**2016遥感科学与技术专业本科培养方案**

**一、专业基本信息**

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| --- | --- | --- | --- |
| 英文名称 | Remote Sensing Science and Technology | | |
| 专业代码 | 081202 | 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：**面向首都及国家城乡建设的需要，培养能够在国土资源调查、国家基础测绘、城乡建设与规划、自然资源监测、环境保护、文化遗产保护及灾害预警与应急响应等领域从事地面、航空、航天遥感信息采集与处理、分析、应用开发及项目管理方面工作的高级专业骨干人才。

毕业后经过5年左右的工作和学习，能够达到如下目标：

（1）具有良好的思想道德修养和科学文化素养、工作责任心，能够承担和履行社会责任。

（2）具有组织管理与协调能力，良好的团队意识、国际化视野和沟通能力，能解决复杂遥感工程问题并在工程中担任重要角色。

（3）具有终身学习和跟随遥感领域新技术发展的能力，掌握现代工具、软件的使用方法，具有竞争潜力。

（4）具备测绘地理信息行业工程师能力，胜任地理空间信息采集与处理、信息化测绘、自然资源调查与监测及城市应急等领域等方面的生产、管理、开发、研究与教育工作。成为遥感领域相关企事业单位的技术负责人或技术骨干。

**专业特色：**

本专业依托首都建设、学校土木建筑类学科和学院测绘学科背景优势，在中、高分辨率地理要素提取与城市环境及设施监测、建筑遗产精细重构与虚拟修复、面向城市管理的移动道路测量系统应用等方面具有突出优势和特色。注重扎实的摄影测量与遥感体系课程的贯穿和建设。着力培养学生的两个能力：第一，在各个教学环节注重“原创能力”，强调“计算机实践能力”。第二，确保学生具有摄影测量遥感的生产实践能力。

**三、主干学科**

测绘科学与技术、地理信息科学、计算机科学与技术。

**四、主干课程**

1．主干基础课程

专业概论、数字地形测量学、C语言与数据结构、自然地理学、地图学

2．主干专业课程

遥感原理（双语）、航空航天数据获取、摄影测量基础、遥感数字图像处理、城市遥感、数字摄影测量

**五、主要实践教学环节**

数字地形测量学实习、摄影测量基础实习、航空数据获取、空间信息综合实习、遥感原理实习、遥感数字图像处理、遥感综合实习、自然地理地貌及遥感图像解译实习、（近景与激光雷达、移动测量、微波遥感）新技术综合实习、地理信息系统原理实习、毕业设计。

**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160学分，其中理论课程122学分，实践教学环节38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 | 29.5 | 608 | 18.4 |
| 选修 | 11.0 | 176 | 6.9 |
| 大类基础课 | 必修 | 47 | 820 | 29.4 |
| 选修 | 1 | 16 | 0.6 |
| 专业核心课 | 必修 | 16 | 256 | 10 |
| 专业方向课 | 必修 | 8 | 128 | 5 |
| 选修 | 10.5 | 168 | 6.6 |
| 独立实践环节 | 必修 | 38 | 784 | 23.8 |
| 总计 | | 160 | 2956 | 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 | 4-16周 | 17-18周 | 19-20周 | 2 | 1-16周 | 17-周 | 18-20周 |
| 3 | 1-16周 | 17周 | 18-20周 | 4 | 1-14周 | 15-16周 | 17-20周 |
| 5 | 1-16周 | 17周 | 18-20周 | 6 | 1-16周 | 17-18周 | 19-20周 |
| 7 | 7-14周 |  | 1-6、15-20周 | 8 | 1-16毕业设计/实习 17周答辩 | | |

