveying, Principles of Remote Sensing, Spatial Analysis and Modeling, Urban geography, Satellite Navigation and Positioning Technology, Digital Topographic Surveying Practice, The Principle of Geographic Information System Practice, Engineering Practice, Undergraduate Design or Thesis, etc. |
| 6.2 Be able to evaluate the impact of geospatial information engineering practice and complex geospatial information engineering problems, solutions to geographical problems on society, health, safety, law and culture, as well as the impact of these constraints on project implementation, and understand the responsibilities to be undertaken. | The Outline of the Modern Chinese History, The Generality of Basic Principle of Marxism, Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese characteristic socialism, Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese characteristic socialism, Military Theory, Engineering Surveying, Urban Spatial Information Science, Urban geography, Classical appreciation and cultural inheritance, Philosophical vision and civilization dialogue, Scientific and technological revolution and social development, Architectural art and aesthetic education, Ecological Civilization and future City, etc. |
| 7. Environment and sustainable development：Be able to understand and evaluate the influence of geospatial engineering practice with complex engineering problems for sustainable development of environment and society. | 7.1 To know and understand the concept and connotation of environmental protection and sustainable development. | Physics Experiment (1-2), Introduction to Geomatics, Introduction to Geoscience, Remote Sensing Image Processing, Situation and Policy(1-4), etc. |
| 7.2 Be able to recognize the sustainability of geospatial information engineering practice activities from the perspective of environmental protection and sustainable development, and evaluate the possible damage and hidden dangers to the environment and society in the production practice of Surveying and mapping engineering. | Introduction to Geoscience, Introduction to Smart City, Urban geography, Urban Spatial Information Science, Big Data and Geographic Information System, Principles of Remote Sensing, Compound Culture, Undergraduate Design or Thesis. |
| 8. Occupational norms: Equip with the quality of humanistic social sciences, sense of social responsibility, understand and follow professional ethics and criteria in engineering, be conscientious in the performance of one’s duties. | 8.1 Equip with the quality of humanistic social sciences, set up correct world outlook, outlook on life and values. | Thought Morals Accomplishment and Basic Law, The Outline of the Modern Chinese History, The Generality of Basic Principle of Marxism, Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese characteristic socialism, Military Theory, Physical Education (1-4), Military Training, etc. |
| 8.2 Understand the professional ethics and norms of geospatial information industry in terms of honesty, fairness and integrity, and consciously abide by them in geospatial information engineering practice | Thought Morals Accomplishment and Basic Law, The Outline of the Modern Chinese History, Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese characteristic socialism, College Student Occupation Career and Development Planning, Introduction to Geomatics, Programming and Development of GIS, WebGIS Technology and Development, Situation and Policy (1-2), Digital Topographic Surveying Practice, Spatial Information Practice, etc. |
