北京建筑大学

2019 级本科培养方案

测绘学院分册

教务处 2019年9月

2019 级测绘工程专业本科培养方案

一、专业基本信息

英文名称	Surveying and Mapping Engineering			
专业代码	081201 学科门类 工学			
学 制	4年	授予学位	工学学士	

二、培养目标和专业特色

1.培养目标

培养具有德、智、体、美全面发展,具备数理基础和人文社科知识,掌握测绘工程基础理论、基本知识和基本技能,接受科学思维和工程实践训练,胜任国家基础测绘、城乡建设、自然资源、应急管理等领域测绘项目的设计、生产、研发及管理工作,具有较强的组织管理能力、创新意识、继续学习能力、国际视野和城市测绘特色的应用型工程技术人才。毕业后经过5年左右的工作和学习,能够达到如下目标:

- (1) 掌握数学、自然科学、工程基础及先进的测绘理论与技术,胜任工程勘测、设计、施工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,成为测绘地理信息 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测绘地理信息科研工作;
 - (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。

2.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、依托建筑行业、服务城乡建设的专业测绘人才。适应测绘高新科技发展,融教学、科研和生产为一体,强调理论与实践密切结合,突出城市测绘特色,培养测绘新技术、新方法、新工艺的应用能力,满足城乡建设、古建筑保护、复杂结构精密测量等测绘人才需求。

三、主干学科

测绘科学与技术

四、主干课程

1. 主干基础课程

测绘地理信息概论、工程制图与识图、C语言与数据结构、自然地理学、数字地形测量学、地图学、CAD基础与应用、误差理论与测量平差基础、地理信息系统原理(双语)、遥感原理、摄影测量基础。

2. 主干专业课程

卫星导航定位技术、大地测量学基础、工程测量学、变形监测与灾害预报、不动产测量与管理、激光雷达测量技术与应用。

五、主要实践教学环节

1. 主要实验

数字地形测量学实验 、卫星导航定位技术实验 、摄影测量基础实验、地理信息系统原理实验、大地测量学基础实验、工程测量学实验、变形监测实验、不动产测量与管理实验、激光雷达测量技术实验。

2. 主要实践环节

数字地形测量实习、卫星导航定位实习、遥感原理实习、摄影测量实习、地理信息系统实习、地图学实习、控制测量实习、自然地理地貌及遥感图像解译实习、工程测量综合实习、空间信息综合实习、不动产测量与管理实习、激光雷达测量实习。

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 124 学分,实践教学环节 42 学分(含创新实践及科研训练必修 2 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	616	25.00%
	选修	2	32	1.20%
大类基础课	必修	46	804	27.71%
	选修	1	16	0.60%
专业核心课	必修	17	272	10.24%
专业方向课	必修	6	96	3.61%
	选修	10. 5	168	6.33%
独立实践环节	必修	40	796	24.10%
	选修	2	40	1.20%
总计		166	2840	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 周	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	1-16 周	17-18 周	19-20 周	6	1-14 周	15 周	16-20 周
7	7-15 周	16 周	1-6 周 17-20 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

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测绘 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 于测绘工程问题 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、自然地理学、计算机图形学等。

	1.2 能针对具体的 测绘对象建立数 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、变形监测与灾害预报、大地测
	学模型并求解 1.3 能够将相关知识和数学模型方法用于推演、分析测绘专业复杂工程问题 1.4 能够将相关知识和数学模型方法用于测绘专规型方法用于测绘专规型方法用于测绘专规型方法用于测绘专规	量学基础、误差理论与测量平差基础等。 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、城市地下管线测量、工程测量学、 城市空间信息学等。 C语言与数据结构、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测绘工程问题,以获得有效结论	决方案的比较与综合 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语言与数据结构、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、土木工程概论、C#程序设计、地图学、地理信息系统原理(双语)、自然地理学、变形监测与灾害预报、空间分析与建模。据影测量基础实习等
效结论。	2.2 能够基于相关 科学原理和数学 模型方法正确表 达复杂测绘工程 问题	空间分析与建模、摄影测量基础实习等。 CAD 基础与应用、数字地形测量学、误差理论与测量平差基础、测量数据处理与程序设计大赛实训、激光雷达测量技术与应用、三维地理信息技术、城市地下管线测量、GIS 基础应用技能、工程测量学、移动道路测量技术及应用等。
	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 2.4 能运用基本原	C语言与数据结构、科技文献检索、摄影测量基础、大地测量学基础、工程测量学、地理信息系统原理实习、不动产测量与管理实习等。 普通物理 A(1-2)、科技文献检索、卫星导
	理,借助文献研究,分析过程的影响因素,获得有效 结论	航定位技术、控制测量实习、工程测量综 合实习、毕业设计、科研训练等。

3.设计/开发解决方案:能够设计针对复杂测绘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、	3.1 掌握测绘工程 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、不动产测量与管理、智慧 城市导论、空间分析与建模、工程测量学、 摄影测量基础实习、工程测量综合实习、 空间信息综合实习等。
文化以及环境等因素。	3.2 能够设计开发 满足特定测绘需 求的生产流程及 系统	C语言与数据结构、CAD基础与应用、 遥感原理、地理信息系统原理(双语)、 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、工程测量学、地图 设计与编绘、地图学实习、卫星导航定位 实习、地理信息系统原理实习、测量数据 处理与程序设计大赛实训等。
	3.3 能够在测绘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、数字地形测量学、工程测量学、移动道路测量技术及应用、地理国情监测、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、工程测量综合实习、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测绘工程问题进行研究,包括设计实验、分析与解释数据、并通过信息综合	4.1能够运用科学 原理对复杂测绘 工程问题提出研 究方案	地图学、地理信息系统原理(双语)、大 地测量学基础、城市地下管线测量、工程 测量学、智慧城市导论、地理国情监测、 遥感原理实习、地图学实习、卫星导航定 位实习等。
得到合理有效的结论。	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、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、 工程测量综合实习等。
	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语言与数据结构、误差理论与测量平差基础、测量数据处理与程序设计、激光雷达测量技术与应用、变形监测与灾害预报、工程测量学、遥感数字图像处理、近景摄影测量、卫星导航定位实习、测量数据处理与程序设计大赛实训、控制测量实习、摄影测量基础实习、激光雷达测量技术实习等。

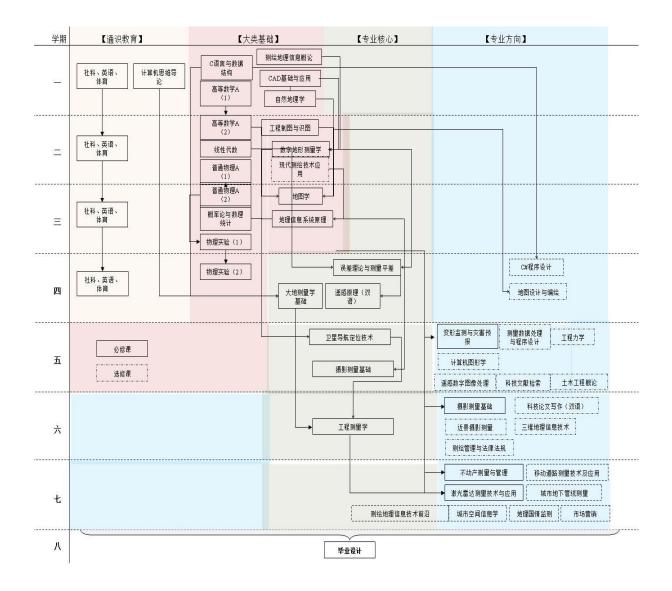
	4.4能够对实验结	科技文献检索、地图学、科技论文写作(双
	果进行信息综合	语)、工程测量学、空间分析与建模、不
	与评判,取得合理	动产测量与管理实习、激光雷达测量技术
	有效结论	实习、空间信息综合实习、毕业设计等。
5.使用现代工具:能够针对复杂测绘工程问题,开发、选择与使用恰当的测绘技术、资源、现代测绘仪器和信息技术,包括对复杂测绘工程问题的预测与模拟,并能够理解其局限性。	5.1 能够针对复杂测绘工程问题,选择恰当的现代测绘技术与仪器	大学英语 (1-2)、计算思维导论、C语言与数据结构、CAD 基础与应用、C#程序设计、数字地形测量学、激光雷达测量技术与应用、三维地理信息技术、计算机图形学、城市地下管线测量、GIS 基础应用技能、变形监测与灾害预报、工程测量学、不动产测量与管理、智慧城市导论、移动道路测量技术及应用、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、工程测量综合实习、不动产测量与管理实习、激光雷达测量技术实习、测绘技能大赛实训、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测绘数据采集、数据处理与精度分析	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、大地测量学基础、卫星导航定位技术、误差理论与测量平差基础、工程测量学、变形监测与灾害预报、不动产测量与管理、遥感数字图像处理、近景摄影测量、数字地形测量实习、遥感原理实习、卫星导航定位实习、地理信息系统原理实习、控制测量实习、工程测量综合实习、不动产测量与管理实习、激光雷达测量技术实习、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,对复杂测 绘工程问题进行 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、测量数据处理与程序设计、地下工程测量、摄影测量基础实习、毕业设计、创新实践(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	6.1 熟悉测绘专业 相关技术标准、法	思想道德修养与法律基础、土木工程概论、数字地形测量学、遥感原理、大地测

理分析,评价测绘工程实	律法规及管理规	量学基础、卫星导航定位技术、测绘管理
践和复杂测绘工程问题解	定,能够基于工程	与法律法规、数字地形测量实习、地理信
决方案对社会、健康、安	相关背景知识进	息系统原理实习、工程测量综合实习、工
全、法律以及文化的影响,	行合理分析	程实践类、毕业设计等。
并理解应承担的责任。	6.2 能够评价测绘	中国近现代史纲要、马克思主义基本原理
	工程实践和复杂	概论、毛泽东思想和中国特色社会主义体
	测绘工程问题解	系理论概论、军事理论、工程测量学、不
	决方案对社会、健	动产管理与测量、测绘管理与法律法规、
	康、安全、法律以	城市空间信息学、变形监测与灾害预报、
	及文化的影响,以	工程测量学、经典赏析与文化传承、哲学
	及这些制约因素	视野与文明对话、科技革命与社会发展、
	对项目实施的影	建筑艺术与审美教育、生态文明与未来城
	响,并理解应承担	市等。
	的责任	
7.环境和可持续发展:能	7.1 知晓和理解环	物理实验(1-2)、测绘地理信息概论、自
够理解和评价针对复杂测	境保护和可持续	然地理学、遥感数字图像处理、地理国情
绘工程问题的测绘工程实	发展的理念和内	监测、形势与政策(1-2)等。
践对环境、社会可持续发	涵	
展的影响。	7.2 能够从环境保	市场营销、自然地理学、不动产测量与管
	护和可持续发展	理、智慧城市导论、地理国情监测、变形
	的角度认知测绘	监测与灾害预报、控制测量实习、不动产
	工程实践活动的	测量与管理实习、复合培养类、毕业设计
	可持续性,以及评	等。
	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	
8.职业规范: 具有人文社	8.1 具有人文社会	思想道德修养与法律基础、中国近现代史
会科学素养、社会责任感,	科学素养,树立正	纲要、马克思主义基本原理概论、毛泽东
能够在测绘工程实践中理	确的世界观、人生	思想和中国特色社会主义体系理论概论、
解并遵守测绘行业职业道	观和价值观	军事理论、体育(1-4)、军训等。
德和规范,履行责任。		思想道德修养与法律基础、中国近现代史
	8.2 理解诚实公	纲要、毛泽东思想和中国特色社会主义体
	正、诚信守则的测	系理论概论、大学生职业生涯与发展规
	会行业职业道德 和## ### ###	划、测绘地理信息概论、测绘管理与法律
	和规范,并能在测	法规、形势与政策(1-2)、数字地形测量
	绘工程实践中自	实习、不动产测量与管理实习、空间信息
	觉遵守	综合实习等。

	8.3 理解测绘工作	马克思主义基本原理概论、大学生职业生
	人员对公众的安	涯与发展规划、测绘地理信息概论、自然
	全、健康、福祉、	地理学、测绘管理与法律法规、毕业设计
	环境保护的社会	等。
	责任,能够在测绘	
	工程实践中自觉	
	履行责任	
9.个人和团队:能够在多	9.1 能与建筑、土	大学生职业生涯与发展规划、体育(1-4)、
学科背景下的团队中承担	木等学科的成员	土木工程概论、工程力学、城市规划概论、
个体、团队成员以及责任	有效沟通,合作共	测量数据处理与程序设计、毕业设计等。
人的角色。	事	
		军事理论、军训、创新实践(测绘技能大
	0.2 数版大国队中	赛、测绘科技论文大赛)、数字地形测量
	9.2 能够在团队中	实习、遥感原理实习、卫星导航定位实习、
	独立或合作开展工作	控制测量实习、工程测量综合实习、激光
	工作	雷达测量技术实习、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	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
	调和指挥团队开	合实习、激光雷达测量技术实习、毕业设
	展工作	计等。
10.沟通: 能够就复杂测绘	10.1 能够在撰写	地图学实习、控制测量实习、工程测量综
工程问题与测绘同行及社	设计书、技术报告	合实习、毕业设计等。
会公众进行有效沟通和交	以及陈述发言中,	
流,包括撰写报告和设计	就复杂测绘工程	
文稿、陈述发言、清晰表	问题与测绘同行	
达或回应指令, 并具备一	及社会公众进行	
定的国际视野,能够在跨	有效沟通和交流	
文化背景下进行沟通和交	10.2 具备一定的	大学英语(1-2)、遥感原理、地理信息
流。	国际视野,了解测	系统原理(双语)、空间信息综合实习、
	绘领域的国际前	大学英语拓展系列课程(1-8)、现代测
	沿发展趋势和研	绘技术应用、GIS 基础应用技能、遥感应
	究热点	用前景等。
	10.3 具有跨文化	大学英语(1-2)、科技论文写作(双语)、
	交流的语言和书	大学英语拓展系列课程(1-8)等。
	面表达能力,能够	
	就测绘问题在跨	
	文化背景下进行	

	沟通和交流	
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	土木工程概论、工程力学、市场营销、不 动产测量与管理、数字地形测量实习、控 制测量实习、工程测量综合实习、毕业设 计等。
	11.2 了解测绘生 产的成本构成,理 解其中涉及的工 程管理与经济决 策问题	市场营销、测绘管理与法律法规、卫星导航定位实习、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	工程测量综合实习、不动产测量与管理实习、城市规划概论、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)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



2019 Undergraduate Program for Specialty in Surveying and Mapping Engineering

I. Specialty Name and Code

English Name	Surveying and Mapping Engineering			
Code	081201 Disciplines Engineering			
Length of Schooling	Four years	Degree	Bachelor of Engineering	

II. Educational Objectives and Features

1.Objectives

This program is to cultivate inter-disciplinary engineering talents, fully developed in morality, intelligence and physique, well equipped with mathematical science and social science, and highly skilled in basic theory, knowledge and profession of surveying and mapping engineering. The students are required to have the systematic training of scientific thinking and engineering practice, so that they are competent in design, production, R&D and management of surveying and mapping engineering, including basic state surveying and mapping, urban and rural development, land resources and urban emergency. It is practical engineering technical personnel with strong organizational management ability, innovative consciousness, continuous learning ability, international vision and urban surveying and mapping characteristics. After five years after graduation to work and study, can achieve the following goals:

- (1) the knowledge of mathematics, natural science, engineering foundation and advanced theory and technology of surveying and mapping, competent for engineering reconnaissance, design, construction 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.

2. 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 city surveying and mapping characteristics, and pinpointing the comprehensive ability of application of new surveying and mapping technologies. Based on the construction of Beijing and with the advantages of the civil construction disciplines of the University, this program aims to

cultivate professional surveying and mapping talents for the urban and rural construction, protection of historic buildings and accurate measurement of complex structures of Beijing and the whole country.

III. Major Disciplines

Science and Technology of Surveying and Mapping

IV. Major Courses

1. Basic Courses

Introduction to Geomatics, Engineering Drawing and Read Drawing, C Language and Data Structure, Physical Geography, Digital Topographic Surveying, CAD Basic and Application, Fundamentals of Error Theory and Surveying Adjustment, The Principle of Geographic Information System (Bilingual), Principles of Remote Sensing, Photogrammetry Fundamental

2. Specialty Courses

Satellite Navigation and Positioning Technology, Foundation of Geodesy, Engineering Surveying, Deformation Monitoring and Disasters Predicting, Real Estate Surveying and Management, Laser Radar Surveying Technology and Application

V. Major Practical Training

1. Major experiment

Experiment of Digital Topographic Surveying, experiment of Satellite Navigation and Positioning Technology, experiment of Fundamentals of Photogrammetry, experiment of GIS Principles, experiment of Geodesy, experiment of Engineering Surveying, experiment of Deformation Monitoring, experiment of Real Estate Surveying and Management, experiment of Laser Radar Surveying Technology and Application

2. Major Practical Training

Digital Topographic Surveying Practice, Satellite Navigation and Positioning Practice, Principles of Remote Sensing Practice, Fundamentals of Photogrammetry Practice, GIS Practice, Cartography Practice, Control Surveying Practice, Comprehensive Training for Engineering Surveying, Comprehensive Training for Spatial Information, Real Estate Surveying and Management Practice, Laser Radar Surveying Practice.