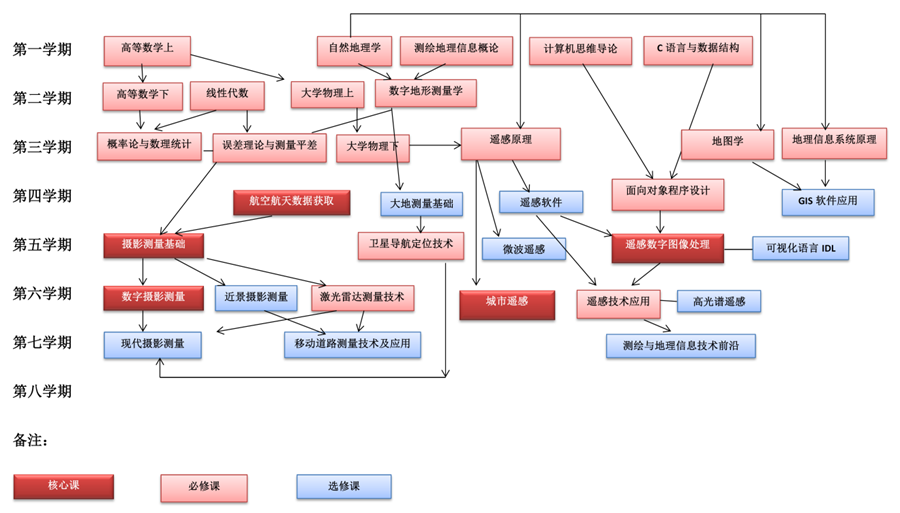
**九、毕业生应具备的知识能力及实现矩阵**

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| --- | --- | --- |
| 毕业生应具备的知识能力 | 相关毕业要求指标点 | 实现途径（课程支撑，粗体为必修课） |
| 1.工程知识: 能够应用数学、物理、计算机、地学科学、工程的基础和专业知识用于解决遥感领域复杂工程问题。 | 1.1能够将数学、物理、地学科学、工程的语言工具用于遥感工程问题的表述 | **C语言与数据结构**、**地图学、高等数学A(1-2)、概率与数理统计B、线性代数、工程制图与识图、CAD基础与应用、普通物理B(1-2)、遥感原理、遥感数字图像处理、大地测量基础、自然地理学**等。 |
| 1.2能针对具体的遥感对象建立数学模型并求解，满足测绘的精度要求 | **高等数学A(1-2)、线性代数、概率与数理统计B、普通物理B(1-2)、数字地形测量学、地理信息系统原理（双语）、摄影测量基础、大地测量基础、误差理论与测量平差基础**等。 |
| 1.3能够将遥感相关知识和数学模型方法用于推演、分析遥感专业复杂工程问题 | **高等数学A(1-2)、线性代数、遥感数字图像处理、卫星导航定位技术、激光雷达测量技术与应用、**微波遥感**、数字摄影测量**等。 |
| 1.4能够将遥感相关知识和数学模型方法用于遥感专业复杂工程问题解决方案的比较与综合 | 概率与数理统计B、近景摄影测量**、遥感技术应用、摄影测量基础、摄影测量基础实习、新技术实习、空间信息综合实习、毕业设计**等。 |
| 2. 问题分析: 能够应用数学、物理、计算机、地学科学和工程的基本原理，识别、表达、并通过文献研究分析复杂遥感工程问题，以获得有效结论。 | 2.1能够将数学、物理、计算机、地学科学和工程的基本理论运用到识别判断、分析与表达遥感复杂工程问题 | **计算思维导论、C语言与数据结构、高等数学A(1-2)、概率与数理统计B、线性代数、普通物理B(1-2)、工程制图与识图、CAD基础与应用、地图学、地理信息系统原理（双语）、面向对象的程序设计、遥感数字图像处理、**大地测量基础等。 |
| 2.2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 | 科技文献检索、大地测量基础、**遥感技术应用、城市遥感（双语）、摄影测量基础、面向对象的程序设计**等。 |
| 2.3能运用数学、物理、计算机、地学科学和工程的基本原理，借助文献研究，分析遥感复杂工程过程中的影响因素，获得有效结论 | 自然地理学、遥感原理、科技文献检索、**卫星导航定位技术**、近景摄影测量**、毕业设计**等。 |
| 3. 设计/开发解决方案：能够设计针对复杂遥感、摄影测量、测绘工程问题的解决方案，设计满足遥感数据获取、处理、应用等方面需求的系统、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能够根据测绘、遥感、地理信息工程用户的需求，设计技术方案，了解影响设计目标和技术方案的各种因素 | **地理信息系统原理（双语）、遥感数字图像处理**、遥感软件、可视化语言IDl、**数字摄影测量**、GIS软件使用、**地理信息系统原理实习、遥感数字图像处理实习、空间信息综合实习**等。 |
| 3.2能够开发满足遥感数据获取、处理、应用等方面需求的生产流程及算法 | 遥感软件、**遥感技术应用**、航空航天数据获取实习、移动道路测量技术及应用、GIS软件使用、卫星导航定位技术、**激光雷达测量技术与应用、面向对象的程序设计、遥感数字图像处理实习**等。 |
| 3.3能够在遥感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 | 生态文明与未来城市、**数字地形测量学、数字摄影测量、遥感技术应用**、移动道路测量技术及应用、智慧城市导论、遥感科学与技术创新实践及科研训练、**数字地形测量实习、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遥感工程问题进行研究，包括现状调研、获取分析与解释数据、并通过信息综合得到合理有效的结论。 | 4.1能够运用科学原理及文献研究等方法对复杂遥感工程问题现状进行调研 | **地图学、地理信息系统原理（双语）、科技文献检索、航空航天数据获取、摄影测量基础、**近景摄影测量、微波遥感**、遥感数字图像处理、遥感数字图像处理实习**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 | **卫星导航定位技术、遥感原理、遥感技术应用、遥感综合实习、空间信息综合实习、**近景摄影测量等。 |
| 4.3能够采用科学方法实施数据采集与分析处理 | **CAD基础与应用、误差理论与测量平差基础、激光雷达测量技术与应用、摄影测量基础、摄影测量基础实习、航空航天数据获取**。 |
| 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 | **物理实验（1-2）、数字地形测量实习、地图学实习、激光雷达测量技术与应用、空间信息综合实习**等。 |
| 5.使用现代工具：能够针对复杂遥感工程问题，选择恰当的遥感、测绘技术与资源；使用现代测绘仪器和遥感处理软件，能够对复杂遥感工程问题的预测与模拟，并能够理解其局限性。 | 5.1 能够针对复杂遥感工程问题，选择恰当的现代遥感技术与硬件、软件 | 现代测绘技术应用、**数字地形测量学、**GIS基础应用技能、**摄影测量基础实习、航空航天数据获取实习、地图学实习、遥感综合实习、（近景与激光雷达、移动测量、微波遥感）新技术实习**、GIS软件开发大赛实训等。 |
| 5.2能够使用现代测绘仪器和信息技术软件完成遥感数据采集、数据处理与精度分析 | GIS基础应用技能、**数字地形测量实习、遥感原理实习、**大地测量基础**、卫星导航定位技术、误差理论与测量平差基础、航空航天数据获取、地理信息系统原理实习、空间信息综合实习、毕业设计**等。 |
| 5.3 能够使用现代工具，对复杂遥感工程问题进行预测与模拟，并理解其局限性 | 遥感软件、微波遥感、**误差理论与测量平差基础、数字摄影测量、新技术实习、**高光谱遥感、GIS软件设计与使用、现代摄影测量等。 |
| 6.工程与社会：能够基于工程相关背景知识进行合理分析，评价遥感工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。 | 6.1熟悉遥感专业相关技术标准、法律法规及管理规定，能够基于工程相关背景知识理解不同社会文化对遥感工程活动的影响 | **思想道德修养与法律基础、数字地形测量学、遥感原理、**大地测量基础**、卫星导航定位技术、测绘地理信息概论**等。 |
| 6.2能够评价遥感测绘成果对社会、健康、法律以及文化、国家安全、领土完整的重要性，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理解遥感工程实践应承担的责任 | 思想道德修养与法律基础、马克思主义基本原理概论、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、军事理论、**空间信息综合实习**、科技革命与社会发展、生态文明与未来城市、形势与政策（1-2）、**遥感综合实习、毕业设计**等。 |
| 7.环境和可持续发展：能够理解和评价针对复杂遥感工程问题的测绘工程实践对环境、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 | **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、自然地理学、形势与政策（1-2）、自然地理地貌与遥感解译实习**等。 |
| 7.2能够从环境保护和可持续发展的角度认知遥感工程实践活动的可持续性，以及评价遥感工程生产实践中可能对环境及社会造成的损害和隐患 | 生态文明与未来城市、**自然地理学、**智慧城市导论、形势与政策（1-2）、**自然地理地貌与遥感解译实习**等。 |
| 8.职业规范：具有人文社会科学素养、社会责任感，能够在遥感工程实践中理解并遵守测绘、地理信息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和健康的体魄，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**、大学生职业生涯与发展规划、形势与政策（1-2）、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等。 |
| 8.2理解诚实公正、诚信守则的遥感行业职业道德和规范，并能在遥感工程实践中自觉遵守 | **思想道德修养与法律基础、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、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理解遥感工作人员对公众的安全、健康、福祉、环境保护的社会责任，能够在遥感工程实践中自觉履行责任 | **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、大学生职业生涯与发展规划、测绘地理信息概论、自然地理学、自然地理地貌及遥感图像解译实习、城市遥感（双语）**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能与测绘、地理信息、计算机 等学科的成员有效沟通，合作共事 | **自然地理学、数字摄影测量、面向对象的程序设计、自然地理地貌及遥感图像解译实习**等。 |
| 9.2能够在团队中独立或合作开展工作 | **军事理论、军训、数字地形测量实习、遥感原理实习、新技术实习**、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 | **数字地形测量实习、地图学实习、地理信息系统原理实习、航空航天数据获取实习、空间信息综合实习、**学院测绘技能大赛等。 |
| 10.沟通：能够就复杂遥感工程问题与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能够就遥感专业问题，以口头、文稿、图表等方式，准确表达自己的观点，回应质疑，理解与同行和社会公众交流的差异性。 | **地图学实习、城市遥感（双语）**、科技论文写作（双语）、**遥感综合实习、空间信息综合实习**、遥感科学与技术创新实践及科研训练等。 |
| 10.2具备一定的国际视野，了解遥感领域的国际前沿发展趋势和研究热点，理解和尊重世界不同文化的差异性和多样性。 | **大学英语（1-2）、城市遥感（双语）、地理信息系统原理（双语）、**现代摄影测量**、**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，能够就遥感问题在跨文化背景下进行沟通和交流 | **大学英语（1-2）、大学英语拓展系列课程（1-4）、大学英语拓展系列课程（5-8）**、科技论文写作（双语）、**城市遥感（双语）**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 | **数字地形测量学实习、**现代测绘技术应用**、航空航天数据获取实习、（近景与激光雷达、移动测量、微波遥感）新技术实习**等。 |
| 11.2了解遥感、测绘生产的成本构成，能在多学科环境下，理解其中涉及的工程管理与经济决策问题 | 现代测绘技术应用、**航空航天数据获取、遥感综合实习、毕业设计**等。 |
| 11.3能在多学科环境下，在设计开发遥感工程解决方案的过程中，运用工程管理与经济决策方法 | **遥感技术应用、 激光雷达测量技术与应用**、现代测绘技术应用、遥感应用前景、**（近景与激光雷达、移动测量、微波遥感）新技术实习** |
| 12.终身学习：具有自主学习和终身学习遥感领域新知识的意识，有不断学习和适应遥感技术发展的能力。 | 12.1具有自主学习和终身学习的意识，掌握必要的学习方法 | **大学生职业生涯与发展规划、计算机思维导论**、**科技革命与社会发展、测绘地理信息概论、**遥感应用前景等。 |
| 12.2具有理解和迁移知识、识别和综述遥感学科新发展的能力 | 智慧城市导论、遥感应用前景、现代摄影测量、**大学生职业生涯与发展规划、测绘地理信息概论**、**毕业设计**、遥感科学与技术创新实践及科研训练等。 |