| 8.3 Understand the social responsibility of geospatial information engineering staff for the safety, health, well-being and environmental protection of the public, and be able to consciously perform their responsibilities in geospatial information engineering practice | The Generality of Basic Principle of Marxism, College Student Occupation Career and Development Planning, Introduction to Geomatics, Introduction to Geoscience, Undergraduate Design or Thesis, etc. |
| 9. Individuals and teams: Be able to play an important role of individual, team member and person in charge in the team of multi-subject background. | 9.1 Able to effectively communicate and work with members of architecture, civil engineering and other disciplines | College Student Occupation Career and Development Planning, Physical Education (1-4), Engineering Mechanics, Urban geography, C# Programming, Undergraduate Design or Thesis, etc. |
| 9.2 Be able to work independently or collaboratively in a team | Military Theory, Military Training, Innovative Practice (Surveying and Mapping Skills Contest，Surveying and Mapping Science and Technology Paper Contest)，Digital Topographic Surveying Practice, Principles of Remote Sensing Practice, Surveying and Mapping Skills Practice Contest, GIS Software Development Competition Practical Training, etc. |
| 9.3 Be able to organize, coordinate and direct team work | The Outline of the Modern Chinese History, Military Theory, Cartography Practice, The Principle of Geographic Information System Practice, Spatial Information Practice, Laser Radar Surveying Technology and Application Practice, Undergraduate Design or Thesis, etc. |
| 10. Communication: Be able to communicate effectively with industry peers in complex engineering, including writing reports and design papers, summary statement, express oneself and response instruction clearly. Have international perspective and the ability of communicating between or among interlocutors of different cultural background | 10.1 Be able to effectively communicate and exchange with geographic information peers and the public on complex geospatial information engineering issues in writing design books, technical reports and presentations | Cartography Practice, Programming and Development of GIS, WebGIS Technology and Development, Spatial Information Practice, Undergraduate Design or Thesis, etc. |
| 10.2 Have international vision and understand the international cutting-edge development trend and research hotspot in the field of Surveying and mapping | College English (1-2), Principles of Remote Sensing, The Principle of Geographic Information System(Bilingual Education), Spatial Information Practice, College English training（1-8）, GIS-based Application Skills, Remote Sensing Application Prospect, etc. |
| 10.3 Have the ability of cross-cultural communication in language and writing, and be able to communicate and exchange geospatial information issues in a cross-cultural context | College English(1-2), Academic Writing (Bilingual Education), College English training（1-8）, etc. |