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 124credits of theoretical courses and 42 credits of practice teaching (2 credits of compulsory innovation practice and scientific research training included).

VII. Proportion of Course

Course Category	Course Type	Credits	Class Hour	Proportion
	Compulsory	41.5	616	25.00%
General Education	Optional	2	32	1.20%
Big Academic Subjects	Compulsory	46	804	27.71%
	Optional	1	16	0.60%
Professional Core	Compulsory	17	272	10.24%
Professional Direction	Compulsory	6	96	3.61%
	Optional	10. 5	168	6.33%
Practice	Compulsory	40	796	24.10%
	Optional	2	40	1.20%
Total		166	2840	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	1-14	15-16	17-20	4	1-14	15-16	17-20
5	1-16	19-20	17-18	6	1-14 15-16		17-20
7	7-15	16	1-6 17-20	8	1-16 grad	uation project	17 defence

IX. Graduate Abilities and Matrices

		f Geodesy, Fundamentals of Error Theory an d Surveying Adjustment.
	1.3 use relevant kno wledge and mathe matical models to de duce and analyze co mplex engineering p roblems in surveying and mapping.	Introduction to Computational Thinking, CA D Basic and Application, Engineering Drawi ng and Interpreting, Linear Algebra, Technol ogy of Satellite navigation and positioning, T he Laser Radar Surveying Technology, Comp uter Graphics, The Detecting and Surveying for underground pipelines in City, Engineerin g Surveying, Urban Spatial Information Scie nce.
	1.4 Solution compari son and synthesis of complex surveying and Mapping engine ering problems by u sing relevant knowle dge and mathematica I modeling methods.	C Programming Language and Data Structur e. Theory of Probability and Statistics (B). T echnology of 3D GIS. Close-range Photogr ammetry. Digital Topographic Surveying Prac tice. Cartography Practice. Practical Training for Photogrammetry Fundamental. Graduation design.
2. Problem analysis: B		Introduction to Computational Thinking, C Pr
e able to apply the basi		ogramming Language and Data Structure, Ad
c principles of mathema	2.1 Be able to apply	vanced Mathematics A(1-2), Theory of Proba
tics, natural science and	the basic principles	bility and Statistics (B) Physics Experiment(1
Engineering Science to	of mathematics, nat	-2), Linear Algebra, Introduction to Civil En
identify, express, and a	ural science and Eng	gineering、C# Programming、Cartography、T
nalyze the complex eng	ineering Science, to	he Principle of Geographic Information Syste
ineering problems throu	identify, analyze an	m. Physical geography. Deformation Monito
gh literature research to obtain the effective co	d express.	ring and Disasters Predicting, Spatial Analysi
nclusion.		s and Modeling, Practical Training for Photo grammetry Fundamental.
inorusion.	2.2 correctly express	CAD Basic and Application Digital Topogra
	complex surveying	phic Surveying, Fundamentals of Error Theor
	and mapping engine	y and Surveying Adjustment, Surveying Data
	ering problems base	Processing and Program Design Practice Co
	d on relevant scienti	ntest. The Laser Radar Surveying Technolog
	fic principles and m	y, Technology of 3D GIS, The Detecting an
	athematical models.	d Surveying for underground pipelines in Cit

		y、GIS base Application Skill、Engineering
		Surveying, Technology and Application of M
		obile Mapping System.
	2.3 recognize alterna	C Programming Language and Data Structur
	tives ways to solve	e, Document Retrieval of Science and Techn
	problems, and can s	ology, Photogrammetry Fundamental, Found
	eek alternative soluti	ation of Geodesy, Engineering Surveying, G
	ons through literatur	IS Practice, Practical Training for Real Estat
	e research.	e Surveying and Management.
	2.4 use the basic pri	College physics A(1-2), Document Retrieval
	nciples and literature	of Science and Technology, Technology of S
	research to analyze	atellite navigation and positioning, Practical T
	the influencing fact	raining for Control Surveying, Practical Train
	ors of the process a	ing for Engineering Surveying, Graduation d
	nd get effective conc	esign. Scientific research training.
	lusions.	
3. Design/Develop solut	3.1 Master the basic	Introduction to Computational Thinking, CA
ions: Be able to design	design/development	D Basic and Application, GIS base Applicati
solutions for complex	methods and techni	on Skill, Real Estate Surveying and Manage
engineering problems. T	ques of the whole c	ment, Introduction to Smart City, Spatial An
he design meets the spe	ycle and whole proc	alysis and Modeling, Engineering Surveying,
cific needs of system, t	ess of Surveying an	Practical Training for Photogrammetry Funda
he unit (components) or	d mapping engineeri	mental, Practical Training for Engineering Su
process, and can embo	ng design/developme	rveying. Comprehensive Practice for Spatial I
dy the sense of innovati	nt, and understand v	nformation.
on in the design proces	arious factors that af	
s, considering the societ	fect design objective	
y, health, safety, law, cu	s and technical solut	
lture and environment f	ions.	
actors.		C Programming Language and Data Structur
		e, CAD Basic and Application, Principles of
	3.2 Able to design a	Remote Sensing, The Principle of Geograph
	nd develop workflo	ic Information System, Photogrammetry Fund
	w and systems that	amental. Technology of Satellite navigation a
	meet specific needs	nd positioning. The Laser Radar Surveying T
	of surveying.	echnology, Engineering Surveying, Map Des
		ign and Compilation, Cartography Practice, P
		ractical Training for Satellite Navigation and

	3.3 Be able to demo nstrate innovation a wareness in the desi gn of Surveying and mapping projects, t aking into account s ocial, health, safety,	Positioning、GIS Practice、Surveying Data Processing and Program Design Practice Contest. Introduction to Geomatics、Digital Topographic Surveying、Engineering Surveying、Technology and Application of Mobile Mapping System、Geographic Conditions Monitoring、Invocation Practice(School of Surveying and Mapping Skills Contest、School of Surveying and Mapping Paper Contest)、Digital Topograp
	law, culture and envi	hic Surveying Practice Practical Training for Engineering Surveying Innovation and Entre preneurship Graduation design.
4. Research: Be able t o study complex engine ering problems, includin g the design of experim ents, analysis and interp retation of data, and get a reasonable and effect ive conclusion through using scientific methods	4.1 use scientific principles to propose a research scheme for complex surveying and mapping engine ering problems.	Cartography, The Principle of Geographic Information System, Foundation of Geodesy, The Detecting and Surveying for underground pipelines in City, Engineering Surveying, Intoroduction to Smart City, Geographic Conditions Monitoring, Practical Training for Control Surveying, Cartography Practice, Practical Training for Satellite Navigation and Positioning.
and based on scientific theory.	4.2 design, demonstr ate and predict the r esearch plan based o n professional theore tical knowledge.	Introduction to Computational Thinking, Engineering Drawing and Interpreting, Principles of Remote Sensing, Photogrammetry Fundamental, Technology of Satellite navigation and positioning, Practical Training for Engineering Surveying.
	4.3 adopt scientific methods for data ac quisition and analysi s.	C# Programming C Programming Language and Data Structure, Fundamentals of Error T heory and Surveying Adjustment, Surveying Data Processing and Programming, The Lase r Radar Surveying Technology, Deformation Monitoring and Disasters Predicting, Enginee ring Surveying, Remote Sensing Digital Image Processing, Close-range Photogrammetry, Practical Training for Satellite Navigation and Positioning, Surveying Data Processing and

5. Using modern tools:	4.4 integrate and jud ge the results of exp eriments, and get rea sonable conclusions.	Program Design Practice Contest, Practical Training for Control Surveying, Practical Training for Photogrammetry Fundamental, Practical Training for Laser Radar Surveying Technology. Document Retrieval of Science and Technology, Cartography, Scientific Paper writing, Engineering Surveying, Spatial Analysis and Modeling, Practical Training for Real Estate Surveying and Management, Practical Training for Laser Radar Surveying Technology, Comprehensive Practice for Spatial Information, Graduation design.
5. Using modern tools: Have the ability to solv e complex engineering problems by developpi ng, selectting and using appropriate technology, resources, modern engi neering tools and infor mation technology tools, including the predictio n and simulation of co mplex engineering probl ems and understanding the limitations.	5.1 choose appropria te modern surveying technology and inst ruments for complex surveying and map ping engineering pro blems.	College English(1-2)、Introduction to Comput ational Thinking、C Programming Language and Data Structure、CAD Basic and Applicat ion、C# Programming、Digital Topographic Surveying、The Laser Radar Surveying Techn ology、Technology of 3D GIS、Computer Graphics、The Detecting and Surveying for und erground pipelines in City、GIS base Application Skill、Deformation Monitoring and Disasters Predicting、Engineering Surveying、Real Estate Surveying and Management、Introduction to Smart City、Technology and Application of Mobile Mapping System、Advanced Technology of Surveying, Maping and GIS、Digital Topographic Surveying Practice、Practical Training for Control Surveying、Cartography Practice、Practical Training for Engineering Surveying、Practical Training for Real Estate Surveying and Management、Practical Training for Laser Radar Surveying Technology、Surveying and Mapping Skills Practice Contest、GIS Software Development Practice.
	5.2 use modern surv eying and mapping i nstruments and infor	Engineering Drawing and Interpreting, Advan ced Mathematics A(1-2), Theory of Probabili ty and Statistics (B), Digital Topographic Sur

mation technology s veying, Principles of Remote Sensing, Carto oftware to complete graphy, Photogrammetry Fundamental, Foun data acquisition, data dation of Geodesy, Technology of Satellite n processing and accu avigation and positioning, Fundamentals of E racy analysis. rror Theory and Surveying Adjustment, Engi neering Surveying, Deformation Monitoring a nd Disasters Predicting, Real Estate Surveyin g and Management, Remote Sensing Digital Image Processing, Close-range Photogramme try, Digital Topographic Surveying Practice, Practical Training for Control Surveying, Pra ctical Training for Satellite Navigation and P ositioning, GIS Practice, Practical Training f or Control Surveying, Practical Training for Engineering Surveying, Practical Training for Real Estate Surveying and Management, Pra ctical Training for Laser Radar Surveying Te chnology, Comprehensive Practice for Spatial Information, Graduation design, Surveying and Mapping Skills Practice Contest, GIS So ftware Development Practice. Theory of Probability and Statistics (B), Coll ege physics A(1-2), Linear Algebra, Docum 5.3 use modern tool ent Retrieval of Science and Technology, Fu s to predict and sim ndamentals of Error Theory and Surveying A ulate complex surve djustment, Surveying Data Processing and Pr ying and mapping e ogramming, Practical Training for Photogram ngineering problems metry Fundamental, Graduation design, Invo and understand their cation Practice(School of Surveying and Map limitations. ping Skills Contest, School of Surveying and Mapping Paper Contest).

6. Society and enginee ring:Be able to conduct rational analysis bqsed on related background knowledge and evaluat ion of the effect of professional engineering pra

6.1 Familiar with rel evant technical stand ards, laws and regul ations and managem ent regulations of Su rveying and mappin g, and can reasonabl Thought Morals Accomplishment and Basic Law, Introduction to Civil Engineering, Digital Topographic Surveying, Principles of Remote Sensing, Foundation of Geodesy, Technology of Satellite navigation and positioning, Surveying Management and Laws, Digital Topographic Surveying Practice, GIS Practi

ctice and complicated e y analyze based on ce, Practical Training for Engineering Survey ngineering problem solu engineering related b ing, Engineering practice class, Graduation d tions on society, health, ackground knowledg esign. and safety, law and cu lture based on engineeri The Outline of the Modern Chinese History, 6.2 evaluate the imp ng-related knowledge ba The Generality of Basic Principle of Marxis act of Surveying and ckground, and understan m. Introduction to Mao Zedong Thoughts an mapping engineerin d the responsibilities. d Theoretical System of the Chinese characte g practice and comp ristic socialism, Military Theory, Engineering lex mapping enginee Surveying, Real Estate Surveying and Mana ring solutions on soc gement, Surveying Management and Laws, iety, health, safety, la Urban Spatial Information Science, Deformat w and culture, as w ion Monitoring and Disasters Predicting, Eng ell as the impact of ineering Surveying, Classical appreciation and these constraints on cultural inheritance. The philosophical persp the implementation o ective and the dialogue of civilization. Scient f the project, and un ific and technological revolution and social d derstanding the respo evelopment, Architectural art and aesthetic ed nsibilities that should ucation, Ecological civilization and future citi be undertaken. es. 7.Environment and sus 7.1 Be aware and u Physics Experiment(1-2), Introduction to Geo tainable development: nderstand the concep matics, Physical geography, Remote Sensing Be able to understand a t and connotation of Digital Image Processing, Geographic Condit nd evaluate the impact environmental prote ions Monitoring, Situation and Policy(1-2). of engineering practice ction and sustainable on environmental and s development. Marketing Management, Physical geography, ocial sustainable develo 7.2 recognize the su pment of complex engi stainability of Surve Real Estate Surveying and Management, Intr neering problems. ying and mapping e oduction to Smart City, Geographic Conditio ngineering practice f ns Monitoring, Deformation Monitoring and rom the perspective Disasters Predicting, Practical Training for Co of environmental pro ntrol Surveying, Practical Training for Real tection and sustainab Estate Surveying and Management, Compoun le development, and d culture class, Graduation design. to evaluate the pote ntial damage and hi dden danger to envir onment and society i

	n the production pra	
	ctice of Surveying a	
	nd mapping.	
8. Occupational norm s: Equip with the qualit y of humanistic social s ciences, sense of social responsibility, understand and follow professional ethics and criteria in e ngineering, be conscient ious in the performance of one's duties.	8.1 Have the human ities and social scien ce literacy; establish the correct world o utlook, outlook on li fe and values. 8.2 Understand the professional ethics a nd norms of the sur veying and mapping industry in an hone st, fair and honest c ode, and observe the m in the practice of Surveying and map	Thought Morals Accomplishment and Basic Law, The Outline of the Modern Chinese Hi story, The Generality of Basic Principle of Marxism, Introduction to Mao Zedong Thou ghts and Theoretical System of the Chinese characteristic socialism, Military Theory, Phy sical Education(1-4), Military Training. Thought Morals Accomplishment and Basic Law, The Outline of the Modern Chinese Hi story, Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese chara cteristic socialism, College Student Occupatio n Career and Development Planning, Introdu ction to Geomatics, Surveying Management and Laws, Situation and Policy(1-2), Digital Topographic Surveying Practice, Practical Tra ining for Real Estate Surveying and Manage
	ping.	ment, Comprehensive Practice for Spatial Inf
	F8	ormation.
	8.3 Understand the s ocial responsibility of Surveying and mapping staff for public safety, health, welf are and environment al protection, and conscientiously fulfill their responsibilities in surveying and mapping engineering practice.	The Generality of Basic Principle of Marxis m. College Student Occupation Career and Development Planning. Introduction to Geom atics. Physical geography. Surveying Manag ement and Laws. Graduation design.
9.Individuals and team	9.1 Able to effective	College Student Occupation Career and Deve
s: Be able to play an i	ly communicate with	lopment Planning Physical Education(1-4) I
mportant role of individ	members of archite	ntroduction to Civil Engineering, Engineering
ual, team member and	cture, civil engineeri	Mechanics Conspectus of Urban Planning

person in charge in the	ng and other discipli	Surveying Data Processing and Programmin					
team of multi-subject	nes.	g, Graduation design.					
background.		Military Theory, Military Training, Invocatio					
		n Practice(School of Surveying and Mapping					
		Skills Contest, School of Surveying and Ma					
	0.2	pping Paper Contest), Digital Topographic Su					
	9.2 work independen	rveying Practice Practical Training for Contr ol Surveying Practical Training for Satellite					
	tly or collaborate wo						
	rk with others in a t	Navigation and Positioning, Practical Training					
	eam.	for Control Surveying, Practical Training for					
		Engineering Surveying, Practical Training for Laser Radar Surveying Technology, Survey					
		ing and Mapping Skills Practice Contest, GI					
		S Software Development Practice.					
		The Outline of the Modern Chinese History					
	9.3 organize, coordin	Military Theory, Cartography Practice, GIS					
	ate and command th	Practice Comprehensive Practice for Spatial					
	e team to carry out	Information Practical Training for Laser Rad					
	the work.	ar Surveying Technology, Graduation design.					
10. Communication: B	10.1 Able to effectiv	Cartography Practice Practical Training for					
e able to communicate	ely communicate an	Control Surveying, Practical Training for Eng					
effectively with industry	d communicate with	ineering Surveying, Graduation design.					
peers and social public	the surveying and						
in complex surveying	mapping colleagues						
and mapping engineerin	and the public in wr						
g, including writing rep	iting design books, t						
orts and design papers,	echnical reports and						
presentations, expressing	presentations.						
oneself and responsing		College English(1-2), Principles of Remote S					
instruction clearly. Hav	10.2 Have an intern	ensing. The Principle of Geographic Informat					
e international perspecti	ational perspective a	ion System, Comprehensive Practice for Spat					
ve and the ability of co	nd understand the in	ial Information, College English extension se					
mmunicating between o	ternational trend and	ries (1-8), Application of Modern Surveying					
r among interlocutors of	research hotspots in	and Mapping Technology, GIS base Applica					
different cultural backg	the field of Surveyi	tion Skill, Remote Sensing Applicantion Pros					
round.	ng and mapping.	pect.					
	10.3 Have the abilit	College English(1-2), Scientific Paper writin					
	y of cross cultural c	g. College English extension series(1-8).					
	<u> </u>						