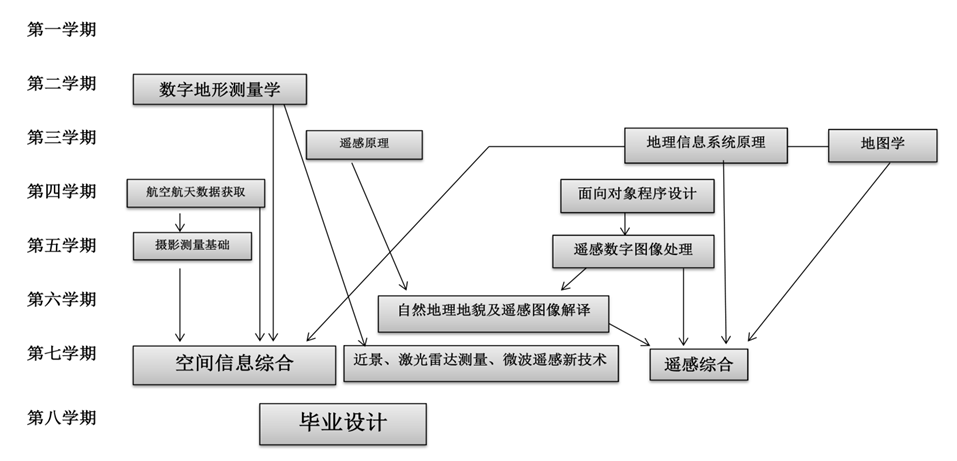
**十、指导性教学计划**（见附表）

**十一、主要课程逻辑关系结构图**

1、主要课程



2、主要实践环节

****

备注：字体大小与实践环节时长对应

2016 Undergraduate Program for Specialty in Remote Sensing Science and Techolonogy

**I 、Specialty Name and Code**

|  |  |  |  |
| --- | --- | --- | --- |
| English Name | Remote Sensing Science and Techolonogy | | |
| Code | 081202 | Disciplines | Engineering |
| Length of Schooling | Four years | Degree | Bachelor of Engineering |