| 11. Project management: Understand and master the method of development and management for economic decision method and application in multi subject environment. | 11.1 Master the management and economic decision-making methods involved in engineering projects | Programming and Development of GIS，The Principle of Geographic Information System (Bilingual Education)，Undergraduate Design or Thesis，etc. |
| 11.2 Understand the cost structure of GIS production and the engineering management and economic decision-making issues involved | Programming and Development of GIS，The Principle of Geographic Information System (Bilingual Education)，Undergraduate Design or Thesis，etc. |
| 11.3 Be able to use engineering management and economic decision-making methods in the process of design and development in a multidisciplinary environment. | Spatial Information Practice, Immovable Property Measurement and Management Practice, Programming and Development of GIS, Urban geography, Undergraduate Design or Thesis, etc. |
| 12. Lifelong learning: Have the awareness of autonomous learning and lifelong learning and the ability to learn, and adapt to the development. | 12.1 Have the awareness of autonomous learning and lifelong learning | Thought Morals Accomplishment and Basic Law, College Student Occupation Career and Development Planning, College English(1-2), Introduction to Geomatics, Fundamentals of Error Theory and Surveying Adjustment, Surveying and Mapping Management and Laws, Advanced Technology of Surveying, Aping and GIS, College English training（1-8）, etc. |
|  | 12.2 Have the ability to learn, and adapt to the development. | The Generality of Basic Principle of Marxism , Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese characteristic socialism, Introduction to Geomatics, Academic Writing (Bilingual Education), Introduction to Smart City , Advanced Technology of Surveying, Undergraduate Design or Thesis, Innovative Practice (Surveying and Mapping Skills Contest，Surveying and Mapping Science and Technology Paper Contest, GIS Skills Competition)，etc. |

## 表1 地理空间信息工程专业指导性教学计划（1）

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **课**  **程**  **类**  **别** | **课**  **程**  **属**  **性** | **课程名称** | **学**  **分** | **总**  **学**  **时** | **讲**  **课**  **学**  **时** | **实**  **验**  **学**  **时** | **上**  **机**  **学**  **时** | **课**  **外**  **学**  **时** | **延**  **续**  **教**  **学** | **开课**  **学期** | **教学单位** |
| 通  识  教  育  课 | 必  修 | 思想道德修养与法律基础  Thought Morals Accomplishment and Basic Law | 3 | 48 | 48 |  |  |  |  | 1 | 马克思主义学院 |
| 中国近现代史纲要  The Outline of the Modern Chinese History | 3 | 48 | 32 |  |  | 16 |  | 2 | 马克思主义学院 |
| 马克思主义基本原理概论★  The Generality of Basic Principle of Marxism | 3 | 48 | 48 |  |  |  |  | 3 | 马克思主义学院 |
| 毛泽东思想和中国特色社会主义体系理论概论★  Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese characteristic socialism | 5 | 80 | 64 |  |  | 16 |  | 4 | 马克思主义学院 |
| 形势与政策（1-4）  Situation and Policy(1-4) | 2 | 32 | 16 |  |  | 16 |  | 1-4 | 马克思主义学院 |
| 形势与政策  Situation and Policy | 0 | 32 |  |  |  | 32 |  | 5-8 | 马克思主义学院 |
| 大学生职业生涯与发展规划  College Student Occupation Career and Development Planning | 1 | 16 | 16 |  |  |  |  | 1/2 | 学工部 |