	ommunicating and p	
	aper work Can co	
	mmunicate in cross	
	culture background i	
	n surveying and ma	
	pping issues.	
11. Project manageme		Introduction to Civil Engineering, Engineerin
nt: Understand and mas	11.1 Master the man	g Mechanics, Marketing Management, Real
ter the method of devel	agement and econo	Estate Surveying and Management, Digital T
opment and managemen	mic decision-making	opographic Surveying Practice, Practical Trai
t for economic decision	methods involved i	ning for Control Surveying, Practical Trainin
method and application	n the project.	g for Engineering Surveying, Graduation desi
in multi subject enviro		gn.
nment.	11.2 Understand the	Marketing Management, Surveying Managem
	cost structure of Sur	ent and Laws Practical Training for Satellite
	veying and mapping	Navigation and Positioning Graduation desig
	production and und	n.
	erstand the problems	
	involved in enginee	
	ring management an	
	d economic decision	
	-making.	
	11.3 apply engineeri	Practical Training for Engineering Surveying
	ng management and	Practical Training for Real Estate Surveying
	economic decision	and Management, Conspectus of Urban Plan
	making in the proce	ning, Graduation design.
	ss of design and de	and communication accepts
	velopment in a multi	
	disciplinary environ	
	ment.	
12. Lifelong learning:		Thought Morals Accomplishment and Basic
Have the awareness of		Law, College Student Occupation Career and
autonomous learning an	12.1 The consciousn	Development Planning, College English(1-
d lifelong learning and	ess of autonomous 1	2). Introduction to Geomatics. Fundamentals
the ability to learn, and	earning and lifelong	of Error Theory and Surveying Adjustment, S
adapt to the developm	learning.	urveying Management and Laws, Advanced
	rearining.	Technology of Surveying, Maping and GIS
ent.		
		College English extension series(1-8).

	The Generality of Basic Principle of Marxis
	m. Introduction to Mao Zedong Thoughts an
	d Theoretical System of the Chinese characte
12.2 Have the abilit	ristic socialism, Introduction to Geomatics, S
y of eternal learning	cientific Paper writing, Introduction to Smart
and adapting develo	City, Advanced Technology of Surveying, M
pment.	aping and GIS, Graduation design, Invocatio
	n Practice(School of Surveying and Mapping
	Skills Contest, School of Surveying and Ma
	pping Paper Contest).

X. Table of Teaching Arrangement (appendix table)

表 1 测绘工程专业指导性教学计划

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
		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	3	48	24			24		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	5	80	48			32		6	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
	必	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
		大学生心理健康 The Mental health of College Students	1	16	16					2	学工部
通		大学英语(1-2) ★ College English(1-2)	6	128	96				32	1, 2	文法学院
识		大学英语拓展系列课程(1-4)	2	32	32					3	文法学院
		大学英语拓展系列课程(5-8)	2	32	32					4	文法学院
教育		体育(1-4) Physical Education(1-4)	4	120	120					1-4	体育部
课		计算思维导论 Introduction to Computational Thinking	1.5	56	24			32		1	电信学院
		小 计	33. 5	656	488			136	32		
		经典赏析与文化传承	2	32						1-8	各院部
		哲学视野与文明对话	2	32						1-8	各院部
	核	科技革命与社会发展	2	32						1-8	各院部
	心	建筑艺术与审美教育	2	32						1-8	各院部
		生态文明与未来城市	2	32						1-8	各院部
		至少修读 4 类合	计 8 学	2分,	每类	至少修	沙 读 2	学分			
		创新创业类			1	-8 学	期任法	先			各院部
	选	工程实践类			1	-8 学	期任達	先			各院部
	修	复合培养类 1-8 学期任选								各院部	
		跨类	任选至	三少 2	学分						
		通识教育课合计至少修读43.5学分,其中	中通识	?教育	必修	33. 5	学分,	通识	教育	核心 8	学分,通识教育
	任选 2 学分										

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
		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
	必	工程制图与识图 Engineering Drawing and Interpreting C语言与数据结构 ★ C Programming	3	48	44				4	2	理学院
大		Language and Data Structure	3	48	32	16				1	地理信息科学系
	修	自然地理学 Physical geography	2	32	32					1	地理信息科学系
类		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
基		数字地形测量学★ Digital Topographic Surveying	4	64	52	12				2	测绘工程系
础		bull veying 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		40	40	0				J	地互同心付于水
课		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	46	804	644	120		8	32		
		现代测绘技术应用									
		Application of Modern Surveying and Mapping Technology	1	16	8	8				2	测绘工程系
	选	GIS 基础应用技能 GIS base Application Skill	1	16	8	8				2	地理信息科学系
	修	遥感应用前景 Remote Sensing Applicantion	1	16	8	8				3	遥感工程系
		Prospect									
		小 计	3	48	48	MA A		 			
-	大类学科基础课合计 47 学分, 必修 46 学分, 任选 1 学分										
专业	必	误差理论与测量平差基础 ★Fundamentals of Error Theory and Surveying Adjustment	3	48	48					4	测绘工程系

核心课	修	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
床		大地测量学基础★ Foundation of Geodesy	4	64	56	8				4	测绘工程系
		卫星导航定位技术★ Technology of Satellite navigation and positioning	3	48	44	4				5	测绘工程系
		摄影测量基础★ Photogrammetry	3	48	40	8				5	遥感工程系
		工程测量学★ Engineering Surveying	4	64	52	12				6	测绘工程系
		小计	17	272	240	32					
		专业核心	课合	计必例	多 17 ²	学分					
		变形监测与灾害预报 Deformation Monitoring and Disasters Predicting	2	32	24	8				5	测绘工程系
	必	不动产测量与管理 Real Estate Surveying and Management	2	32	28	4				7	测绘工程系
	修	激光雷达测量技术与应用 The Laser Radar Surveying Technology	2	32	24	8				7	测绘工程系
		小 计	6	96	76	20					
		C#程序设计 C# Programming	2	32	16	16				4	地理信息科学系
专		地图设计与编绘 Map Design and Compilation	2	32	16	16				4	地理信息科学系
		计算机图形学 Computer Graphics (限选)	2	32	24	8				5	地理信息科学系
业		测量数据处理与程序设计 Surveying Data Processing and Programming	2	32	16	16				5	测绘工程系
方向		遥感数字图像处理 Remote Sensing Digital Image Processing	2	32	24	8				5	遥感工程系
课	选	科技文献检索 Document Retrieval of Science and Technology	1	24	16			8		5	图书馆
	修	空间分析与建模 Spatial Analysis and Modeling	2	32	24	8				5	地理信息科学系
		工程力学 Engineering Mechanics (限选)	2	32	32					5	理学院
		土木工程概论 Introduction to Civil Engineering(限选)	2	32	32					5	土木学院
		近景摄影测量 Close-range Photogrammetry	2	32	26	6				6	遥感工程系
		三维地理信息技术 Technology of 3D GIS	2	32	16	16				6	地理信息科学系
		智慧城市导论 Introduction to Smart City	1	16	16					6	地理信息科学系

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
科技论文写作(双语)	1	16	16					6	测绘工程系
Scientific Paper writing									
测绘管理与法律法规	1.5	24	24					6	测绘工程系
Surveying Management and Laws (限选)	1. 0	21	21						例坛工住水
城市空间信息学	2	32	0.4	0				,	地理
Urban Spatial Information Science	2	32	24	8				7	地理信息科学系
城市地下管线测量									
The Detecting and Surveying for	1	16	10	6				7	测绘工程系
underground pipelines in City									
移动道路测量技术及应用									
Technology and Application of Mobile	1	16	8	8				7	地理信息科学
Mapping System									
地理国情监测									bl em Ar Ar Al W
Geographic Conditions Monitoring	1.5	24	16	8				7	地理信息科学
测绘地理信息技术前沿									
Advanced Technology of Surveying, Maping	1	16	16					7	测绘学院
and GIS									
城市规划概论	1.5	24	20	4				7	建筑学院
Conspectus of Urban Planning	1. 0	44	20	4					
市场营销	1 5	0.4	0.4					,	级类类
Marketing Management	1.5	24	24					7	经管学院
小 计	34	552	416	128		8			

专业方向课合计 16.5 学分,必修 6 学分,任选至少修读 10.5 学分

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
	军事理论 Military Theory 军训	2	36 40			1	1-3	武装部
	Military Training 形势与政策(5-7) Situation and Policy(5-7)		40			5-7	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	40		3	17-18	地理信息科学系
	地理信息系统原理实习 GIS Practice	2	40		40	3	19-20	地理信息科学系
	控制测量实习 Practical Training for Control Surveying	3	60	60		4	18-20	测绘工程系
	遥感原理实习 Practical Training for Principles of Remote Sensing	1	20	20		4	17	遥感工程系
课	摄影测量基础实习	1	20	20		5	20	遥感工程系
内	卫星导航定位实习 Practical Training for Satellite Navigation and Positioning	1	20	20		5	19	测绘工程系
	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	16	遥感工程系
	工程测量综合实习 Practical Training for Engineering Surveying	4	80	80		6	17-20	测绘工程系
	空间信息综合实习 Comprehensive Practice for Spatial Information	6	120	120		7	1-6	测绘学院
	不动产测量与管理实习 Practical Training for Real Estate Surveying and Management	2	40	20	20	7	17-18	测绘工程系
	激光雷达测量技术实习 Practical Training for Laser Radar Surveying Technology	2	40	20	20	7	19-20	测绘工程系
	毕业设计与毕业答辩 Graduation design and defense	8	160	160		8	1-16	测绘工程系
	小 计	40	796	640	80			

课程属性		课程名称			实验实践	上机	开课 学期	开设 周次	教学单位
		测绘技能大赛实训 Surveying and Mapping Skills Practice Contest	2	40	40		4	1-14	测绘工程系
		学院测绘技能大赛 School of Surveying and Mapping Skills Contest	1	20	20		4		测绘学院
课		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
外		全国论文大赛 Mostrule Cup-National Paper Contest	1	20	20				测绘学院
		GIS 软件开发大赛实训 GIS Software Development Practice	1	20	20				地理信息科学系
		科研训练 Scientific research training	1	20	20				测绘工程系
		7	140	140					

2019 级测绘工程(智能导航实验班)专业 本科培养方案

一、专业基本信息

英文名称	Surveying and Mapping Engine	eering (Intelli	gent Navigation)
专业代码	081201	学科门类	工学
学 制	4年	授予学位	工学学士

二、培养目标和专业特色

1.培养目标

培养具有德、智、体、美全面发展,具备数理基础和人文社科知识,掌握测绘工程与导航定位基础理论、基本知识和基本技能,接受科学思维和工程实践训练,培养从事自然资源测绘、导航定位、导航软硬件研发与位置服务等应用的专业人才,服务于城市测绘、智能交通、应急管理、互联网、航空航天等领域和部门,具有较强的组织管理能力、创新意识、继续学习能力、国际视野和智能导航特色的应用型工程技术人才。毕业后经过5年左右的工作和学习,能够达到如下目标:

- (1) 掌握数学、自然科学、工程基础、测绘理论与技术及导航定位理论与技术,胜任智慧城市数据采集、高精度导航地图生产、导航产品制造、大数据分析与位置服务以及智能导航硬件研发等专业技术工作;
- (2) 具有良好专业素养、丰富的产品研发经验和极强工作责任心,成为测绘地理信息及导航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测绘地理信息及导航相关研发工作;
 - (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。

2.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,具备解决智慧城市测绘相关问题,能进行导航定位产品研发及集成解决方案设计的测绘人才。适应测绘高新科技发展,融教学、科研和生产为一体,强调测绘理论、生产实践与测绘产品研发制造为一体,突出城市测绘特色,培养测绘新产品研发、新技术、新方法、新工艺的应用能力,服务于城市测绘与管理、智能交通、应急管理、互联网、航空航天等领域。

三、主干学科

测绘科学与技术

四、主干课程

1. 主干基础课程

测绘地理信息概论、工程制图与识图、C语言与数据结构、自然地理学、导航装备基础、数字地形测量学、地图学、CAD基础与应用、误差理论与测量平差基础、地理信息系统原理(双语)、遥感原理、摄影测量基础。

2. 主干专业课程

卫星导航定位技术、大地测量学基础、工程测量学、导航嵌入式系统与程序设计、高精度导航地图与位置服务、组合导航原理、室内定位与智能导航。

五、主要实践教学环节

1. 主要实验

数字地形测量学实验 、卫星导航定位技术实验 、摄影测量基础实验、地理信息系统原理实验、大地测量学基础实验、工程测量学实验、导航装备基础实验。

2. 主要实践环节

数字地形测量实习、卫星导航定位实习、遥感原理实习、摄影测量实习、地理信息系统实习、地图学实习、控制测量实习、导航装备基础实习、工程测量综合实习、导航定位综合实习、高精度地图采集实习、导航定位嵌入式研发实习。

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 167 学分,其中理论课程 122 学分,实践教学环节 45 学分(含创新实践及科研训练必修 2 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	通识教育课 必修		616	24.85%
	选修	2	32	1.20%
大类基础课	必修	47	784	28.14%
	选修	1	16	0.60%
专业核心课	必修	14	224	8.38%
专业方向课	必修	8	128	4.79%
	选修	8.5	136	5.09%
独立实践环节	必修	39	776	23.35%
	选修	6	120	3.59%
总计		167	2832	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 周	2	1-15 周	16周	17-20 周
3	1-15 周	16 周	17-20 周	4	1-14 周	15 周	16-20 周
5	1-16 周	17 周	18-20 周	6	1-14 周	15 周	16-20 周
7	8-19 周	20 周	1-7 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

/N +-	业生应具备的知识能力力	X 头
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)
22/11/0/11/0/2	1.1 能够将数学、自 然科学、工程科学的 语言工具用于测绘工 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、自然地理学、计算机图形学等。
1.工程知识: 能够将数学、自 然科学、工程基	1.2 能针对具体的测 绘对象建立数学模型 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、变形监测与灾害预报、大地测量学基础、误差理论与测量平差基础、导航装备基础等。
础和专业知识 用于解决复杂 测绘工程问题。	1.3 能够将相关知识 和数学模型方法用于 推演、分析测绘专业 复杂工程问题	计算思维导论、CAD 基础与应用、工程制图与识图、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、城市地下管线测量、工程测量学、城市空间 信息学等。
	1.4 能够将相关知识 和数学模型方法用于 测绘专业复杂工程问 题解决方案的比较与 综合	C语言与数据结构、概率与数理统计 B、三维地理信息技术、工业智能定位测量、数字地形测量实习、地图学实习、摄影测量基础实习、导航装备基础实习、导航定位综合实习、毕业设计等。
2. 问题分析: 能够应用数学、 自然科学和工	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语言与数据结构、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、工程力学、 土木工程概论、C#程序设计、地图学、地理信息系统原理 (双语)、自然地理学、变形监测与灾害预报、空间分析与 建模、摄影测量基础实习等。
程科学的基本原理,识别、表达、并通过文献研究分析复杂	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测绘工程问题	CAD 基础与应用、数字地形测量学、误差理论与测量平差基础、测量数据处理与程序设计大赛实训、激光雷达测量技术与应用、三维地理信息技术、城市地下管线测量、室内定位与智能导航、工程测量学、移动道路测量技术及应用等。
测绘工程问题,以获得有效结论。	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语言与数据结构、科技文献检索、摄影测量基础、大地测量学基础、工程测量学、地理信息系统原理实习、自然地理地貌及遥感图像解译实习、高精度地图采集实习等。
	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、控制测量实习、工程测量综合实习、毕业设计、科研团队创新训练等。
3.设计/开发解 决方案: 能够设 计针对复杂测 绘工程问题的	3.1 掌握测绘工程设计/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、室内定位与智能导航、 嵌入式系统与程序设计、智慧城市导论、空间分析与建模、 工程测量学、摄影测量基础实习、工程测量综合实习、导 航定位综合实习等。
解决方案,设计 满足特定需求 的系统、生产流 程,并能够在设	3.2 能够设计开发满 足特定测绘需求的生 产流程及系统	C语言与数据结构、CAD基础与应用、遥感原理、地理信息系统原理(双语)、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、工程测量学、地图设计与编绘、地图学实习、卫星导航定位实习、地理信息系统原理实习、测量数据从理与程序设计大策实训练
计环节中体现 创新意识,考虑 社会、健康、安	3.3 能够在测绘工程 解决方案设计中体现 创新意识,考虑社会、 健康、安全、法律、	测量数据处理与程序设计大赛实训等。 测绘地理信息概论、数字地形测量学、工程测量学、移动 道路测量技术及应用、地理国情监测、创新实践(测绘技能大赛、测绘科技论文大赛等)、数字地形测量实习、工程