**II 、Educational Objectives**

**Training objectives:** to meet the needs of the capital and the country's urban and rural construction, to train students who can engage in the collection and processing, analysis, application development and project management of ground, aviation and aerospace remote sensing information in the fields of land and resources survey, national basic surveying and mapping, urban and rural construction and planning, natural resources monitoring, environmental protection, cultural heritage protection, disaster early warning and emergency response Level professional backbone talents.

After five years of work and study after graduation, we can achieve the following goals:

(1) With good ideological and moral cultivation and scientific and cultural literacy, strong sense of responsibility, able to undertake and fulfill social responsibility.

(2) With the ability of organization management and coordination, good team consciousness, international vision and communication ability, can solve complex remote sensing engineering problems and play an important role in the project.

(3) It has the ability of lifelong learning and following the development of new technology in remote sensing field, mastering the use method of modern tools and software, and has competitive potential.

(4) With the ability of Surveying and mapping geographic information industry engineer, competent in geospatial information collection and processing, information surveying and mapping, natural resources investigation and monitoring, urban emergency and other fields of production, management, development, research and education. Become the technical director or technical backbone of relevant enterprises and institutions in the field of remote sensing.

**Professional features:**

Relying on the background advantages of capital construction, civil engineering and architecture discipline of the University and surveying and mapping discipline of the college, this major has outstanding advantages and characteristics in the extraction of medium and high-resolution geographical elements and urban environment and facilities monitoring, fine reconstruction and virtual restoration of architectural heritage, and application of mobile Road Survey system for urban management. Pay attention to the penetration and construction of photogrammetry and remote sensing system course. First, we should pay attention to "original ability" and "computer practice ability" in every teaching link. Second, to ensure that students have the production practice ability of photogrammetry and remote sensing.

**III、Major Disciplines**

Science and technology of Surveying and mapping, geographic information science, computer science and technology.

IV、**Major Courses**

**1 main basic courses**

Professional introduction, digital topographic surveying, C language and data structure, geography, cartography

**2 main courses**

Remote sensing principle (Bilingual), aerospace data acquisition, photogrammetry, remote sensing digital image processing, urban remote sensing, digital photogrammetry

**V、Major Practical Training**

Digital topographic survey practice, basic photogrammetry practice, aviation data acquisition, field work practice of aerial photogrammetry control and annotation, 4D products integrated photogrammetric practice, practice of basic remote sensing, remote sensing digital image processing, remote sensing comprehensive practice, natural geography and remote sensing image interpretation practice, (close range and laser radar, mobile measurement, microwave remote sensing technology comprehensive practice, the principle of geographic information system, graduation design.

**VI、Graduation Requirements**

According to Beijing University of civil engineering and architecture undergraduate students studying management regulations and bachelor's degree granting rules, completed the professional plan minimum credits should reach 160 credits, the theoretical course of 115 credits, practice course of 45 credits.

**VII、Proportion of Course**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Course** [**Category**](http://www.baidu.com/link?url=T-sTAae63xKETLJd_N7nNsFUo4ds7VX1E0PW1OwBIazAjp1vVAUKLUIUFYxDzfyxsSDXgWReQf8aH7q_CabOr9251wtvAH6OwY8dszrOr2u) | **Course Type** | **Credits** | **Class Hour** | | **Proportion** | | |
| General Education | Compulsory | 29.5 | 608 | | 18.4 | | |
| Core | 8 | 128 | | 5 | | |
| Optional | 3 | 48 | | 1.9 | | |
| Big Academic Subjects | Compulsory | 47 | 820 | | 29.4 | | |
| Optional | 1 | 16 | | 0.6 | | |
| Professional Core | Compulsory | 16 | 256 | | 10 | | |
| Professional Direction | Compulsory | 8 | 128 | | 5 | | |
| Optional | 10.5 | 168 | | 6.6 | | |
| Practice | Compulsory | 38 | 784 | | 23.8 | | |
| Total | | 160 | | 2956 | | 100 |

**VIII、Table of Teaching Program**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Semester | Teaching | Exam | Practice | Semester | Teaching | Exam | Practice |
| 1 | 4-16 | 17-18 | 19-20 | 2 | 1-16 | 17 | 18-20 |
| 3 | 1-16 | 17 | 18-20 | 4 | 1-14 | 15-16 | 17-20 |
| 5 | 1-16 | 17 | 18-20 | 6 | 1-16 | 17-18 | 19-20 |
| 7 | 7-14 |  | 1-6、15-20 | 8 | 1-16graduation project 17defence | | |