| 大学生心理健康  The Mental health of College Students | 1 | 16 | 16 |  |  |  |  | 2 | 学工部 |
| 大学英语(1-2) ★ College English(1-2) | 6 | 128 | 96 |  |  |  | 32 | 1-2 | 人文学院 |
| 口语 | 2 | 32 | 32 |  |  |  |  | 3 | 文法学院 |
| 大学英语四级强化 | 2 | 32 | 32 |  |  |  |  | 3 | 文法学院 |
| 大学英语六级提高 | 2 | 32 | 32 |  |  |  |  | 3 | 文法学院 |
| 英语报刊选读 | 2 | 32 | 32 |  |  |  |  | 3 | 文法学院 |
| 英语国家文化 | 2 | 32 | 32 |  |  |  |  | 4 | 文法学院 |
| 英美文学名篇赏析 | 2 | 32 | 32 |  |  |  |  | 4 | 文法学院 |
| 专门用途英语 | 2 | 32 | 32 |  |  |  |  | 4 | 文法学院 |
| 升学英语考试 | 2 | 32 | 32 |  |  |  |  | 4 | 文法学院 |
| 体育(1-4)  Physical Education(1-4) | 4 | 120 | 120 |  |  |  |  | 1-4 | 体育部 |
| 计算思维导论  Introduction to Computational Thinking | 1.5 | 56 | 24 |  |  | 32 |  | 1 | 电信学院 |
| 小 计 | 33.5 | 688 | 544 |  |  | 112 | 32 |  |  |
| 核  心 | 建筑艺术与城市设计 | 2 | 32 |  |  |  |  |  | 1-8 | 各院部 |
| 哲学视野与人文素养 | 2 | 32 |  |  |  |  |  | 1-8 | 各院部 |
| 创新创业与社会发展 | 2 | 32 |  |  |  |  |  | 1-8 | 各院部 |
| 生态文明与智慧科技 | 2 | 32 |  |  |  |  |  | 1-8 | 各院部 |
| 至少修读4类合计8学分，每类至少修读2学分 | | | | | | | | | |
| 任修 | 工程实践类 | 1-8学期任选 | | | | | | | | 各院部 |
| 复合培养类 | 1-8学期任选 | | | | | | | | 各院部 |
| 跨类任选至少2学分 | | | | | | | | | | |
| **通识教育课合计至少修读43.5学分，其中通识教育必修33.5学分（其中口语、大学英语四级强化、大学英语六级提高、英语报刊选读必选2学分，英语国家文化、英美文学名篇赏析、专门用途英语、升学英语考试必选2学分），通识教育核心8学分，通识教育任选2学分** | | | | | | | | | | |

## 表1 地理空间信息工程专业指导性教学计划（2）

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **课**  **程**  **类**  **别** | **课**  **程**  **属**  **性** | **课程名称** | **学**  **分** | **总**  **学**  **时** | **讲**  **课**  **学**  **时** | **实**  **验**  **学**  **时** | **上**  **机**  **学**  **时** | **课**  **外**  **学**  **时** | **延**  **续**  **教**  **学** | **开课**  **学期** | **教学单位** |
| 大  类  基  础  课 | 必  修 | 高等数学A（1）★  Advanced Mathematics A(1) | 5 | 92 | 80 |  |  |  | 12 | 1 | 理学院 |
| 高等数学A（2）★  Advanced Mathematics A(2) | 5 | 84 | 80 |  |  |  | 4 | 2 | 理学院 |
| 线性代数 Linear Algebra | 2 | 40 | 32 |  |  |  | 8 | 2 | 理学院 |
| 概率与数理统计B Theory of Probability and Statistics (B) | 3 | 48 | 44 |  |  |  | 4 | 3 | 理学院 |
| 普通物理A（1）★ College physics A(1) | 3 | 56 | 52 |  |  | 4 |  | 2 | 理学院 |
| 普通物理A（2）★ College physics A(2) | 3 | 56 | 52 |  |  | 4 |  | 3 | 理学院 |
| 物理实验（1-2）Physics Experiment(1-2) | 2 | 60 |  | 60 |  |  |  | 3-4 | 理学院 |
| C语言程序设计★  C Language Programming | 2 | 32 | 24 | 8 |  |  |  | 1 | 地理信息科学系 |
| 地球科学概论  Introduction to Geoscience | 2 | 32 | 32 |  |  |  |  | 1 | 地理信息科学系 |
| 测绘地理信息概论  Introduction to Geomatics | 1 | 16 | 16 |  |  |  |  | 1 | 测绘学院 |
| CAD 基础与应用  CAD Basic and Application | 2 | 32 | 16 | 16 |  |  |  | 1 | 测绘工程系 |
| 数字地形测量学★  Digital Topographic Surveying | 4 | 64 | 52 | 12 |  |  |  | 2 | 测绘工程系 |
| 地图学 Cartography | 3 | 48 | 40 | 8 |  |  |  | 3 | 地理信息科学系 |
| 地理信息系统原理(双语)  The Principle of Geographic Information System(Bilingual Education) | 3 | 48 | 40 | 8 |  |  |  | 3 | 地理信息科学系 |
| 遥感原理与应用  Principles of Remote Sensing | 3 | 48 | 48 |  |  |  |  | 3 | 遥感工程系 |
| 合 计 | 43 | 756 | 608 | 112 |  | 8 | 28 |  |  |
| 选  修 | GIS基础应用技能  GIS-based Application Skills | 1 | 16 | 8 | 8 |  |  |  | 2 | 地理信息科学系 |
| 现代测绘技术应用 Modern Surveying and Mapping Technology Application | 1 | 16 |  |  |  |  |  | 2 | 测绘工程系 |
| 遥感应用前景  Remote Sensing Application Prospect | 1 | 16 |  |  |  |  |  | 3 | 遥感工程系 |