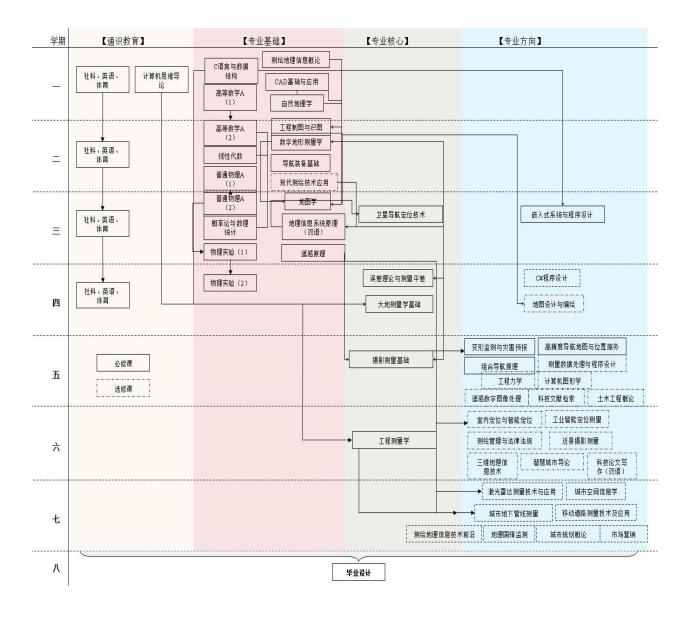
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全、法律、文化	文化以及环境等因素	测量综合实习、创新创业类、毕业设计等。
以及环境等因		
素。		
4.研究: 能够基	 4.1能够运用科学原	地图学、地理信息系统原理(双语)、大地测量学基础、城
于科学原理并	理对复杂测绘工程问	市地下管线测量、工程测量学、智慧城市导论、地理国情
采用科学方法	题提出研究方案	监测、遥感原理实习、地图学实习、卫星导航定位实习等。
对复杂测绘工	4.2能够基于专业理	计算思维导论、工程制图与识图、遥感原理、摄影测量基
程问题进行研	论知识对研究方案进 行设计、论证与预测	础、卫星导航定位技术、工程测量综合实习等。
究,包括设计实		C#程序设计、C 语言与数据结构、误差理论与测量平差基
验、分析与解释	4.3能够采用科学方	础、测量数据处理与程序设计、激光雷达测量技术与应用、
数据、并通过信	法实施数据采集与分	 变形监测与灾害预报、工程测量学、遥感数字图像处理、
息综合得到合	析处理	 工业智能定位测量、卫星导航定位实习、测量数据处理与
理有效的结论。		程序设计大赛实训、控制测量实习、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	科技文献检索、地图学、科技论文写作(双语)、工程测量
		 学、空间分析与建模、高精度地图采集实习、导航定位综
	论	 合实习、毕业设计等。
5.使用现代工		大学英语 (1-2)、计算思维导论、C 语言与数据结构、CAD
具: 能够针对复		基础与应用、C#程序设计、数字地形测量学、激光雷达测
杂测绘工程问		量技术与应用、三维地理信息技术、计算机图形学、城市
题,开发、选择	5.1 能够针对复杂测	地下管线测量、室内定位与智能导航、变形监测与灾害预
与使用恰当的	绘工程问题,选择恰 当的现代测绘技术与	报、工程测量学、组合导航原理、智慧城市导论、移动道
测绘技术、资	仪器	路测量技术及应用、测绘地理信息技术前沿、数字地形测
源、现代测绘仪		量实习、遥感原理实习、地图学实习、工程测量综合实习、
器和信息技术,		高精度地图采集实习、测绘技能大赛实训、导航定位终端
包括对复杂测		嵌入式程序设计大赛等。
绘工程问题的		工程制图与识图、高等数学 A (1-2)、概率与数理统计 B、
预测与模拟,并		数字地形测量学、遥感原理、地图学、摄影测量基础、大
能够理解其局	E O 松坡佳田埔仏湖	地测量学基础、卫星导航定位技术、误差理论与测量平差
限性。	5.2 能够使用现代测 绘仪器和信息技术软	基础、工程测量学、变形监测与灾害预报、组合导航原理、
	件完成测绘数据采	遥感数字图像处理、工业智能定位测量、数字地形测量实
	集、数据处理与精度 分析	习、遥感原理实习、卫星导航定位实习、高精度地图采集
		实习、控制测量实习、工程测量综合实习、导航定位综合
		实习、毕业设计、测绘技能大赛实训、导航定位终端嵌入
		式程序设计大赛等。
	 5.3 能够使用现代工	概率与数理统计 B、普通物理 (1-2)、线性代数、科技文
	具,对复杂测绘工程	献检索、误差理论与测量平差基础、测量数据处理与程序
	问题进行预测与模 拟,并理解其局限性	设计、嵌入式系统与程序设计、摄影测量基础实习、毕业
		设计、创新实践(测绘技能大赛、测绘科技论文大赛)等。

6.工程与社会:	6.1 熟悉测绘专业相	思想道德修养与法律基础、土木工程概论、数字地形测量
能够基于工程		学、遥感原理、大地测量学基础、卫星导航定位技术、测
相关背景知识		绘管理与法律法规、数字地形测量实习、地理信息系统原
进行合理分析,	识进行合理分析	理实习、工程测量综合实习、工程实践类、毕业设计等。
评价测绘工程		中国近现代史纲要、马克思主义基本原理概论、毛泽东思
实践和复杂测	6.2 能够评价测绘工	想和中国特色社会主义体系理论概论、军事理论、工程测
绘工程问题解	程实践和复杂测绘工 程问题解决方案对社	量学、工业智能定位测量、测绘管理与法律法规、城市空
决方案对社会、	会、健康、安全、法	间信息学、变形监测与灾害预报、工程测量学、经典赏析
健康、安全、法	律以及文化的影响, 以及这些制约因素对	与文化传承、哲学视野与文明对话、科技革命与社会发展、
律以及文化的	项目实施的影响,并	建筑艺术与审美教育、生态文明与未来城市等。
影响,并理解应	理解应承担的责任	
承担的责任。	PT of Bases to the Action of t	
7. 环境和可持	7.1 知晓和理解环境 保护和可持续发展的	物理实验(1-2)、测绘地理信息概论、自然地理学、遥感
续发展: 能够理	理念和内涵	数字图像处理、地理国情监测、形势与政策(1-2)等。
解和评价针对	7.2 能够从环境保护	市场营销、自然地理学、工业智能定位测量、智慧城市导
复杂测绘工程	和可持续发展的角度	论、地理国情监测、变形监测与灾害预报、控制测量实习、
问题的测绘工	认知测绘工程实践活 动的可持续性,以及	高精度地图采集实习、复合培养类、毕业设计等。
程实践对环境、	评价测绘工程生产实	
社会可持续发	践中可能对环境及社 会造成的损害和隐患	
展的影响。	N CONTRACT THE TOTAL	
8.职业规范: 具	8.1 具有人文社会科 学素养,树立正确的	思想道德修养与法律基础、中国近现代史纲要、马克思主
有人文社会科	学系乔, 树立止侧的 世界观、人生观和价	义基本原理概论、毛泽东思想和中国特色社会主义体系理
学素养、社会责	值观	论概论、军事理论、体育(1-4)、军训等。
任感,能够在测	8 9 珊~油分八工	思想道德修养与法律基础、中国近现代史纲要、毛泽东思
绘工程实践中	8.2 理解诚实公正、 诚信守则的测绘行业	想和中国特色社会主义体系理论概论、大学生职业生涯与
理解并遵守测	职业道德和规范,并	发展规划、测绘地理信息概论、测绘管理与法律法规、形
绘行业职业道	能在测绘工程实践中 自觉遵守	势与政策(1-2)、数字地形测量实习、高精度地图采集实
德和规范,履行		习、导航定位综合实习等。
责任。	8.3 理解测绘工作人 员对公众的安全、健	马克思主义基本原理概论、大学生职业生涯与发展规划、
	康、福祉、环境保护	测绘地理信息概论、自然地理学、测绘管理与法律法规、
	的社会责任,能够在 测绘工程实践中自觉	毕业设计等。
	履行责任	
9.个人和团队:	9.1 能与建筑、土木	大学生职业生涯与发展规划、体育(1-4)、土木工程概论、
能够在多学科	等学科的成员有效沟	工程力学、城市规划概论、测量数据处理与程序设计、毕
背景下的团队	通,合作共事	业设计等。
中承担个体、团		军事理论、军训、创新实践(测绘技能大赛、测绘科技论
队成员以及责	9.2 能够在团队中独 立或合作开展工作	文大赛)、数字地形测量实习、遥感原理实习、卫星导航定
任人的角色。	- / - / / / / / 11	位实习、控制测量实习、工程测量综合实习、测绘技能大

		赛实训、导航定位终端嵌入式程序设计大赛等。
	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、导航定位综合实习、毕业设计等。
10.沟通: 能够 就复杂测绘工 程问题与测绘 同行及社会公	10.1 能够在撰写设计书、技术报告以及陈述发言中,就复杂测绘工程问题与测绘同行及社会公众进行有效沟通和交流	地图学实习、控制测量实习、工程测量综合实习、毕业设计等。
众进行有效沟 通和交流,包括 撰写报告和设	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)、导航定位综合实习、大学英语拓展系列课程(1-8)、现代测绘技术应用、工业智能定位测量、室内定位与智能导航等。
计文稿、陈述发言、清晰表达或回应指令,并具备一定的国际,能够在跨文化背景下、处于为通和交流。	10.3 具有跨文化交流的语言和书面表达能力,能够就测绘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	11.1 掌握工程项目 中涉及的管理与经济 决策方法	土木工程概论、工程力学、市场营销、工业智能定位测量、 数字地形测量实习、控制测量实习、工程测量综合实习、 毕业设计等。
经济决策方法, 并能在多学科	11.2 了解测绘生产 的成本构成,理解其 中涉及的工程管理与 经济决策问题	市场营销、测绘管理与法律法规、卫星导航定位实习、毕业设计等。
环境中应用。	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	工程测量综合实习、高精度地图采集实习、导航定位嵌入式研发实习、城市规划概论、毕业设计等。
12. 終身学习: 具有自主学习 和终身学习的 意识, 有不断学	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。
习和适应发展的能力。	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、测绘科技论文写作大赛、北斗创新创业大赛、导航定位终端嵌入式程序设计大赛、"北斗杯"全国青少年科技创新大赛)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



2019 Undergraduate Program for Specialty in Surveying and Mapping Engineering (Intelligent Navigation)

I. Specialty Name and Code

English Name	Surveying and Mapping Engineering (Intelligent Navigation)		
Code	081201	Disciplines	Engineering
Length of Schooling	Four years	Degree	Bachelor of Engineering

II. Educational Objectives and Features

1.Objectives

This program is to cultivate all-round development of morality, intelligence, physique and beauty, basic knowledge of mathematics and Humanities and social sciences, master basic theory, basic knowledge and basic skills of Surveying and mapping engineering and navigation positioning, accept training of scientific thinking and engineering practice, and train people to engage in natural resources surveying and mapping, navigation positioning, navigation software and hardware development and location services, etc. Applied professionals serve urban surveying and mapping, intelligent transportation, emergency management, Internet, aerospace and other fields and departments. They have strong organizational and management capabilities, innovative consciousness, continuous learning ability, international vision and intelligent navigation characteristics of Applied Engineering and technical personnel. After five years after graduation to work and study, can achieve the following goals:

- (1) Master mathematics, natural science, engineering foundation, surveying and mapping theory and technology, navigation and positioning theory and technology, competent for intelligent city data acquisition, high-precision navigation map production, navigation product manufacturing, large data analysis and location services, and intelligent navigation hardware development and other professional and technical work.
- (2) With good professional accomplishment, rich product development experience and strong sense of responsibility, the graduate has become a technical leader or backbone in surveying and mapping geographic information and navigation enterprises and institutions.
- (3) Ability to continue learning and adapt to development, and be able to independently or collaboratively undertake research and development related to surveying and mapping geographic information and navigation.
- (4) Good team awareness, international vision and communication skills, able to assume leadership roles in the team.

2.Features

This program features relying on the advantages of capital construction and university civil architecture, this specialty trains surveying and mapping talents who serve the capital and face the whole country, have the ability to solve the problems related to surveying and mapping in smart cities, and can develop navigation and positioning products and design integrated solutions. To adapt to the development of high and new technology in surveying and mapping, integrate teaching, scientific research and production, emphasize the integration of surveying and mapping theory, production practice and research and manufacture of surveying and mapping products, highlight the characteristics of urban surveying and mapping, cultivate the application ability of new product development, new technology, new method and new technology in surveying and

mapping, and serve urban surveying and mapping management, intelligent transportation, emergency management, internet, aerospace and other fields.

III. Major Disciplines

Science and Technology of Surveying and Mapping

IV. Major Courses

1. Basic Courses

Introduction to Geomatics, Engineering Drawing and Read Drawing, C Language and Data Structure, Physical Geography, Foundation of Navigation Equipment, Digital Topographic Surveying, Cartography, CAD Basic and Application, Fundamentals of Error Theory and Surveying Adjustment, The Principle of Geographic Information System (Bilingual), Principles of Remote Sensing, Photogrammetry Fundamental.

2. Specialty Courses

Technology of Satellite navigation and positioning, Foundation of Geodesy, Engineering Surveying, High Precision Navigation Map and Location Service, Principle of Integrated Navigation, Indoor Positioning and Intelligent Navigation.

V. Major Practical Training

1. Major experiment

Experiment of Digital Topographic Surveying, experiment of Satellite Technology of Navigation and Positioning, experiment of Fundamentals of Photogrammetry, experiment of GIS Principles, experiment of Foundation of Geodesy, experiment of Engineering Surveying, and experiment of Foundation of Navigation Equipment.

2. Major Practical Training

Digital Topographic Surveying Practice, Satellite Navigation and Positioning Practice, Principles of Remote Sensing Practice, Fundamentals of Photogrammetry Practice, GIS Practice, Cartography Practice, Control Surveying Practice, Foundation of Navigation Equipment Practice, Comprehensive Training for Engineering Surveying, Comprehensive Training for Navigation and Positioning, High-precision Map Collection Practice, Navigation and Positioning Embedded Research and Development Practice.

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 167, including 122 credits of theoretical courses and 45 credits of practice teaching (2 credits of compulsory innovation practice and scientific research training included).