**IX、Table of Teaching Arrangement**

X**、Graduate Abilities and Matrices**

|  |  |  |
| --- | --- | --- |
| **The knowledge and ability of graduates** | **Relevant graduation requirements indicators** | **Implementation approach (course support)** |
| 1. Engineering knowledge: be able to apply the basic and professional knowledge of mathematics, physics, computer, geosciences and engineering to solve complex engineering problems in remote sensing field. | 1.1 be able to use the language tools of mathematics, physics, geosciences and engineering to express remote sensing engineering problems | C language and data structure, cartography, advanced mathematics a (1-2), General Physics A (1-2), remote sensing principle, remote sensing digital image processing, physical geography, etc. |
| 1.2 be able to build mathematical model for specific remote sensing objects | Probability and Mathematical Statistics B, digital topographic survey, principles of geographic information system (Bilingual), Fundamentals of photogrammetry, geodesy, error theory and survey adjustment. |
| 1.3 be able to apply the relevant knowledge and mathematical model methods to deduce and analyze the complex engineering problems of remote sensing | Linear algebra、Remote sensing digital image processing、Satellite navigation and positioning technology, lidar measurement technology and application, microwave remote sensing, digital photogrammetry, etc. |
| 1.4 be able to apply relevant knowledge and mathematical model methods to the comparison and synthesis of solutions to complex engineering problems of remote sensing | Close range photogrammetry, remote sensing technology application, photogrammetry foundation, photogrammetry basic practice, new technology practice, spatial information comprehensive practice, graduation project, etc. |
| 2. Problem analysis: be able to apply the basic principles of mathematics, physics, computer, geosciences and engineering to identify, express and analyze complex remote sensing engineering problems through literature research, so as to obtain effective conclusions. | 2.1 be able to apply the basic theories of mathematics, physics, computer, geosciences and engineering to the identification, judgment, analysis and expression of remote sensing complex engineering problems | Introduction to computational thinking, C language and data structure, probability and Mathematical Statistics B, linear algebra, cartography, principles of geographic information system (Bilingual), object-oriented programming, remote sensing digital image processing, modern photogrammetry, etc. |
| 2.2 be able to recognize that there are many solutions to the problem, and will seek alternative solutions through literature research | Scientific and technological literature retrieval, geodetic basis, remote sensing technology application, urban remote sensing (Bilingual), photogrammetry basis, GIS principle practice, remote sensing comprehensive practice, etc. |
| 2.3 be able to use the basic principles of mathematics, physics, computer, geosciences and engineering, and with the help of literature research, analyze the influencing factors in the process of remote sensing complex engineering, and obtain effective conclusions | Scientific and technological literature retrieval, satellite navigation and positioning technology, close range photogrammetry, remote sensing technology application, new technology practice, graduation project, scientific research training, etc. |
| 3. Design / development solutions: be able to design solutions for complex remote sensing, photogrammetry, surveying and mapping engineering problems, design systems and production processes that meet the requirements of remote sensing data acquisition, processing, application, etc., and embody the sense of innovation in the design process, and consider the factors of society, health, safety, law, culture and environment. | 3.1 be able to design technical schemes according to the needs of users of Surveying and mapping, remote sensing and geographic information engineering, and understand various factors affecting design objectives and technical schemes | Principles of geographic information system (Bilingual), remote sensing digital image processing, remote sensing software, digital photogrammetry, GIS software application, GIS theory practice, remote sensing digital image processing practice, spatial information comprehensive practice, etc. |
| 3.2 be able to develop production processes and algorithms that meet the requirements of remote sensing data acquisition, processing and application | Remote sensing software, remote sensing technology application, GIS software use, satellite navigation and positioning technology, lidar measurement technology and application, object-oriented programming, remote sensing digital image processing practice, etc. |
| 3.3 be able to reflect the innovative consciousness in the design of remote sensing engineering solutions, and consider the factors of society, health, safety, law, culture and environment | Ecological civilization and future city, digital topographic survey, introduction to surveying and mapping geographic information, application of remote sensing technology, mobile road survey technology and application, introduction to smart city, innovative practice and scientific research training of Remote Sensing Science and technology, digital topographic survey practice, graduation project, etc. |
| 4. Research: be able to study complex remote sensing engineering problems based on scientific principles and scientific methods, including current situation investigation, obtaining analysis and interpretation data, and obtaining reasonable and effective conclusions through information synthesis. | 4.1 be able to use scientific principles and literature research methods to investigate the current situation of complex remote sensing engineering problems | Cartography, principles of geographic information system (Bilingual), Fundamentals of geodesy, aerospace data acquisition, Fundamentals of photogrammetry, close range photogrammetry, microwave remote sensing, remote sensing digital image processing practice, etc. |
| 4.2 be able to design, demonstrate and predict the research scheme based on professional theoretical knowledge | Satellite navigation and positioning technology, remote sensing principle, remote sensing technology application, remote sensing comprehensive practice, spatial information comprehensive practice, close range photogrammetry, etc. |
| 4.3 be able to use scientific methods to implement data collection and analysis | CAD basis and application, error theory and survey adjustment basis, lidar measurement technology and application, photogrammetry basic practice, aerospace data acquisition. |
| 4.4 be able to synthesize and evaluate the experimental results and obtain reasonable and effective conclusions | Physical experiment (1-2), cartography, lidar measurement technology and application, comprehensive practice of spatial information, etc. |
| 5. Using modern tools: be able to develop, select and use appropriate remote sensing and surveying technology and resources for complex remote sensing engineering problems; modern surveying and mapping instruments and remote sensing processing software can predict and simulate complex remote sensing engineering problems, and understand their limitations. | 5.1 be able to select appropriate modern remote sensing technology, hardware and software for complex remote sensing engineering problems | Modern surveying and mapping technology application, digital topographic survey, GIS basic application skills, photogrammetry basic practice, aerospace data acquisition practice, cartography practice, remote sensing comprehensive practice, (close range and lidar, mobile measurement, microwave remote sensing) new technology practice, GIS software development competition training. |
| 5.2 be able to use modern surveying and mapping instruments and information technology software to complete remote sensing data acquisition, data processing and accuracy analysis | Cartography, GIS basic application skills, digital topographic survey practice, remote sensing principle practice, geodesy basis, satellite navigation and positioning technology, error theory and survey adjustment basis, aerospace data acquisition, GIS principle practice, spatial information comprehensive practice, graduation project, etc. |
| 5.3 be able to use modern tools to predict and simulate complex remote sensing engineering problems, and understand their limitations | Remote sensing software, microwave remote sensing, error theory and survey adjustment basis, hyperspectral remote sensing, GIS software design and use, modern photogrammetry, etc. |
| 6. Engineering and society: be able to conduct reasonable analysis based on engineering related background knowledge, evaluate the impact of remote sensing engineering practice and complex 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 remote sensing, and be able to understand the impact on project implementation | Ideological and moral cultivation and legal basis, digital topographic survey, remote sensing principle, geodesy foundation, satellite navigation and positioning technology, introduction to surveying and mapping geographic information, etc. |