| 大类学科基础课合计44学分，必修43学分，任选1学分 | | | | | | | | | | |

## 表1 地理空间信息工程专业指导性教学计划（3）

| **课**  **程**  **类**  **别** | **课**  **程**  **属**  **性** | **课程名称** | **学**  **分** | **总**  **学**  **时** | **讲**  **课**  **学**  **时** | **实**  **验**  **学**  **时** | **上**  **机**  **学**  **时** | **课**  **外**  **学**  **时** | **延**  **续**  **教**  **学** | **开课**  **学期** | **教学单位** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 专  业  核  心  课 | 必  修 | 空间数据库  Spatial Database | 3 | 48 | 32 | 16 |  |  |  | 4 | 地理信息科学系 |
| 误差理论与测量平差基础★  Fundamentals of Error Theory and Surveying Adjustment | 2 | 32 | 32 |  |  |  |  | 4 | 测绘工程系 |
| 空间分析与建模  Spatial Analysis and Modeling | 3 | 48 | 40 | 8 |  |  |  | 5 | 地理信息科学系 |
| 地理信息系统设计与开发  Programming and Development of GIS | 3 | 48 | 24 | 24 |  |  |  | 5 | 地理信息科学系 |
| WebGIS技术与开发  WebGIS Technology and Development | 3 | 48 | 24 | 24 |  |  |  | 6 | 地理信息科学系 |
| 城市空间信息学  Urban Spatial Information Science | 2 | 32 | 24 | 8 |  |  |  | 7 | 地理信息科学系 |
| 小计 | 16 | 256 | 176 | 80 |  |  |  |  |  |
| 专业核心课合计必修16学分 | | | | | | | | | |
| 专  业  方  向  课 | 必  修 | C#程序设计  C# Programming | 3 | 48 | 32 | 16 |  |  |  | 4 | 地理信息科学系 |
| GNSS原理及其应用  The Application and Principles of GNSS | 2 | 32 | 28 | 4 |  |  |  | 5 | 测绘工程系 |
| 小 计 | 5 | 80 | 60 | 20 |  |  |  |  |  |
| 专  业  方  向  课 | 选  修 | 地图设计与编绘  Map Design and Compilation | 2 | 32 | 16 | 16 |  |  |  | 4 | 地理信息科学系 |
| Java程序设计  Java Programming | 2 | 32 | 24 | 8 |  |  |  | 6 | 地理信息科学系 |
| 人文地理学Human Geography | 1.5 | 32 | 16 | 16 |  |  |  | 5 | 地理信息科学系 |
| 遥感软件  Remote Sensing Software | 2 | 32 | 16 | 16 |  |  |  | 5 | 遥感工程系 |
| 摄影测量学 Photogrammetry（限选） | 3 | 48 | 44 | 4 |  |  |  | 5 | 遥感工程系 |
| Python语言  Python language | 2 | 32 | 24 | 8 |  |  |  | 4 | 地理信息科学系 |
| 遥感数字图像处理 （限选）  [Remote](app:ds:remote) [Sensing](app:ds:sensing) [Image](app:ds:image) [Processing](app:ds:processing) | 1.5 | 24 | 16 | 8 |  |  |  | 5 | 遥感工程系 |
| 数据结构Data Structure（限选） | 1.5 | 24 | 16 | 8 |  |  |  | 5 | 地理信息科学系 |
| 工程制图与识图 （限选）  Engineering Drawing and Read Drawing | 2 | 32 | 32 |  |  |  |  | 6 | 理学院 |
| 科技论文写作（双语）  Academic Writing (Bilingual Education) | 1 | 16 | 16 |  |  |  |  | 6 | 遥感工程系 |
| 科技文献检索 Document Retrieval of Science and Technology | 1 | 24 | 16 |  |  | 8 |  | 7 | 图书馆 |
| GIS应用（双语）  GIS Applications (Bilingual Education) | 1.5 | 24 | 16 | 8 |  |  |  | 6 | 地理信息科学系 |
| 三维地理信息技术 Technology of 3D GIS | 2 | 32 | 16 | 16 |  |  |  | 6 | 地理信息科学系 |
| 计算机图形学（限选）Computer Graphics | 2 | 32 | 20 | 12 |  |  |  | 6 | 地理信息科学系 |
| 人工智能在地理信息系统中的应用（限选）  Application of Artificial Intelligence in GIS | 1.5 | 24 | 16 | 8 |  |  |  | 5 | 地理信息科学系 |
| 大数据与地理信息系统（限选）  Big Data and Geographic Information System | 1.5 | 24 | 16 | 8 |  |  |  | 6 | 地理信息科学系 |
| CIM技术与应用 （限选）  CIM Technology and Application | 2 | 24 | 16 | 8 |  |  |  | 7 | 地理信息科学系 |
| 城市地理学Urban geography（限选） | 2 | 32 | 32 |  |  |  |  | 7 | 地理信息科学系 |
| 遥感技术应用 Applications of Remote Sensing Technology | 2 | 32 | 16 | 16 |  |  |  | 6 | 遥感工程系 |
| 移动GIS开发 Mobile GIS Development | 2 | 32 | 16 | 16 |  |  |  | 7 | 地理信息科学系 |
| 激光雷达测量技术与应用  Laser Radar Surveying Technology and Application | 2 | 32 | 24 | 8 |  |  |  | 6 | 地理信息科学系 |
| 测绘地理信息技术前沿  Advanced Technology of Surveying, Mapping and GIS | 1 | 16 | 16 |  |  |  |  | 7 | 测绘学院 |