VII. Proportion of Course

Course Category	Course Type	Credits	Class Hour	Proportion
	Compulsory	41.5	616	24.85%
General Education	Optional	2	32	1.20%
Big Academic Subjects	Compulsory	47	784	28.14%
	Optional	1	16	0.60%
Professional Core	Compulsory	14	224	8.38%
Professional Direction	Compulsory	8	128	4.79%
	Optional	8.5	136	5.09%
Practice	Compulsory	39	776	23.35%
	Optional	6	120	3.59%
Total		167	2832	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	1-14	15-16	17-20	4	1-14	15-16	17-20
5	1-16	19-20	17-18	6	1-14	15	16-20
7	8-19	20	1-7	8	1-16 grad	uation project	17 defence

IX. Graduate Abilities and Matrices

1A. Graduate Admittes and Matrices		
Graduate	Related Knowledge	Course Supports
Abilities		
1.Engineering knowledge: have the ability of solving complex Survey and	1.1 Use language tools of mathematics, natural science and engineering science to formulate surveying and mapping engineering issues.	Introduction to Computational Thinking、C Programming Language and Data Structure、CAD Basic and Application、Engineering Drawing and Interpreting、Advanced Mathematics A(1-2)、Theory of Probability and Statistics (B)、College physics A(1-2)、Physics Experiment(1-2)、Linear Algebra、Introduction to Civil Engineering、Cartography、Physical geography、Computer Graphics.
Mapping engineering issues with mathematics, natural science, engineering foundation and	1.2 set up and solve mathematical models for specific surveying objects	Advanced Mathematics A(1-2), Linear Algebra, Digital Topographic Surveying, The Principle of Geographic Information System, Photogrammetry Fundamental, Deformation Monitoring and Disasters Predicting, Foundation of Geodesy, Fundamentals of Error Theory and Surveying Adjustment, Foundation of Navigation Equipment.
professional knowledge.	1.3 use relevant knowledge and mathematical models to deduce and analyze complex engineering	Introduction to Computational Thinking, CAD Basic and Application, Engineering Drawing and Interpreting, Linear Algebra, Technology of Satellite navigation and positioning, The Laser Radar Surveying Technology, Computer Graphics, The Detecting and Surveying for underground pipelines in City, Engineering Surveying,

	problems in surveying and	Urban Spatial Information Science.
	mapping.	
	1.4 Solution comparison and	C Programming Language and Data Structure, Theory of Probability and Statistics (B), Technology of 3D GIS,
	synthesis of complex	Industrial Intelligent Positioning Survey Digital
	surveying and	Topographic Surveying Practice Cartography Practice
	Mapping	Practical Training for Photogrammetry Fundamental
	engineering	Foundation of Navigation Equipment Pratice
	problems by using	Comprehensive Practice for Navigation and Positioning
	relevant knowledge	Graduation design.
	and mathematical	
	modeling methods.	Introduction to Computational Thinking、C Programming
2.Problem analysis:	2.1 Be able to apply	Language and Data Structure Advanced Mathematics
Be able to apply the	the basic principles	A(1-2), Theory of Probability and Statistics (B), Physics
basic principles of	of mathematics,	Experiment(1-2), Linear Algebra, Engineering Mechanics,
	natural science and	Introduction to Civil Engineering C# Programming
mathematics, natural	Engineering Science,	Cartography The Principle of Geographic Information
science and	to identify, analyze and express.	System, Physical geography, Deformation Monitoring and Disasters Predicting, Spatial Analysis and Modeling,
Engineering Science	ини схртсээ.	Practical Training for Photogrammetry Fundamental.
to identify,	2.2 correctly express	CAD Basic and Application Digital Topographic
	complex surveying	Surveying Fundamentals of Error Theory and Surveying
express, and analyze	and mapping	Adjustment, Surveying Data Processing and Program
the complex	engineering	Design Practice Contest. The Laser Radar Surveying
engineering	problems based on relevant scientific	Technology Technology of 3D GIS. The Detecting and Surveying for underground pipelines in City. Indoor
	principles and	Positioning and Intelligent Navigation Engineering
problems through	mathematical	Surveying Technology and Application of Mobile
literature research to	models.	Mapping System.
obtain the effective	2.3 recognize	C Programming Language and Data Structure, Document
conclusion.	alternatives ways to	Retrieval of Science and Technology Photogrammetry
concrasion.	solve problems, and can seek alternative	Fundamental Foundation of Geodesy Engineering Surveying GIS Practice Natural Geography and Remote
	solutions through	Sensing image interpretation Practice, High-precision Map
	literature research.	Collection Practice.
	2.4 use the basic	College physics A(1-2). Document Retrieval of Science
	principles and	and Technology Technology of Satellite navigation and
	literature research to analyze the	positioning Practical Training for Control Surveying Practical Training for Engineering Surveying Graduation
	analyze the influencing factors	Practical Training for Engineering Surveying, Graduation design, Innovation Training Project of Scientific Research
	of the process and	Team.
	get effective	
	conclusions.	
3. Design/Develop	3.1 Master the basic	Introduction to Computational Thinking, CAD Basic and
solutions: Be able to	design/development methods and	Application Indoor Positioning and Intelligent Navigation Navigation and Positioning Embedded
	techniques of the	Research and Development Practice, Introduction to Smart
design solutions for	whole cycle and	City Spatial Analysis and Modeling Engineering
complex engineering	whole process of	Surveying Practical Training for Photogrammetry
problems. The	Surveying and	Fundamental Practical Training for Engineering
design meets the	mapping engineering design/development,	Surveying Comprehensive Practice for Navigation and
	and understand	Positioning.
specific needs of	various factors that	
system, the unit	affect design	

(components) or process, and can embody the sense of	objectives and technical solutions.	
innovation in the design process, considering the society, health, safety, law, culture and environment factors.	3.2 Able to design and develop workflow and systems that meet specific needs of surveying.	C Programming Language and Data Structure、CAD Basic and Application、Principles of Remote Sensing、The Principle of Geographic Information System、Photogrammetry Fundamental、Technology of Satellite navigation and positioning、The Laser Radar Surveying Technology、Engineering Surveying、Map Design and Compilation、Cartography Practice、Practical Training for Satellite Navigation and Positioning、GIS Practice、Surveying Data Processing and Program Design Practice Contest.
	3.3 Be able to demonstrate innovation awareness in the design of Surveying and mapping projects, taking into account social, health, safety, law, culture and environmental factors.	Introduction to Geomatics Digital Topographic Surveying Engineering Surveying Technology and Application of Mobile Mapping System Geographic Conditions Monitoring Invocation Practice(School of Surveying and Mapping Skills Contest School of Surveying and Mapping Paper Contest) Digital Topographic Surveying Practice Practical Training for Engineering Surveying Innovation and Entrepreneurship Graduation design.
4.Research: Be able to study complex engineering problems, including the design of experiments, analysis and interpretation of data, and get a	4.1 use scientific principles to propose a research scheme for complex surveying and mapping engineering problems. 4.2 design, demonstrate and predict the research	Cartography、The Principle of Geographic Information System、Foundation of Geodesy、The Detecting and Surveying for underground pipelines in City、Engineering Surveying、Introduction to Smart City、Geographic Conditions Monitoring、Practical Training for Control Surveying、Cartography Practice、Practical Training for Satellite Navigation and Positioning. Introduction to Computational Thinking、Engineering Drawing and Interpreting、Principles of Remote Sensing、
reasonable and effective conclusion through using	plan based on professional theoretical knowledge.	Photogrammetry Fundamental、Technology of Satellite navigation and positioning、Practical Training for Engineering Surveying.
scientific methods and based on scientific theory.	4.3 adopt scientific methods for data acquisition and analysis.	C# Programming、C Programming Language and Data Structure、Fundamentals of Error Theory and Surveying Adjustment、Surveying Data Processing and Programming、The Laser Radar Surveying Technology、 Deformation Monitoring and Disasters Predicting、 Engineering Surveying、Remote Sensing Digital Image

		Processing Industrial Intelligent Positioning Survey
		Practical Training for Satellite Navigation and Positioning
		Surveying Data Processing and Program Design Practice
		Contest Practical Training for Control Surveying Practical
		Training for Photogrammetry Fundamental.
	4.4 integrate and	Document Retrieval of Science and Technology
	4.4 integrate and judge the results of	Cartography、Scientific Paper writing、Engineering
	experiments, and get	Surveying, Spatial Analysis and Modeling, High-precision
	reasonable conclusions.	Map Collection Practice Comprehensive Practice for
		Navigation and Positioning, Graduation design.
5.Using modern		College English(1-2). Introduction to Computational
tools:Have the		Thinking、C Programming Language and Data Structure、
ability to solve		CAD Basic and Application、C# Programming、Digital
complex engineering		Topographic Surveying The Laser Radar Surveying
problems by		Technology Technology of 3D GIS Computer Graphics
developping,		The Detecting and Surveying for underground pipelines in
selectting and using	5.1 choose appropriate modern	City Indoor Positioning and Intelligent Navigation
appropriate	appropriate modern surveying	Deformation Monitoring and Disasters Predicting
technology,	technology and	Engineering Surveying Principle of Integrated
resources, modern	instruments for complex surveying	Navigation Introduction to Smart City Technology and
engineering tools	and mapping engineering problems.	Application of Mobile Mapping System Advanced
and information		Technology of Surveying, Mapping and GIS, Digital
technology tools,		Topographic Surveying Practice Practical Training for
including the		Control Surveying Cartography Practice Practical
prediction and		Training for Engineering Surveying, High-precision Map
simulation of		Collection Practice Surveying and Mapping Skills Practice
complex engineering		Contest、Navigation and Positioning Embedded Research
problems and		and Development Practice.
understanding the		Engineering Drawing and Interpreting, Advanced
limitations.		Mathematics A(1-2). Theory of Probability and Statistics
	5.2 use modern	(B) Digital Topographic Surveying Principles of Remote
	surveying and mapping instruments	Sensing Cartography Photogrammetry Fundamental
	and information technology software to complete data acquisition, data	Foundation of Geodesy Technology of Satellite navigation
		and positioning Fundamentals of Error Theory and
		Surveying Adjustment, Engineering Surveying, Principle
	processing and accuracy analysis.	of Integrated Navigation Remote Sensing Digital Image
	accuracy analysis.	Processing Industrial Intelligent Positioning Survey
		Digital Topographic Surveying Practice Practical Training
		6 -1-0-T

		for Control Surveying, Practical Training for Satellite
		Navigation and Positioning, High-precision Map
		Collection Practice Practical Training for Control
		Surveying Practical Training for Engineering Surveying
		Comprehensive Practice for Navigation and Positioning
		Graduation design Surveying and Mapping Skills Practice
		Contest、Navigation and Positioning Terminal Embedded
		Programming Contest.
		Theory of Probability and Statistics (B), College physics
		A(1-2), Linear Algebra, Document Retrieval of Science
	5.3 use modern tools	and Technology. Fundamentals of Error Theory and
	to predict and simulate complex	Surveying Adjustment Surveying Data Processing and
	surveying and mapping engineering	Programming Embedded System and Programming
	problems and	Practical Training for Photogrammetry Fundamental
	understand their limitations.	Graduation design \ Invocation Practice(Surveying and
		Mapping Skills Practice Contest、Surveying and Mapping
		Paper Contest).
6. Society and	6.1 Familiar with relevant technical	Thought Morals Accomplishment and Basic Laws
engineering:Be able	standards, laws and	Introduction to Civil Engineering, Digital Topographic
to conduct rational	regulations and management	Surveying Principles of Remote Sensing Foundation of
analysis bqsed on	regulations of	Geodesy Technology of Satellite navigation and
related background	Surveying and mapping, and can	positioning, Surveying Management and Laws, Digital
knowledge and	reasonably analyze	Topographic Surveying Practice, GIS Practice, Practical
evaluation of the	based on engineering related background	Training for Engineering Surveying, Engineering practice
effect of professional	knowledge.	class. Graduation design.
engineering practice		The Outline of the Modern Chinese History . The
and complicated	6.2 evaluate the impact of Surveying	Generality of Basic Principle of Marxism \ Introduction to
engineering problem	and mapping	Mao Zedong Thoughts and Theoretical System of the
solutions on society,	engineering practice and complex	Chinese characteristic socialism, Military Theory,
health, and safety,	mapping engineering	Engineering Surveying Industrial Intelligent Positioning
law and culture	solutions on society, health, safety, law	Survey、Surveying Management and Laws、Urban Spatial
based on	and culture, as well	Information Science Deformation Monitoring and
engineering-related	as the impact of these constraints on	Disasters Predicting Engineering Surveying Classical
knowledge	the implementation	appreciation and cultural inheritance. The philosophical
background, and	of the project, and understanding the	perspective and the dialogue of civilization. Scientific and
understand the	responsibilities that	technological revolution and social developments
responsibilities.	should be undertaken.	Architectural art and aesthetic education, Ecological
	andorunon.	civilization and future cities.

	7.1 Be aware and	
7.Environment and	understand the	Physics Experiment(1-2) Introduction to Geomatics
sustainable	concept and	Physical geography Remote Sensing Digital Image
development:Be	connotation of environmental	Processing, Geographic Conditions Monitoring, Situation
able to understand	protection and	and Policy(1-2).
and evaluate the	sustainable	
impact of	development. 7.2 recognize the	
	sustainability of	Marketing Management、Physical geography、Industrial
engineering practice	Surveying and	Intelligent Positioning Survey Introduction to Smart City
on environmental	mapping engineering practice from the	Geographic Conditions Monitoring Deformation
and social	perspective of	Monitoring and Disasters Predicting, Practical Training for
sustainable	environmental	Control Surveying High-precision Map Collection
development of	protection and sustainable	Practice Compound culture class Graduation design.
complex engineering	development, and to	Theree Composite Curare Class Conduction accign.
problems.	evaluate the	
	potential damage and hidden danger to	
	environment and	
	society in the	
	production practice of Surveying and	
	mapping.	
8.Occupational	0 1 11 41	Thought Morals Accomplishment and Basic Law, The
norms:Equip with	8.1 Have the humanities and	Outline of the Modern Chinese History The Generality of
the quality of	social science	Basic Principle of Marxism Introduction to Mao Zedong
humanistic social	literacy; establish the correct world	Thoughts and Theoretical System of the Chinese
	outlook, outlook on	characteristic socialism, Military Theory, Physical
,	life and values.	
social responsibility,		Education(1-4) Military Training.
understand and		Thought Morals Accomplishment and Basic Law The
follow professional	8.2 Understand the	Outline of the Modern Chinese History Introduction to
ethics and criteria in	professional ethics and norms of the	Mao Zedong Thoughts and Theoretical System of the
engineering, be	surveying and	Chinese characteristic socialism, College Student
conscientious in the	mapping industry in an honest, fair and	Occupation Career and Development Planning
performance of one's	honest code, and	Introduction to Geomatics Surveying Management and
duties.	observe them in the	Laws Situation and Policy(1-2) Digital Topographic
	practice of Surveying and	Surveying Practice High-precision Map Collection
	mapping.	Practice Comprehensive Practice for Navigation and
		-
	8.3 Understand the	Positioning.
	social responsibility	The Generality of Basic Principle of Marxism College
	of Surveying and	Student Occupation Career and Development Planning
	mapping staff for public safety, health,	Introduction to Geomatics, Physical geography, Surveying
	welfare and	Management and Laws, Graduation design.
	environmental	

9.Individuals and teams:Be able to play an important role of individual, team member and	protection, and conscientiously fulfill their responsibilities in surveying and mapping engineering practice. 9.1 Able to effectively communicate with members of architecture, civil engineering and other disciplines.	College Student Occupation Career and Development Planning、Physical Education(1-4)、Introduction to Civil Engineering、Engineering Mechanics、Conspectus of Urban Planning、Surveying Data Processing and Programming、 Graduation design.
person in charge in the team of multi-subject background.	9.2 work independently or collaborate work with others in a team.	Military Theory Military Training Invocation Practice(School of Surveying and Mapping Skills Contest, School of Surveying and Mapping Paper Contest) Digital Topographic Surveying Practice Practical Training for Control Surveying Practical Training for Satellite Navigation and Positioning Practical Training for Control Surveying Practical Training for Engineering Surveying Surveying and Mapping Skills Practice Contest Navigation and Positioning Terminal Embedded Programming Contest.
	9.3 organize, coordinate and command the team to carry out the work.	The Outline of the Modern Chinese History Military Theory Cartography Practice GIS Practice Comprehensive Practice for Navigation and Positioning Graduation design.
10. Communication: Be able to communicate effectively with industry peers and social public in	10.1 Able to effectively communicate and communicate with the surveying and mapping colleagues and the public in writing design books, technical reports and presentations.	Cartography Practice Practical Training for Control Surveying Practical Training for Engineering Surveying Graduation design.
complex surveying and mapping engineering, including writing reports and design papers, presentations,	10.2 Have an international perspective and understand the international trend and research hotspots in the field of Surveying and mapping.	College English(1-2)、Principles of Remote Sensing、The Principle of Geographic Information System、 Comprehensive Practice for Navigation and Positioning、 College English extension series (1-8)、Application of Modern Surveying and Mapping Technology、Industrial Intelligent Positioning Survey、Indoor Positioning and Intelligent Navigation.

expressing oneself and responsing instruction clearly. Have international perspective and the ability of communicating between or among interlocutors of different cultural background.	10.3 Have the ability of cross cultural communicating and paper work. Can communicate in cross culture background in surveying and mapping issues.	College English(1-2)、Scientific Paper writing、College English extension series(1-8).
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 the project. 11.2 Understand the cost structure of Surveying and mapping production and understand the problems involved in engineering management and economic decision-making. 11.3 apply engineering management and economic decision making in the process of design and development in a multidisciplinary environment.	Introduction to Civil Engineering Engineering Mechanics Marketing Management Industrial Intelligent Positioning Survey Digital Topographic Surveying Practice Practical Training for Control Surveying Practical Training for Engineering Surveying Graduation design. Marketing Management Surveying Management and Laws Practical Training for Satellite Navigation and Positioning Graduation design. Practical Training for Engineering Surveying High-precision Map Collection Practice Navigation and Positioning Embedded Research and Development Practice Conspectus of Urban Planning Graduation design.
learning: Have the awareness of autonomous learning and lifelong learning and the ability to learn, and adapt to the development.	12.1 The consciousness of autonomous learning and lifelong learning. 12.2 Have the ability of eternal learning and adapting development.	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 Management and Laws、Advanced Technology of Surveying,Maping and GIS、College English extension series(1-8). The Generality of Basic Principle of Marxism、Introduction to Mao Zedong Thoughts and Theoretical System of the

	Chinese characteristic socialism. Introduction to
	Geomatics, Scientific Paper writing, Introduction to Smart
	City、Advanced Technology of Surveying, Maping and
	GIS、Graduation design、Invocation Practice(Surveying
	and Mapping Skills Contest, Surveying and Mapping Paper
	Contest, Beidou Innovation and Entrepreneurship Contest,
	Navigation and Positioning Terminal Embedded
	Programming Contest, Beidou Cup National Youth Science
	and Technology Innovation Contest).