| 6.2 be able to evaluate the importance of remote sensing surveying and mapping results to society, health, law and culture, national security and territorial integrity, as well as the impact of these constraints on the implementation of the project, and understand the responsibilities to be borne by the remote sensing engineering practice | The basic principles of Marxism, military theory, scientific and technological revolution and social development, ecological civilization and future city, remote sensing comprehensive practice, graduation project, etc. |
| 7. Environment and sustainable development: be able to understand and evaluate the impact of Surveying and mapping engineering practice for complex remote sensing engineering problems on environmental and social sustainable development. | 7.1 know and understand the concept and connotation of environmental protection and sustainable development | Mao Zedong Thought and the theory of socialist system with Chinese characteristics, introduction to surveying and mapping geographic information, physical geography, situation and policy (1-2), physical geography and geomorphology and remote sensing interpretation practice. |
| 7.2 be able to recognize the sustainability of remote sensing engineering practice activities from the perspective of environmental protection and sustainable development, and evaluate the possible damage and hidden danger to the environment and society in the production practice of remote sensing engineering | Ecological civilization and future city, physical geography, introduction to smart city, physical geography and geomorphology and remote sensing interpretation practice. |
| 8. Professional norms: have humanities and social science literacy, sense of social responsibility, be able to understand and abide by the professional ethics and norms of Surveying and mapping and geographic information industry in the practice of remote sensing engineering, and fulfill the responsibilities. | 8.1 have humanities and social science literacy and healthy physique, and establish correct world outlook, outlook on life and values | Ideological and moral cultivation and legal basis, outline of modern Chinese history, introduction to basic principles of Marxism, introduction to Mao Zedong Thought and socialist system with Chinese characteristics, military theory, physical education (1-4), military training, classic appreciation and cultural inheritance, philosophical vision and civilization dialogue, scientific and technological revolution and social development. |
| 8.2 understand the professional ethics and norms of the remote sensing industry of honesty, justice and integrity, and consciously abide by them in the practice of remote sensing engineering | College Students' career and development planning, survey of geographic information, situation and policy (1-2), digital topographic survey practice, spatial information comprehensive practice, etc. |
| 8.3 understand the social responsibility of remote sensing staff for public safety, health, well-being and environmental protection, and be able to consciously perform their responsibilities in remote sensing engineering practice | College Students' career and development planning, introduction to surveying and mapping geographic information, physical geography, physical geography and geomorphology and remote sensing image interpretation practice, urban remote sensing, etc. |
| 9. Individual and team: be able to play the roles of individual, team member and responsible person in a team with multi-disciplinary background. | 9.1 be able to effectively communicate and cooperate with members of Surveying and mapping, geographic information, computer and other disciplines | Physical geography, digital photogrammetry, object-oriented programming, physical geography and geomorphology and remote sensing image interpretation practice. |
| 9.2 be able to work independently or cooperatively in a team | Military theory, military training, digital topographic survey practice, remote sensing principle practice, new technology practice, Zetai cup national paper competition, GIS software development competition, etc. |
| 9.3 be able to organize, coordinate and direct the work of the team | Digital topographic survey practice, cartography practice, GIS principle practice, aerospace data acquisition practice, spatial information comprehensive practice, new technology practice, college surveying and mapping skills competition, etc. |
| 10. Communication: be able to effectively communicate and communicate with the industry and the public on complex remote sensing engineering issues, including writing reports and design manuscripts, making statements, clearly expressing or responding to instructions, and having a certain international vision, and being able to communicate and communicate in a cross-cultural context. | 10.1 be able to accurately express their own views, respond to queries, and understand the differences in communication with peers and the public on remote sensing professional issues in oral, manuscript, chart and other ways. | It includes cartography practice, urban remote sensing (Bilingual), scientific and Technological Paper Writing (Bilingual), remote sensing digital image processing practice, object-oriented programming practice, remote sensing science and technology innovation practice and scientific research training. |
| 10.2 have a certain international perspective, understand the international cutting-edge development trends and research hotspots in the field of remote sensing, and understand and respect the differences and diversity of different cultures in the world. | College English (1-2), urban remote sensing (Bilingual), GIS principles (Bilingual), modern photogrammetry, remote sensing application prospects, etc. |
| 10.3 have the language and written expression ability of cross-cultural communication, and be able to communicate and exchange on remote sensing issues in the cross-cultural context | College English (1-2), College English Development Series (1-4), College English expansion series (5-8), scientific and Technological Paper Writing (Bilingual), urban remote sensing (Bilingual), etc. |
| 11. Project management: understand and master the whole cycle and whole process management principles and economic decision-making methods for the design and implementation of remote sensing engineering projects or products, and be able to apply them in a multidisciplinary environment. | 11.1 master the management and economic decision-making methods involved in the project | Digital topographic survey practice, modern surveying and mapping technology application, aerospace data acquisition practice, (close range and lidar, mobile measurement, microwave remote sensing) new technology practice. |
| 11.2 understand the cost composition of remote sensing, surveying and mapping engineering and products in the whole cycle and whole process, and understand the engineering management and economic decision-making problems involved in the multi-disciplinary environment | Application of modern surveying and mapping technology, aerospace data acquisition, remote sensing comprehensive practice, graduation project, etc. |
| 11.3 be able to apply engineering management and economic decision-making methods in the design and development of remote sensing engineering solutions in a multidisciplinary environment. | Remote sensing technology application, lidar measurement technology and application, modern surveying and mapping technology application, remote sensing application prospect, (close range and lidar, mobile measurement, microwave remote sensing) new technology practice |
| 12. Lifelong learning: have the awareness of self-learning and lifelong learning of new knowledge in remote sensing field, and have the ability to continuously learn and adapt to the development of remote sensing technology. | 12.1 have the awareness of self-learning and lifelong learning, and master the necessary learning methods | College Students' career and development planning, introduction to computer thinking, scientific and technological revolution and social development, introduction to surveying and mapping geographic information, remote sensing application prospect, modern surveying and mapping technology application, etc. |
| 12.2 have the ability to understand and transfer knowledge, identify and summarize the new development of remote sensing | Introduction to smart city, remote sensing application prospect, modern photogrammetry, career and development planning of college students, introduction to surveying and mapping geographic information, graduation design, innovation practice of Remote Sensing Science and technology, scientific research training, etc. |