| 智慧城市导论Introduction to Smart City | 1 | 16 | 16 |  |  |  |  | 6 | 地理信息科学系 |
| 城市遥感(双语)Urban Remote Sensing(Bilingual Education) | 2.0 | 32 | 24 | 8 |  |  |  | 6 | 遥感工程系 |
| 城市规划概论  Conspectus of Urban Planning | 1.5 | 24 | 20 | 4 |  |  |  | 7 | 建筑学院 |
| 市场营销 Marketing Management | 1.5 | 24 | 24 |  |  |  |  | 7 | 经管学院 |
| 自然资源管理  Natural Resources Management | 1 | 16 |  |  |  |  |  | 7 | 测绘学院 |
| 测绘法律法规（限选）  SurveyingManagement and Laws | 1 | 16 |  |  |  |  |  | 6 | 测绘学院 |
| 小计 | 47 | 760 | 524 | 196 |  |  |  |  |  |
| 专业方向课合计26.5学分，必修5学分，限选18学分，任选3.5学分 | | | | | | | | | | |

## 表2 地理空间信息工程专业指导性教学计划（实践环节）

| **课**  **程**  **属**  **性** | **课程名称** | | **学**  **分** | **折**  **合**  **学**  **时** | **实**  **验**  **实**  **践** | **上**  **机** | **开课**  **学期** | **开设**  **周次** | **教学单位** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 课  内 | 军事理论  Military Theory | | 2 | 36 |  |  | 1 | 1-3 | 武装部 |
| 军训  Military Training | | 2 | 112 |  |  |
| 形势与政策（5-8）Situation and Policy(5-8) | |  | 32 |  |  | 5-8 | 分散 | 马院、各学院 |
| 数字地形测量实习 Digital Topographic Surveying Practice | | 3 | 60 | 60 |  | 2 | 18-20 | 测绘工程系 |
| 地图学实习  Cartography Practice | | 2 | 40 |  |  | 3 | 17-18 | 地理信息科学系 |
| C#程序实习  C# Programming Practice | | 2 | 40 |  |  | 4 | 18-19 | 地理信息科学系 |
| 空间数据库实习Spatial Database Practice | | 2 | 40 |  |  | 4 | 20 | 地理信息科学系 |
| 地理信息系统原理实习The Principle of Geographic Information System Practice | | 2 | 40 |  |  | 3 | 19-20 | 地理信息科学系 |
| 遥感原理与应用实习Principles of Remote Sensing Practice | | 1 | 20 |  |  | 3 | 17 | 遥感工程系 |
| 地理信息系统设计与开发实习 Programming and Development of GIS Practice | | 2 | 40 |  |  | 5 | 19-20 | 地理信息科学系 |
| 摄影测量基础实习  Photogrammetry Fundamental Practice | | 1 | 20 |  |  | 5 | 18 | 遥感工程系 |
| 空间分析与建模实习  Spatial Analysis and Modeling Practice | | 1 | 20 |  |  | 5 | 17 | 地理信息科学系 |
| 自然地理地貌及遥感图像解译实习  Natural Geography and Remote Sensing image interpretation Practice | | 1 | 20 | 20 |  | 6 | 15 | 遥感工程系 |
| 空间信息综合实习  Spatial Information Practice | | 5 | 100 | 100 |  | 7 | 1-5 | 测绘学院 |
| 毕业设计或论文  Undergraduate Design or Thesis | | 8 | 160 | 160 |  | 8 | 1-16 | 地理信息科学系 |
| **合计** | | 34 | 780 | 340 |  |  |  |  |
| 课  外 | 创新实践  及科研训练 | GIS软件开发大赛实训GIS Software Development Competition Practical Training | 1 | 20 | 20 |  | 4 |  | 地理信息科学系 |
| 学院GIS选拔比赛 School GIS Selection Competition | 1 | 20 | 20 |  | 5 |  | 地理信息科学系 |
| 课  外 | 创新实践  及科研训练 | [全国大学生GIS应用技能大赛](http://www.cqvip.com/QK/85996X/20191/7001582884.html" \t "_blank)  National University GIS Application Skills Contest | 1 | 20 | 20 |  |  |  | 地理信息科学系 |
| 超图开发大赛  SuperMap Development Competition | 1 | 20 | 20 |  |  |  | 地理信息科学系 |
| 天地图开发大赛 Map World Development Competition | 1 | 20 | 20 |  |  |  | 地理信息科学系 |
| 则泰杯全国论文大赛 The Mostrule Cup State Essay Competition | 1 | 20 | 20 |  |  |  | 地理信息科学系 |
| Mapgis开发大赛 Mapgis Development Competition | 1 | 20 | 20 |  |  |  | 地理信息科学系 |
| 测绘技能大赛实训 Surveying and Mapping Skills Practice Contest | 2 | 40 | 40 |  | 4 |  | 测绘工程系 |
| 学院测绘技能大赛 School of Surveying and Mapping Skills Contest | 1 | 20 | 20 |  | 4 |  | 测绘工程系 |
| 测量数据处理与程序设计大赛实训 Surveying Data Processing and Program Design Practice Contest | 1 | 20 | 20 |  | 5 |  | 测绘工程系 |
| 遥感科学与技术创新实践及科研训练 | 2 | 40 | 40 |  | 6 |  | 遥感工程系 |
| 小 计 | | 13 | 260 |  |  |  |  |  |
| 实践环节合计36学分，课内必修34学分，创新实践及科研训练选修2学分 | | | | | | | | | |