X.Table of Teaching Arrangement (appendix table)

表 1 测绘工程(智能导航实验班)专业指导性教学计划

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
		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	3	48	24			24		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	5	80	48			32		6	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
	必	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
		大学生心理健康 The Mental health of College Students	1	16	16					2	学工部
通		大学英语(1-2) ★ College English(1-2)	6	128	96				32	1, 2	文法学院
识		大学英语拓展系列课程(1-4)	2	32	32					3	文法学院
		大学英语拓展系列课程(5-8)	2	32	32					4	文法学院
教育		体育(1-4) Physical Education(1-4)	4	120	120					1-4	体育部
课		计算思维导论 Introduction to Computational Thinking	1.5	56	24			32		1	电信学院
		小 计	33. 5	656	488			136	32		
		经典赏析与文化传承	2	32						1-8	各院部
		哲学视野与文明对话	2	32						1-8	各院部
	核	科技革命与社会发展	2	32						1-8	各院部
	心	建筑艺术与审美教育	2	32						1-8	各院部
		生态文明与未来城市	2	32						1-8	各院部
		至少修读 4 类合	计 8 学	2分,	每类	至少修	逐读 2	学分			
		创新创业类			1	-8 学	期任造	先			各院部
	选	工程实践类			1	-8 学	期任道	先			各院部
	修	复合培养类 1-8 学期任选									各院部
		跨类化	任选至	三少 2	学分						
		通识教育课合计至少修读 43.5 学分,	其中	通识	教育。	 込修 3	5. 5 労	2分,	通识	教育核	核心 8 学分,通识
			育任进								

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	
		高等数学A(1)★ 或B、C Advanced Mathematics A(1)	5	80	80				16	1	理学院
		高等数学A(2)★ 或B、C Advanced Mathematics A(2)	5	80	80					2	理学院
		线性代数 Linear Algebra	2	32	32				8	2	理学院
		概率与数理统计 B Theory of Probability and Statistics (B)	3	44	44				4	3	理学院
		普通物理 A (1) ★ College physics A(1)	3	52	52			4		2	理学院
		普通物理 A (2) ★ College physics A(2) 物理实验 (1-2)	3	52	52			4		3	理学院
大		Physics Experiment(1-2) 工程制图与识图 Engineering Drawing and	2	60		60				3, 4	理学院
	必	Interpreting C 语言与数据结构 ★ C Programming	3	48	44				4	2	理学院
类	修	Language and Data Structure	3	48	32	16				1	地理信息科学系
基	12	自然地理学 Physical geography 测 绘 地 理 信 息 概 论 Introduction to	1	32	32 16					1	地理信息科学系
础		Geomatics CAD 基础与应用 CAD Basic and Application	2	32	16	16				1	测绘工程系
4Щ		导航装备基础 Foundation of Navigation Equipment	3	48	44	4				2	测绘工程系
课		数字地形测量学★ Digital Topographic Surveying	4	64	52	12				2	测绘工程系
		地图学 Cartography	2	32	24	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	2	32	24	8				3	地理信息科学系
		遥感原理★ Principles of Remote Sensing	2	32	32					3	遥感科学与技术系
	选	小 计 现代测绘技术应用 Application of Modern Surveying and Mapping Technology	1	16	8	8		8	32	2	测绘工程系
	修	小 计	1	16	8	8					
		学科基础课合计 48 学	2分,	必修	47 学	分,亻	壬选 1	学分			
		卫星导航定位技术★ Technology of Satellite navigation and positioning	3	48	44	4				3	测绘工程系
专	必	误差理论与测量平差基础★ Fundamentals of Error Theory and Surveying Adjustment	3	48	48					4	测绘工程系
业核		大地测量学基础★ Foundation of Geodesy 摄影测量基础★ Photogrammetry Fundamental	2	32	32	8				5	测绘工程系 遥感科学与技术系
心	修	rundamental 工程测量学★ Engineering Surveying	3	48	36	12				6	测绘工程系
课		小计	14	224	200	24					
		专业核心	课合	计必值	多 17 🖣	学分					

		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
	.	嵌入式系统与程序设计 Embedded System and Programming	2	32	32					3	遥感科学与技术系
	必	变形监测与灾害预报 Deformation Monitoring and Disasters Predicting	2	32	24	8				5	测绘工程系
	修	高精度导航地图与位置服务 High Precision Navigation Map and Location Service	2	32	32					5	测绘工程系
		组合导航原理 Principle of Integrated Navigation	2	32	24	8				5	测绘工程系
		小 计	8	128	112	16					
		C#程序设计 C# Programming	2	32	16	16				4	地理信息科学系
		地图设计与编绘 Map Design and Compilation	2	32	16	16				4	地理信息科学系
专		计算机图形学 Computer Graphics	2	32	24	8				5	地理信息科学系
4		测量数据处理与程序设计 Surveying Data Processing and Programming	2	32	16	16				5	测绘工程系
业		遥感数字图像处理 Remote Sensing Digital Image Processing	2	32	24	8				5	遥感科学与技术系
方		科技文献检索 Document Retrieval of Science and Technology	1	24	16			8		5	图书馆
向		空间分析与建模 Spatial Analysis and Modeling	2	32	24	8				5	地理信息科学系
课		工程力学 Engineering Mechanics	2	32	32					5	理学院
	选	土木工程概论 Introduction to Civil Engineering	2	32	32					5	土木学院
	修	室内定位与智能导航 Indoor Positioning and Intelligent Navigation	2	32	28	4				6	测绘工程系
		工业智能定位测量 Industrial Intelligent Positioning Survey	2	32	32					6	测绘工程系
		科技论文写作(双语) Scientific Paper writing	1	16	16					6	测绘工程系
		测绘管理与法律法规 Surveying Management and Laws	1. 5	24	24					6	测绘工程系
		近景摄影测量 Close-range Photogrammetry	2	32	26	6				6	遥感科学与技术系
		三维地理信息技术 Technology of 3D GIS	2	32	16	16				6	地理信息科学系
		智慧城市导论 Introduction to Smart City	1	16	16					6	地理信息科学系
		激光雷达测量技术与应用 The Laser Radar Surveying Technology	2	32	24	8				7	测绘工程系
		城市空间信息学 Urban Spatial Information Science	2	32	24	8				7	地理信息科学系

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
城市地下管线测量									
The Detecting and Surveying for underground pipelines in City	1	16	10	6				7	测绘工程系
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
地理国情监测 Geographic Conditions Monitoring	1. 5	24	16	8				7	地理信息科学
测绘地理信息技术前沿									
Advanced Technology of Surveying, Maping and GIS	1	16	16					7	测绘学院
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
小计	40	648	500	140		8			

表 2 测绘工程(智能导航实验班)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
	军事理论 Military Theory 军训	2	36 40			1	1-3	武装部
	Military Training 导航装备基础实习 Foundation of Navigation Equipment Pratice	1	20	20		2	17	测绘工程系
	数字地形测量实习 Digital Topographic Surveying Practice	3	60	60		2	18-20	测绘工程系
	卫星导航定位实习 Practical Training for Satellite Navigation and Positioning	2	40	40		3	17-18	测绘工程系
	地理信息系统原理实习 GIS Practice	2	40		40	3	19-20	地理信息科学系
	导航定位嵌入式研发实习 Navigation and Positioning Embedded Research and Development Practice		20		20	4	16	测绘工程系
课	遥感原理实习 Practical Training for Principles of Remote Sensing	1	20	20		4	17	遥感科学与技术系
内	控制测量实习 Practical Training for Control Surveying	3	60	60		4	18-20	测绘工程系
	高精度地图采集实习 High-precision Map Collection Practice	1	20	20		5	19	测绘工程系
	摄影测量基础实习 Foundation of Photogrammetry Practice	1	20	20		5	20	遥感科学与技术系
	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	遥感科学与技术系
	工程测量综合实习 Practical Training for Engineering Surveying	4	80	80		6	17-20	测绘工程系
	导航定位综合实习 Comprehensive Practice for Navigation and Positioning	7	140	140		7	1-7	测绘工程系
	毕业设计与毕业答辩 Graduation design and defense	8	160	160		8	1-16	测绘工程系
	小 计	39	776	640	60			
	科研团队创新训练-导航基础研发 能力实训 Innovation Training Project of Scientific Research Team		20	20		1-3		测绘学院
课外	科研团队创新训练-导航产品/系统 创新实践及科研研制能力实训 Innovation Training Project of Scientific Research Team	1	20	20		4-5		测绘学院
	科研团队创新训练-团队协作与创 新创业能力实训 Innovation Training Project of Scientific Research Team	,	20	20		6-7		测绘学院

课程属性	课程名称		折合学时	实验实践	上机	开课 学期	开设 周次	教学单位
	测绘技能大赛实训 Surveying and Mapping Skills Practice Contest	l n	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		测绘学院
	测量数据处理与程序设计大赛实训 Surveying Data Processing and Program Design Practice	1	20	20		5		测绘工程系
	测绘科技论文写作大赛 College Students Paper Contest of Surveying and Mapping Science and Technology		20	20		5		测绘学院
	北斗创新创业大赛 Beidou Innovation and Entrepreneurship Contest	1	20	20		5		测绘工程系
	导航定位终端嵌入式程序设计大赛 Navigation and Positioning Terminal Embedded Programming Contest		20	20		4		测绘工程系
	"北斗杯"全国青少年科技创新大 赛 Beidou Cup National Youth Science and Technology Innovation Contest	1	20	20				测绘工程系
	小计	11	220	220				

2019 级地理空间信息工程专业本科培养方案

一、专业基本信息

英文名称	Geospatial Information Engine	Geospatial Information 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:

培养具有德、智、体全面发展,具备数理基础和人文社科知识,掌握地理信息基础理论、 基本知识和基本技能,接受科学思维和工程实践训练,胜任城市规划、地理国情、资源管理、 环境保护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的复合型工程技术人才。

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、计算机应用。

四、主干课程

1. 主干基础课程 (9门)

测绘地理信息概论、工程制图与识图、C语言与数据结构、自然地理学、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

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、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 164 学分,其中理论课程 127 学分,实践教学环节 37 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
深识	必修	41.5	616	25.30%
通识教育课	选修	2	32	1.22%
	必修	46	804	28.05%
大类基础课	选修	1	16	0.61%
专业核心课	必修	17	272	10.37%
+ .U> -+ \P	必修	8	128	4.88%
专业方向课	选修	11.5	184	7.01%
V4 2	必修	35	696	21.34%
独立实践环节	选修	2	40	1.22%
总计		164	2788	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	1-15、	20 周	16 周
					17-19 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

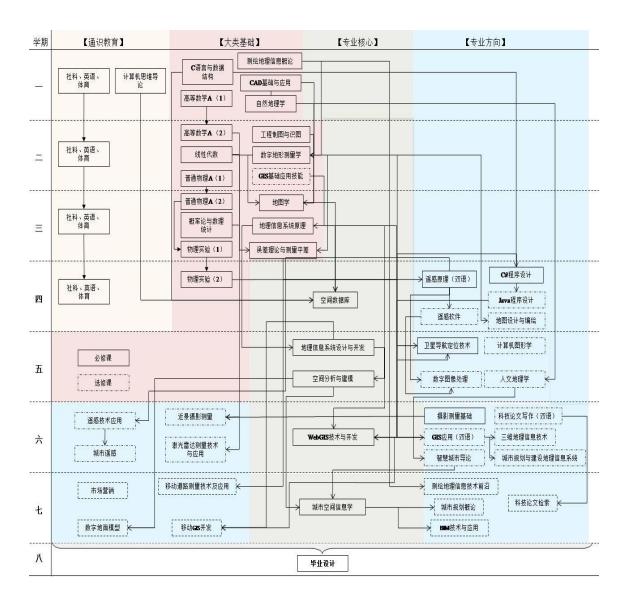
毕业生应具备的知识能力	相关知识领域	实现途径 (课程支撑)
具备解决复杂工程问题的数	工程知识: 能够将数学、自然科	高等数学、测绘地理信息概
学、地理信息科学、测绘科学、	学、工程基础和专业知识用于解	念、自然地理、地理信息系
空间信息技术、建筑工程技术	决复杂工程问题	统原理、地理信息系统开发
等知识; 具有应用数学、地理		与设计、WebGIS 技术与开
信息系统工程、空间信息技术		发、移动 GIS 开发、城市空
的等知识进行工程数据获取		间信息学、数字地形测量学、
和处理的能力;应用专业知识		误差理论与测量平差基础、
进行测绘工程项目的技术设		卫星导航定位技术、数字地
计、组织和实施		形测量实习、地理信息原理
		实习、空间信息综合实习
能够应用数学、地理信息科	问题分析: 能够应用数学、自然	概率论与数理统计、地理信
学、测绘科学、空间信息科学,	科学和工程科学的基本原理,识	息系统原理、空间分析与建
识别及表达复杂工程问题;通	别、表达、并通过文献研究分析	模、地理信息系统开发与设
过文献查阅和研究, 能够剖析	复杂工程问题,以获得有效结	计、WebGIS 技术与开发、
复杂工程项目,选择合适的数	论。	移动 GIS 开发、数字地形测

学模型,并进行推理和验证,		量学、误差理论与测量平差
得到有效结论		基础、卫星导航定位技术
能够根据复杂地理信息系统	设计/开发解决方案: 能够设计	思想道德修养与法律基础、
项目的目标、任务和要求, 考	针对复杂工程问题的解决方案,	空间分析与建模、地理信息
虑社会、安全、法律、环境等	设计满足特定需求的系统、单元	系统开发与设计、WebGIS
因素,设计解决方案,编撰项	(部件)或工艺流程,并能够在	技术与开发、移动 GIS 开发、
目设计任务书; 能够对地理信	设计环节中体现创新意识,考虑	数字地形测量实习、激光雷
息系统项目进行技术设计,编	社会、健康、安全、法律、文化	达测量技术与应用、移动道
撰相关技术文档; 能够应用新	以及环境等因素。	路测量技术及应用、卫星导
技术与方法对设计方案进行		航定位技术、空间信息综合
改进和创新		实习、毕业设计
能够利用地理信息科学与技	研究: 能够基于科学原理并采用	空间分析与建模、地理信息
术对复杂地理信息系统问题	科学方法对复杂工程问题进行	系统开发与设计、WebGIS
进行探索和研究; 能够利用地	研究,包括设计实验、分析与解	技术与开发、移动 GIS 开发、
理信息系统新技术和计算机	释数据、并通过信息综合得到合	误差理论与测量平差基础、
技术,进行创新型实验设计,	理有效的结论。	数字地形测量学、毕业设计、
并通过分析解释和改进,得到		激光雷达测量技术与应用
合理有效的结论		
熟练掌握现代空间数据获取	使用现代工具: 能够针对复杂工	计算思维导论、C 语言与数
仪器设备、计算机、数字绘图、	程问题,开发、选择与使用恰当	据结构、C#程序设计、空间
网络等现代工具的应用; 能使	的技术、资源、现代工程工具和	分析与建模、CAD 基础与应
用现代工具对工程方案进行	信息技术工具,包括对复杂工程	用、三维地理信息技术、误
优化设计、对监测过程进行模	问题的预测与模拟,并能够理解	差理论与测量平差基础、移
拟和灾害预测	其局限性。	动 GIS 开发、数字地面模型
理解地理信息系统成果的重	工程与社会:能够基于工程相关	思想道德修养与法律基础、
要性,并能客观评价其对工程	背景知识进行合理分析,评价专	地理信息系统原理、空间分
安全和社会等影响; 对所实施	业工程实践和复杂工程问题解	析与建模、城市规划与建设
的工程质量负责,并理解应承	决方案对社会、健康、安全、法	地理信息系统、遥感原理
担的责任	律以及文化的影响,并理解应承	
	担的责任。	
理解地理信息学科的实践活	环境和可持续发展: 能够理解和	遥感原理、概率论与数理统
动与环境保护和社会可持续	评价针对复杂工程问题的工程	计、自然地理地貌及遥感图
发展的关系,具备分析地理信	实践对环境、社会可持续发展的	像解译实习
息工程的实践活动对环境保	影响。	
护和社会可持续发展的影响		
的能力		
理解马克思主义世界观、人生	职业规范: 具有人文社会科学素	马克思主义基本原理概论、
观和价值观的基本意义; 了解	养、社会责任感,能够在工程实	思想道德修养和法律基础、