表1 遥感科学与技术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 | 32 |  |  | 16 |  | 1 | 马克思主义学院 |
| 中国近现代史纲要  The Outline of the Modern Chinese History | 2 | 32 | 24 |  |  | 8 |  | 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 | 32 |  |  | 16 |  | 5 | 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 | 4 | 96 | 48 |  |  | 48 |  | 6 | 马克思主义学院 |
| 形势与政策（1-2）  Situation and Policy(1-2) | 1 | 32 | 32 |  |  |  |  | 1、3 | 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 | 学工部 |
| 大学英语(1-2) ★  College English(1-2) | 6 | 128 | 96 |  |  |  | 48 | 1、2 | 文法学院 |
| 大学英语拓展系列课程（1-4） | 2 | 32 |  |  |  |  |  | 3 | 文法学院 |
| 大学英语拓展系列课程（5-8） | 2 | 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 | 1.5 | 24 |  |  |  | 32 |  | 1 | 电信学院 |
| 小 计 | **29.5** | **608** |  |  |  |  |  |  |  |
| 核  心 | 经典赏析与文化传承 | 2 | 32 |  |  |  |  |  | 1-8 | 各院部 |
| 哲学逻辑与文明对话 | 2 | 32 |  |  |  |  |  | 1-8 | 各院部 |
| 科技精神与社会发展 | 2 | 32 |  |  |  |  |  | 1-8 | 各院部 |
| 建筑艺术与审美体验 | 2 | 32 |  |  |  |  |  | 1-8 | 各院部 |
| 生态文明与智慧城市 | 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 | | | | | | | | | |
| 选修 | 创新创业类 | 1-8学期任选 | | | | | | | | 各院部 |
| 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3学分 | | | | | | | | | | |
| 通识教育课合计至少修读40.5学分 ，其中通识教育必修29.5学分，通识教育核心8学分，通识教育任选3学分 | | | | | | | | | | |

表1 遥感科学与技术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 | 96 | 80 |  |  |  | 16 | 1 | 理学院 |
| 高等数学A（2）★  Advanced Mathematics A(2) | 5 | 80 | 80 |  |  |  |  | 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A  Theory of Probability and Statistics | 3 | 44 |  |  |  |  | 4 | 3 | 理学院 |
| 普通物理A（1）★  College physics(1) | 3 | 56 | 52 |  |  | 4 |  | 2 | 理学院 |
| 普通物理A（2）★  College physics(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 |
| 工程制图与视图Engineering Drawing | 3 | 48 | 44 |  |  |  | 4 | 2 | 理学院 |
| C语言与数据结构C★ Programming Language and Data Structure | 3 | 48 | 32 | 16 |  |  |  | 1 | 地理信息科学系 |
| 自然地理学Physical geography | 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 |
| 误差理论与测量平差基础★Fundamentals of Error Theory and Surveying Adjustment | 3 | 48 | 48 |  |  |  |  | 3 | 测绘工程系 |
| 地理信息系统原理（双语）The Principle of Geographic Information System | 3 | 48 | 40 | 8 |  |  |  | 3 | 地理信息科学系 |
| 遥感原理Principles of Remote Sensing | 2 | 32 | 32 |  |  |  |  | 3 | 遥感工程系 |
| **小 计** | **49** | **852** | **692** | **120** |  | **8** | **32** |  |  |
| 选  修 | GIS基础应用技能 Gis Base Application Skill | **1** | 16 | 8 | 8 |  |  |  | 2 | 地理信息科学系 |
| 遥感应用前景 remote sensing application prospect | 1 | 16 | 8 | 8 |  |  |  | 3 | 遥感工程系 |
|  |  |  |  |  |  |  |  |  |  |
| **小 计** | **3** | **48** | 24 | 24 |  |  |  |  |  |
| **大类学科基础课合计 50 学分，必修49 学分，选修 1学分** | | | | | | | | | | |
|  | 航空航天数据获取Aerospace data acquisition | 2 | 32 | 28 | 4 |  |  |  | 4 | 遥感工程系 |
| 城市遥感(双语)Urban Remote Sensing | 3 | 48 | 40 | 8 |  |  |  | 6 | 遥感工程系 |
| 摄影测量基础Photogrammetry Fundamental | 3 | 48 | 44 | 4 |  |  |  | 5 | 遥感工程系 |
| 遥感数字图像处理Digital Image Processing | 3 | 48 | 40 | 8 |  |  |  | 5 | 遥感工程系 |
| 数字摄影测量Digital Photogrammetry | 3 | 48 | 40 | 8 |  |  |  | 6 | 遥感工程系 |
| **小计** | **14** | **224** | **192** | **32** |  |  |  |  |  |
| 专业核心课合计必修 14 学分 | | | | | | | | | | |

表1 遥感科学技术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  方  向  课 | 必  修 | 卫星导航定位技术Technology of Satellite navigation and positioning | 2 | 32 | 28 | 4 |  |  |  | 5 | 测绘工程系 |
| 面向对象程序设计 object oriented programming | 2 | 32 | 32 |  |  |  |  | 4 | 遥感工程系 |
| 激光雷达测量技术与应用Laser radar Surveying Technology | 2 | 32 | 24 | 8 |  |  |  | 6 | 遥感工程系 |
| 遥感技术应用Applications of Remote Sensing | 2 | 32 | 16 | 16 |  |  |  | 6 | 遥感工程系 |
| **小 计** | **8** | **128** | 100 | 28 |  |  |  |  |  |
| 选  修 | 近景摄影测量Close Range Photogrammetry | 2 | 32 | 26 | 6 |  |  |  | 6 | 遥感工程系 |
| 微波遥感Microwave Remote Sensing | 2 | 32 | 32 |  |  |  |  | 5 | 遥感工程系 |
| 移动道路测量技术及应用Technology and Application of Mobile Mapping System | 1 | 16 | 8 | 8 |  |  |  | 7 | 地理信息科学系 |
| 现代摄影测量Modern Photogrammetry | 2 | 32 | 32 |  |  |  |  | 7 | 遥感工程系 |
| 大地测量基础Geodesy Fundamental | 2 | 32 | 24 | 8 |  |  |  | 4 | 测绘工程系 |
| 高光谱遥感Hyperspectral remote sensing | 2 | 32 |  |  |  |  |  | 6 | 遥感工程系 |
| 科技论文写作（双语）Academic Writing (Billinguish) | 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 |  | 5 | 图书馆 |
| 测绘与地理信息技术前沿  Advanced Technology of Surveying,Maping 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 |
| 遥感软件Remote Sensing Software | 2 | 32 | 16 | 16 |  |  |  | 4 | 遥感工程系 |
| GIS软件使用 GIS Software | 2 | 32 | 16 | 16 |  |  |  | 4 | 地理信息科学系 |
| 可视化语言IDL The Language IDL | 2 | 32 | 16 | 16 |  |  |  | 6 | 遥感工程系 |
| **小 计** | **21** | **304** | 234 | 70 |  |  |  |  |  |
| 要求选修10分 | | | | | | | | | | |

表2 测绘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 | | 1 | 32 | 32 |  | 1 | 1-3 | 武装部 |
| 军训  Military Training | | 1 | 32 | 32 |  |
| 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 | 40 |  | 3 | 17-18 | 地理信息科学系 |
| 摄影测量基础实习Photogrammetry Fundamental Practice | | 1 | 20 | 20 |  | 5 | 18 | 遥感工程系 |
| 地理信息系统原理The Principle of Geographic Information System Practice | | 2 | 40 | 40 |  | 3 | 19-20 | 地理信息科学系 |
| 遥感数字图像处理Digital Image Processing Practice | | 2 | 20 | 20 |  | 5 | 19-20 | 遥感工程系 |
| 航空航天数据获取Aerospace data Acquisition Practice | | 1 | 20 | 20 |  | 4 | 18 | 遥感工程系 |
| 空间信息综合实习Spatial Information Practice | | 6 | 120 | 120 |  | 7 | 1-6 | 测绘学院 |
| 遥感综合实习Remote Sensing Comprehensive  Practice | | 3 | 60 | 60 |  | 7 | 18-20 | 遥感工程系 |
| 遥感原理实习Principles and Applications of Remote Sensing Practice | | 1 | 20 | 20 |  | 4 | 17 | 遥感工程系 |
| 自然地理地貌及遥感图像解译实习 geography and remote sensing image interpretation Practice | | 2 | 40 | 40 |  | 6 | 19-20 | 遥感工程系 |
| （近景与激光雷达、移动测量、微波遥感）新技术实习New technology Practice | | 3 | 60 | 60 |  | 7 | 15-17 | 遥感工程系、地理信息科学系 |
| 面向对象程序设计实习Object oriented programming Practice | | 2 | 40 | 40 |  | 4 | 19-20 | 地理信息科学系 |
| 毕业设计Undergraduate Design or Thesis | | 8 | 320 | 320 |  | 8 | 1-16 | 遥感工程系 |
| 小 计 | | 38 | 744 | 744 |  |  |  |  |
| 创新实践及科研训练 | 正式报名参加Esri杯、航天宏图杯等遥感应用开发竞赛  Participate in Esri Cup, Hangtianhongtu Cup and other remote sensing application development competitions | 1 | 20 | 20 |  |  |  | 遥感工程系 |
| GIS软件开发大赛实训  GIS Software Development Competition Practical Training | 1 | 20 | 20 |  |  |  | 地理信息科学系 |
| 学院遥感应用选拔比赛 Remote Sensing application Competition | 1 | 20 | 20 |  |  |  | 遥感工程系 |
| 全国GIS选拔比赛State GIS Selection 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 |
| 测绘技能大赛实训 Surveying and Mapping Skills Practice Contest | 2 | 40 | 40 |  |  |  | 测绘工程系 |
|  | 学院测绘技能大赛 School of Surveying and Mapping Skills Contest | 1 | 20 | 20 |  |  |  | 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 |  |  |  | 测绘工程系 |
| 小 计 | | 40 | 784 | 784 |  |  |  |  |
| 实践环节合计40 学分，其中课内38 学分，课外 2 学分（创新实践及科研训练必修2学分） | | | | | | | | | |