国史国情,理解中国特色社会	践中理解并遵守工程职业道德	中国近现代史纲要、毛泽东
主义道路以及个人的责任;理	和规范,履行责任。	思想和中国特色社会主义理
解职业道德的含义和工程师		论体系概论、测绘地理信息
的职业和责任		概论、空间信息综合实习、
		数字地形测量实习
能够理解一个多角色团队中	个人和团队: 能够在多学科背景	物理实验、军训、地理信息
每个角色的含义以及对整个	下的团队中承担个体、团队成员	系统开发与设计、空间信息
团队环境和目标的意义; 能够	以及负责人的角色。	综合实习、数字地形测量实
在团队中做好自己承担的角		习
色,具备综合团队成员的意见		
并进行合理决策的能力		
能够就地理信息系统工程问	沟通: 能够就复杂工程问题与业	地理信息系统开发与设计、
题与同行进行有效沟通和交	界同行及社会公众进行有效沟	毕业设计、毕业答辩、大学
流,包括撰写项目报告和设计	通和交流,包括撰写报告和设计	英语、大学英语拓展系列课
文档,并能够清晰表达;具备	文稿、陈述发言、清晰表达或回	程、科技文献检索、科技论
一定的国际视野和在跨文化	应指令。并具备一定的国际视	文写作
背景下沟通和交流的能力	野,能够在跨文化背景下进行沟	
	通和交流。	
理解并掌握地理信息系统开	项目管理:理解并掌握工程管理	市场营销、人文地理、自然
发管理与经济决策方法; 能在	原理与经济决策方法,并能在多	地理学、城市规划概论、遥
多学科环境中应用地理信息	学科环境中应用。	感图像处理、BIM 技术与应
系统管理与经济决策的技术		用
和方法		
能够认识不断进行自我学习	终身学习: 具有自主学习和终身	大学英语、误差理论与测量
的必要性,并采用有效途径,	学习的意识,有不断学习和适应	平差基础、C语言与数据结
通过不断学习,提升和完善自	发展的能力。	构、科技论文写作、测绘地
身能力;通过自我学习能够取		理信息概论、科技文献检索
得一定的成效		

十、指导性教学计划(见附表)

十一、主要课程逻辑关系结构图



2019 Undergraduate Program for Specialty in Geospatial Information Engineering

I. Specialty Name and Code

English Name	Geospatial Information 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 inter-disciplinary engineering talents, fully developed in morality, intelligence and physique, well equipped with mathematical science and social science, and highly skilled in basic theory, knowledge and profession of geographical information system. The students are required to have the systematic training of scientific thinking and engineering practice, so that they are competent in design, production, R&D and management of geographical information system, including urban planning, geographical conditions and environmental protection. Besides, the graduates have a good ability of organizing, innovation, learning, and international vision as well.

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 Application

IV. Major Courses

1. Basic Courses

Introduction to Geomatics, Engineering Drawing and Read Drawing, C Language and Data Structure, Physical Geography, Digital Topographic Surveying, 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 164, including 127 credits of theoretical courses and 37 credits of practice teaching.

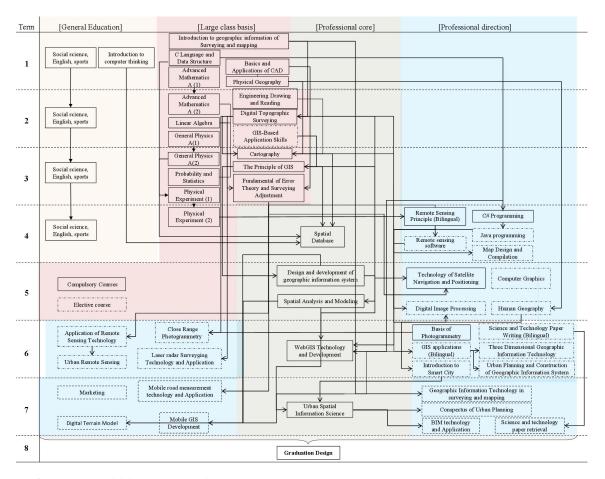
VII. Proportion of Course

Course Category	Course Type	Credits	Class Hour	Proportion
	Compulsory	41.5	616	25.30%
General Education	Optional	2	32	1.22%
Big Academic Subjects	Compulsory	46	804	28.05%
	Optional	1	16	0.61%
Professional Core	Compulsory	17	272	10.37%
Professional Direction	Compulsory	8	128	4.88%
	Optional	11.5	184	7.01%
Practice	Compulsory	35	696	21.34%
	Optional	2	40	1.22%
Total		164	2788	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	1-15、	20	16			
					17-19					
7	7-20		1-6	8	1-16 Undergraduate Design or Thesi					
					17 Graduation reply					

IX. Table of Teaching Arrangement



X. Graduate Abilities and Matrices

Graduate Abilities	Related Knowledge	Course Supports
Master mathematics, geographic in	Engineering knowledge: ha	Advanced Mathematics, Mapping
formation science, surveying and	ve the ability of solving c	Geographic Information Concept,
mapping science, spatial informatio	omplex engineering proble	Physical Geography, Principle of
n technology, construction technolo	ms with mathematics, natu	Geographic Information System, G
gy and other knowledge to solve t	ral science, engineering fo	eographic Information System Dev
he problems of complex engineeri	undation and professional	elopment and Design, WebGIS Te
ng; Ability of engineering data acq	knowledge.	chnology and Development, Mobil
uisition and processing with mathe		e GIS Development, Urban Spatial
matics, geographic information syst		Information Science, Digital Topo
ems engineering, spatial informatio		graphic Surveying, Fundamentals o
n technology, etc.; Technical desig		f Error Theory and Surveying Adj
n, organization and implementation		ustment, Technology of Satellite N
of Surveying and mapping engine		avigation and Positioning, Digital
ering project with professional kno		Topographic Survey Practice, Princ
wledge.		iple of Geographic Information Pr
		actice, Space information Compreh

		ensive Practice
Identify and express complex engineering problems by applying mat	Problem analysis: Be able to apply the basic princip	Probability and Statistics, Principle of Geographic Information Syste
hematics, geography information sc ience, surveying and Mapping Scie	les of mathematics, natural science and Engineering	m, Spatial Analysis and Modeling, GIS Design and Programming,
nce and spatial information scienc	Science, identify, express,	WebGIS Technology and Develop
e; be able to analyze complex pro	and analyze the complex	ment, Mobile GIS Development,
jects, select the appropriate mathe	engineering problems throu	Digital Topographic Surveying, Fu
matical model, and conduct reason	gh literature research to o	ndamentals of Error Theory and S
ing and verification to get an effe	btain the effective conclusi	urveying Adjustment, Technology
ctive conclusion Through literature	on.	of Satellite Navigation and Positio
review and research.		ning
According to the objectives, tasks	Design/Develop solutions:	Moral Education and Foundation o
and requirements of the complex	Be able to solve complex	f Law, Spatial Analysis and Mode
geographic information system proj	engineering problems with	ling, GIS Design and Programmin
ect, considering the social, security,	design solutions. The desi	g, WebGIS Technology and Devel
legal, environmental and other fa	gn meets the specific need	opment, Mobile GIS Development,
ctors, design solutions, compile the	s of system, the unit (com	Digital Topographic Survey Practi
project design task book; be able	ponents) or process, and c	ce, Laser Radar Surveying Techno
to design and compile the releva	an embody the sense of i	logy and Application, Technology
nt technical documents, and to app	nnovation in the design pr	and Application of Mobile Mappi
ly new technologies and methods t	ocess, considering the soci	ng System, Technology of Satellite
o improve and innovate the design	ety, health, and safety, la	Navigation and Positioning, Spac
scheme.	w, culture and environmen	e Information Comprehensive Prac
	t factors.	tice, Graduation Project
Be able to use geographic informa	Study: Be able to study c	Spatial Analysis and Modeling, GI
tion science and technology to exp	omplex engineering proble	S Design and Programming, Web
lore and study the problem of co	ms, including the design o	GIS technology and development,
mplex geographic information syst	f experiments, analysis an	Mobile GIS Development, Funda
em; be able to use the new techn	d interpretation of data, an	mentals of Error Theory and Surv
ology and computer technology of	d get a reasonable and eff	eying Adjustment, Digital Topogra
geographic information system to	ective conclusion through t	phic Surveying, Graduation Projec
carry out innovative experimental	he comprehensive informat	t, Laser Radar Surveying Technolo
design, and get a reasonable and	ion by using scientific met	gy and Application
effective conclusion through the an	hods based on scientific th	
alysis of the interpretation and im	eory.	
provement.		

Understand the relationship between the practice of GIS and environmental protection and social sustal inable development. Have the ability to analyze the impact of geographic information engineering practices on environmental protection and social sustainable development.

Understand basic meaning of Mar

Environment and sustainab le development: Be able t o understand and evaluate the influence of engineering practice with complex engineering problems for s ustainable development of environment and society.

Principles and Applications of Re mote Sensing, Probability and Stat istics, Natural Geography And Inte rpretation of Remote Sensing Ima ges

Understand basic meaning of Mar xist outlook on life and conception of value, understand the history of national conditions; understand the road of socialism with Chinese characteristics and personal responsibility; understand the meaning of professional ethics and engineer career and responsibility.

Occupational norms: Equip with the quality of huma nistic social sciences, sens e of social responsibility, understand and follow pro fessional ethics and criteria in engineering, be conscientious in the performance of one's duties

Basic Theory of Marxism, Moral Education and Foundation of Law, The Outline of Modern Chinese History, Introduction to Mao Zedo ng Thought and the Theoretical S ystem of Socialism with Chinese Characteristics, Introduction to Geo graphic Information of Surveying and Mapping, Practical Sessions of Spatial Information Synthesis, Practical Sessions of Digital Topogra phic Survey

Be able to understand the value of each role in a team and the signi ficance to the environment and objectives. Be able to take responsibility for the team, and have the ability to integrate ideas for making reasonable decisions.

Individuals and teams: Be able to play an important role of individual, team member and person in charge in the team of multi-s ubject background.

Physics Experiment, Military Train ing, Programming and Design for GIS, Spatial Information Compreh ensive, Practice of Digital Terrain Surveying

Be able to communicate effectivel y and express clearly with peers o n geographic information systems engineering, including project repor t and design scheme. Have interna tional perspective and the ability o f communicating between or amon g interlocutors of different cultural background Communication: Be able to communicate effectively with industry peers in complex engineering, including writing reports and design papers, summary state ment, express oneself and response instruction clearly. Have international perspective and the ability of communicating between or

Programming and Design for GIS, Graduation Project, Defense of G raduation Project, College English, College English Development, Sc ience and Technology Document Retrieval, Academic Writing

	among interlocutors of diff	
	erent cultural background	
Understand and master the method	Project management: Unde	Marketing Management, Human G
of development and management	rstand and master the met	eography, Physical Geography, Co
for economic decision method; be	hod of development and	nspectus of Urban Planning, Remo
able to apply the techniques and	management for economic	te Sensing Digital Image Processin
methods of system management a	decision method and appl	g, BIM Technology and Applicatio
nd economic decision making in a	ication in multi subject en	n
multi-disciplinary environment.	vironment.	
Recognize the necessity of self-stu	Lifelong learning: Have th	College English, Fundamentals of
dy. Enhance and improve their abi	e awareness of autonomou	Error Theory and Surveying Adjus
lity by studying continuously and		tment, C Language and Data Stru
achieve certain effectiveness eventu	s learning and lifelong lea	cture, Academic Writing, Advance
ally.	rning and the ability to le	d Technology of Surveying, Mappi
	arn, and adapt to the deve	ng and GIS, Science and Technol
	lopment.	ogy Document Retrieval

表 1 地理空间信息工程专业指导性教学计划

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
		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	3	48	24			24		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		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	48			32		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
		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
2名		大学生心理健康 The Mental health of College Students	1	16	16					2	学工部
通		大学英语(1-2) ★ College English(1-2)	6	128	96				32	1-2	文法学院
识		大学英语拓展系列课程(1-4) College English training(1-4)	2	32	32					3	文法学院
教		大学英语拓展系列课程(5-8) College English training(5-8)	2	32	32					4	文法学院
育		体育(1-4) Physical Education(1-4)	4	120	120					1-4	体育部
课		计算思维导论 Introduction to Computational Thinking	1.5	56	24			32		1	电信学院
		小 计	33. 5	656	488			136	32		
		经典赏析与文化传承	2	32						1-8	各院部
		哲学视野与文明对话	2	32						1-8	各院部
	核	科技革命与社会发展	2	32						1-8	各院部
	心	建筑艺术与审美教育	2	32						1-8	各院部
		生态文明与未来城市	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									
		创新创业类			1	-8 学	期任道	<u>t</u>			各院部
	选修	工程实践类	1-8 学期任选						各院部		
	1135	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,	通识	教育	亥心 8	学分	,通i	只教育任选2学纪

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
		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 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
		工程制图与识图 Engineering Drawing and Read Drawing	3	48	44				4	2	理学院
大	必	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
类	修	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
基		CAD 基础与应用 CAD Basic and Application	2	32	16	16				1	测绘工程系
础		数字地形测量学★ Digital Topographic Surveying	4	64	52	12				2	测绘工程系
课		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 Principles of Remote Sensing	2	32	32					3	遥感工程系
		合 计	46	804	644	120		8	32		
	۱4-	GIS基础应用技能 GIS-based Application Skills	1	16	8	8				2	地理信息科学系
	选	现代测绘技术应用 Modern Surveying and Mapping Technology Application	1	16	8	8				2	测绘工程系
	修 遥感应用前景 Remote Sensing Application Prospect		1	16	8	8				3	遥感工程系
		大类学科基础课合计 47	学分	,必何	多 46 🖰	学分,	任选	1 学	分		

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
		空间数据库 Spatial Database	3	48	32	16				4	地理信息科学系
		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
专业	必	WebGIS 技术与开发 WebGIS Technology and Development	3	48	24	24				6	地理信息科学系
核心	修	城市空间信息学 Urban Spatial Information Science	2	32	24	8				7	地理信息科学系
课		误差理论与测量平差基础★ Fundamentals of Error Theory and Surveying Adjustment	3	48	48					4	测绘工程系
		小计	17	272	192	80					
		专业核	心课	合计必	必修 13	3 学分					
		卫星导航定位技术 Technology of Satellite navigation and positioning	2	32	28	4				5	测绘工程系
	必	C#程序设计 C# Programming	3	48	32	16				4	地理信息科学系
	修	摄影测量基础 Photogrammetry Fundamental	3	48	44	4				5	遥感工程系
		小	8	128							
专		地图设计与编绘 Map Design and Compilation	2	32	16	16				4	地理信息科学系
业		Java 程序设计 Java Programming	2	32	24	8				5	地理信息科学系
方		人文地理学 Human Geography	1.5	32	16	16				5	地理信息科学系
向	选	遥感软件 Remote Sensing Software	2	32	16	16				4	遥感工程系
课	修	Python 语言 Python language	1	16	8	8				4	地理信息科学系
		计算机图形学 Computer Graphics	2	32	24	8				5	地理信息科学系
		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

	城市规划与建设地理信息系统							
	Geographic Information System for City	2.5	48	24	24		6	地理信息科学
	Planning and Construction							
	GIS 应用(双语)	1.5	24	16	8		6	 地理信息科学
	GIS Applications (Bilingual Education)	1.0	21	10	Ü			20年1112411
	三维地理信息技术	2	32	16	16		6	地理信息科学
	Technology of 3D GIS			10	10			2021日104月17
	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	2	32	16	16		7	 地理信息科学
	Mobile GIS Development		- 52	10	10		'	经法国论有于
	数字地面模型	2	32	16	16		7	 地理信息科学
	Digital Terrain Model	2	52	10	10			地经旧心们于
	移动道路测量技术及应用 Technology and						7	 地理信息科学
	Application of Mobile Mapping System	1	16	8	8			地经旧心们于
	激光雷达测量技术与应用 Laser Radar	2	32	24	8		6	 测绘工程系
	Surveyging Technology and Application	2	34	24	O		0	例坛工任东
	测绘地理信息技术前沿 Advanced	1	16	16			7	测绘学院
	Technology of Surveying, Maping and GIS	1	10	10			,	例坛子机
选	智慧城市导论							
	Introduction to Smart City	1	16	16			6	地理信息科学
	近景摄影测量							
	Close Range Photogrammetry	2	32	26	6		6	遥感工程系
	城市遥感(双语)Urban Remote							
修	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
	遥感图像处理	_			_			\
	Remote Sensing Image Processing	2	32	24	8		5	遥感工程系
	BIM 技术与应用							4-14.34-3
	BIM Technology and Application	2	32	16	16		7	经管学院
	市场营销		_	_				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	Marketing Management	1.5	24	24			7	经管学院
	小计	40. 5						

专业方向课合计19.5学分,必修8学分,任选11.5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
	军事理论 Military Theor	у	2	36			1	1-3	武装部
	军训 Military Train	ing	2	40			1	1 3	此表即
	形势与政策(5-	7) Situation and Policy(5-7)					5-7	分散	马院、各学院
	数字地形测量实习 Digital Topographic Surveying Practice				60		2	18-20	测绘工程系
	地图学实习 Cartography Pr	actice	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
		理实习 The Principle of ormation System Practice	2	40			3	19-20	地理信息科学系
	遥感原理实习 Pr Practice	rinciples of Remote Sensing	1	20			4	17	遥感工程系
	地理信息系统设 Development of	计与开发实习 Programming and GIS Practice	2	40			5	19-20	地理信息科学系
	摄影测量基础实 Photogrammetry	기 Fundamental Practice	1	20			5	18	遥感工程系
	空间分析与建模 Spatial Analys	实习 is and Modeling Practice	1	20			5	17	地理信息科学系
		遥感图像解译实习 phy and Remote Sensing image Practice	1	20			6	16	遥感工程系
	空间信息综合实 Comprehensive		6	120	120		7	1-6	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	35	696					
课	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
外		学院 GIS 选拔比赛 School GIS Selection Competition	1	20	20		5		地理信息科学系

课 程 属	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
	全国大学生 GIS 应用技能大赛 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 37 学分,课内必修 35 学分,创新实践及科研训练选修 2 学分

2019 级遥感科学与技术专业本科培养方案

一、专业基本信息

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:面向国家和首都城乡建设的需要,培养具备数理基础和人文社科知识,掌握遥感科学与技术基础理论、基本知识和基本技能,接受科学思维和工程实践训练,胜任国家基础测绘、土地利用与土地覆盖监测、资源调查、城市规划、建设、管理及应急等领域企事业单位工作。具有较强的航空、航天和地面遥感数据获取、处理、分析、应用及遥感影像处理开发能力和国际视野的复合型工程技术人才。毕业后经过5年左右的工作和学习,能够达到如下目标:

- (1) 在遥感与地理信息行业从事测绘数据生产、影像处理等相关生产工作的毕业生, 具有良好专业素养、丰富的行业解决经验和极强工作责任心,能独立或负责完成生产任务, 成为遥感领域相关企事业单位的技术负责人或技术骨干。
- (2) 在科研院所、大专院校从事科学研究的毕业生,掌握坚实的遥感科学与技术理论基础,能够独立从事本学科科学研究工作,具有国际化视野和沟通能力,有一定的软件设计开发能力及研究创新性成果。

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、依托建筑行业、服务城乡建设的专业人才。适应摄影测量与遥感高新科技发展,融教学、科研和生产为一体,强调理论与实践密切结合,突出城市遥感特色,培养摄影测量与遥感新技术、新方法、新工艺的应用能力,满足城乡建设、古建筑保护、智慧城市等遥感人才需求。

三、主干学科

测绘科学与技术

四、主干课程

1. 主干基础课程

测绘地理信息概论、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、航空摄影测量外业综合实习、 4D产品综合摄影测量实习、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、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 162 学分,其中理论课程 123 学分,实践教学环节 39 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	40. 5	608	24. 5	
	选修	3. 0	48	2	
大类基础课	必修	46	764	28	
	选修	1	16	0. 4	
专业核心课	必修	14	224	8. 4	
专业方向课	必修	11	176	6. 7	
	选修	10. 5	168	6. 4	
独立实践环节	必修	39	780	23. 6	
总计		165	2784	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 周	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	1-16 周	17周	18-20 周	6	1-15、	20 周	16-17 周		
					18-19 周				
7	7-14 周	15 周	1-6、16-20 周	8	1-16 毕业设计/实习 17 周答辩				

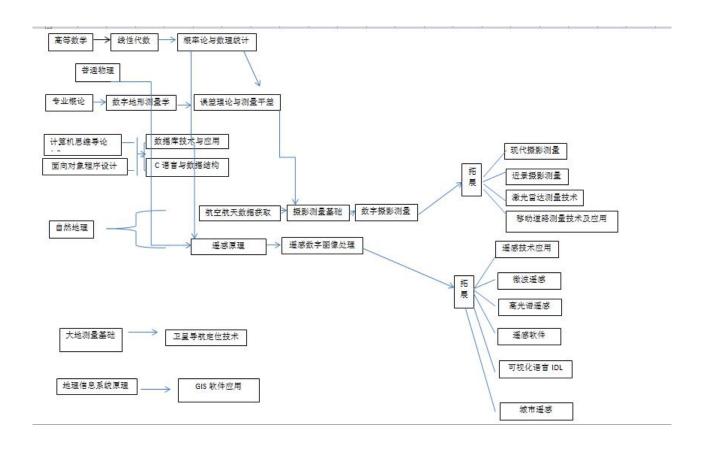
九、毕业生应具备的知识能力及实现矩阵

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)
理解马克思主义世界观、人生	职业规范: 具有人文社会科学素	思想道德修养与法律基础、
观和价值观的基本意义; 了解	养、社会责任感,能够在工程实	中国近现代史纲要、马克思
国史国情,理解中国特色社会	践中理解并遵守工程职业道德	主义基本原理概述、毛泽东
主义道路以及个人的责任; 理	和规范,履行责任。	思想和中国特色社会主义理
解职业道德的含义和工程师		论体系概论、军事理论、形
的职业和责任		势与政策(1-2)
掌握计算机操作和信息管理	计算机系统和软件开发等计算	计算思维导论、C 语言与数
的基本知识, 具有程序设计和	机科学与技术基本理论	据结构、面向对象程序设计、
开发能力、了解软件体系架		可视化语言 IDL 等
构、软件设计和开发的发展趋		
势		
掌握摄影测量的基本知识,具	摄影测量基础等基本理论	航空航天数据获取、摄影测
有运用航测相片进行空间信		量基础、数字摄影测量、近

息获取能力、了解摄影测量技		景摄影测量、新型航空遥感
术的发展趋势		数据处理技术等
掌握遥感数据获取、数据处理	遥感平台、载荷、数据处理及信	航空航天数据获取、遥感原
的基本知识, 具有利用遥感数	息提取等基本理论	理、遥感数字图像处理、遥
据进行解译、行业应用的能		感技术应用、微波遥感、高
力,了解遥感技术的发展趋势		光谱遥感等
能够理解一个多角色团队中	个人和团队: 能够在多学科背景	思想道德修养与法律基础、
每个角色的含义以及对整个	下的团队中承担个体、团队成员	军事理论、形势与政策
团队环境和目标的意义; 能够	以及负责人的角色。	(1-2)、体育 (1-4)、军训、
在团队中做好自己承担的角		空间信息类综合实习
色,具备综合团队成员的意见		
并进行合理决策的能力。		
能够通过口头及书面方式表	沟通: 能够就复杂工程问题与业	大学英语 (1-2)、大学英语
达自己的想法,掌握技术文件	界同行及社会公众进行有效沟	拓展系列课程(1-8)、科技
写作方法,理解和撰写效果良	通和交流,包括撰写报告和设计	文献检索、科技论文写作、
好的报告和设计文件,基本掌	文稿、陈述发言、清晰表达或回	遥感原理 (双语)、地理信息
握一门外语,具有外语听说读	应指令。并具备一定的国际视	系统原理 (双语)
写能力。	野,能够在跨文化背景下进行沟	
	通和交流。	
对于遥感技术的发展水平、所	终身学习: 具有自主学习和终身	测绘地理信息概论、深度学
面临的挑战有正确认识; 对于	学习的意识,有不断学习和适应	习与模式识别概论、(近景与
职业生涯规划和持续学习的	发展的能力。	激光雷达、移动测量、微波
必要性有正确认识, 能够采用		遥感)新技术实习、毕业设
合适的方法通过学习不断发		计、毕业答辩
展自身的能力。		

十、指导性教学计划(见附表)

十一、主要课程逻辑关系结构图



2019 Undergraduate Program for Specialty in Remote Sensing Science and Technology

I. Specialty Name and Code

English Name	Remote Sensing Science and Technology							
Code	081202	Disciplines	Bachelor of Engineering					
Length of Schooling	4 years	Degree	Bachelor of Engineering					

II. Educational Objectives and Features

Objectives: This program is to meet the needs of urban and rural construction of the country and the city of Beijing, cultivating the knowledge of mathematics, physics, humanities and social sciences, grasp basic theory, basic knowledge and basic skills of Remote Sensing Science and technology, and training of scientific thinking and engineering practice, and be competent for the work of enterprises and institutions in the fields of national basic surveying and mapping, land use and land cover monitoring, resource survey and urban emergency response. Students should have strong ability to acquire, process, analyze, apply and develop remote sensing image processing and have international vision of composite engineering and technical personnel. After about five years of work and study after graduation, the following goals can be achieved:

- (1) Graduates engaged in surveying and mapping data production, image processing and other related production work in remote sensing and geographic information industry have good professional literacy, rich industry solving experience and strong sense of responsibility. They can independently or responsibly complete production tasks and become technical leaders or backbone of relevant enterprises and institutions in the field of remote sensing.
- (2) Graduates engaged in scientific research in scientific research institutes and colleges and universities have a solid theoretical foundation of Remote Sensing Science and technology, can independently engage in scientific research in their own disciplines, have an international vision and communication skills, and have certain software design and development capabilities and research innovative achievements.

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 remote sensing characteristics, and pinpointing the comprehensive ability of application of new photogrammetry and remote sensing 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 remote sensing talents for the urban and rural construction, protection of historic buildings and smart city construction of Beijing and the whole country.

III. Major Disciplines

Science and Technology of Surveying and Mapping

IV. Major Courses

1. Basic Courses

Introduction to Geomatics, Digital Topographic Surveying, C Language and Data Structure, Physical Geography,, Cartography

2. Specialty Courses

Principles of Remote Sensing (Bilingual), Aerospace Data Acquisition, Photogrammetry Fundamental, Remote Sensing Digital Image Processing, Urban Remote Sensing, Digital Photogrammetry

V. Major Practical Training

Digital Topographic Surveying Practice, Photogrammetry Fundamental Practice, Aviation Data Acquisition, Field Work Practice of Aerial Photogrammetry Control And Annotation, 4D Products Integrated Photogrammetry Practice, Practice of Principles of 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) New Technology Comprehensive Practice, The Principle of Geographic Information System, Graduation Project.

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 162, including 123 credits of theoretical courses and 39 credits of practice teaching.

VII. Proportion of Course

vii. i roportion or coun				
Course Category	Course Type	Credits	Class Hour	Proportion
	Compulsory	40. 5	608	24. 5
General Education	Optional	3. 0	48	2
Big Academic Subjects	Compulsory	46	764	28
	Optional	1	16	0. 4
Professional Core	Compulsory	14	224	8. 4
Professional Direction	Compulsory	11	176	6. 7
	Optional	10. 5	168	6. 4
Practice	Compulsory	39	780	23. 6
total		165	2784	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	1-16	17	18-20	6	1-15、	20	16-17		
					18-19				
7	7-14	15	1-6、16-20	8	1-16graduation project 17defence				

IX. Table of Teaching Arrangement

X. Graduate Abilities and Matrices

Graduate Abilities	Related Knowledge	Course Supports			
Understand the basic meanings of	Professional norms: with the	Ideological and moral cultivation			
Marxist world outlook, outlook on	humanities and social science	and the legal basis, Chinese			
life and values; understand history	literacy, social responsibility,	modern history outline, an			
conditions, understanding the road	can be in engineering practice	overview of the basic principles			
of socialism with Chinese	to understand and abide by the	of Marxism, Mao Zedong			
characteristics and personal	engineering ethics and norms,	Thought and the Chinese			
responsibility; understanding	fulfill their responsibilities.	characteristic socialism			
ethical meaning and engineer		introduction to the theoretical			
career and responsibility		system, military theory, situation			
		and policy (1-2)			
To master the basic knowledge of	Basic theory of computer	Introduction to computational			
computer operation and	science and technology, such	thinking, object oriented			
information management, with the	as computer system and	programming, data structure,			
development of programming and	software development	visual language IDL, etc.			
development capabilities,					
understanding of software					
architecture, software design and					
development trends					
Master the basic knowledge of	Basic theory of	Aerospace photogrammetry data			
photogrammetry, with aerial	Photogrammetry	acquisition, digital			
photos of space information		photogrammetry,			
acquisition ability and		photogrammetry, close range			
understanding of the development		photogrammetry and Modern			
trend of photogrammetry		aerial remote sensing data			
technology		processing technology			
Master the basic knowledge of	The basic theory of remote	Aerospace data acquisition,			
remote sensing data acquisition,	sensing platform, sensors,	remote sensing principle, remote			
data processing, with the use of	data processing and	sensing digital image processing,			

remote sensing data interpretation,	information extraction.	remote sensing technology
the ability of remote sensing		application, microwave remote
application in certain field and		sensing, High spectral remote
the development trend of remote		sensing, etc.
sensing technology		
Can understand the meaning of a	Individuals and teams: be able	ideological and moral cultivation
multi role teams for each role and	to take the role of individuals,	and legal basis, military theory,
the importance of the team	team members, and the person	situation and policy (1-2), sports
environment and the target; in the	in charge in a	(1-4), military training,
team do assume their role, and	multidisciplinary context.	comprehensive practice of
rational decision-making ability		spatial information
with the opinion of the members of		
the team.		
Through oral and written	Communication: be able to	College English (1-2),
expression of ideas, to master the	communicate and	University English Development
writing method of technical	communicate effectively with	Series (1-8), science and
documents, understand and write	industry colleagues and the	technology document retrieval,
good reports and design	public in complex engineering	science and technology paper
documents, basic grasp of a	issues, including writing	writing, remote sensing principle
foreign language, with good	reports and design documents,	(Bilingual), geographic
English listening, speaking,	presentations, clear expression	information system (Bilingual)
reading and writing ability.	or response instructions. And	
	have a certain international	
	vision, to be able to	
	communicate and exchange in	
	the cross cultural context.	
For the level of development of	Lifelong learning: a sense of	Surveying and mapping
remote sensing technology and	autonomous learning and	introduction to geographic
facing challenges have a correct	lifelong learning, and the	information, An introduction to
understanding, for career planning	ability to continuously learn	deep learning and pattern
and the necessity for continuous	and adapt to the development	recognition, (close range
learning have correct	of.	photohrammetry and laser radar,
understanding, to adopt		mobile measurement, microwave
appropriate methods by learning to		remote sensing) new technology
develop their own capacity.		practice, graduation design,
		graduation reply

表 1 遥感科学与技术专业指导性教学计划

课	课	化			讲	实	上	课	延		
1			学	总	课			-		TT:H	
程	程	课程名称		学		验	机	外	续	开课	教学单位
类	属		分	时	学	学	学	学	学	学期	
别	性				时	时	时	时	时		
		思想道德修养与法律基础 Thought Morals Accomplishment and Basic	3	10	32			1.6		,	刀古田子立為院
		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	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	3	48	32			16		3	马克思主义学院
		Marxism 毛泽东思想和中国特色社会主义体系理论概									
		它★									
		Introduction to Mao Zedong Thoughts and	5	80	48			32		4	马克思主义学院
		Theoretical System of the Chinese									
	l .	characteristic socialism									
		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
		大学生职业生涯与发展规划									
		College Student Occupation Career and	1	16	16					1/2	学工部
		Development Planning									
		大学生心理健康	1	16	16					2	学工部
通		The Mental health of College Students 大学英语 (1-2) ★									
识		English (1-2)	6	128	96				32	1-2	文法学院
		大学英语拓展系列课程(1-4)		0.0	0.0					0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
教		College English training (1-4)	2	32	32					3	文法学院
→ -		大学英语拓展系列课程(5-8)	2	32	32					4	文法学院
育		College English training (5-8)									
课		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	656	496			128	32		
					430			120	34	1 0	ながます
		经典赏析与文化传承	2	32						1-8	各院部
		哲学视野与文明对话	2	32						1-8	各院部
	核	科技革命与社会发展	2	32						1-8	各院部
	心	建筑艺术与审美教育	2	32						1-8	各院部
		生态文明与未来城市	2	32						1-8	各院部
		至少修读 4 类合	 计 8 学	 2分,	每类:	上 至少修	 读 2	上 学分		1	
		创新创业类					期任道				各院部
	选	工程实践类					期任道				各院部
	修	复合培养类									各院部
		复合培养类 1-8 学期任选 跨类任选至少 2 学分							H 170 FIF		
			,		• /•	以板。)) F A	学 八	7岁7口	新 云+	去 2、0
		通识教育课合计至少修读 43.5 学分				少修	აპ. 5 -	子汀,	进以	教育性	& 心 δ 子分, 进以 ————————————————————————————————————
	教育任选2学分										

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
		高等数学 A (1) ★ Advanced Mathematics A(1)	5	80	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	32	32				8	2	理学院
		概率与数理统计 B Theory of Probability and Statistics (B)	3	44	44				4	3	理学院
		普通物理 A (1) ★ College physics A(1)	3	52	52			4		2	理学院
		普通物理 A (2) ★ College physics A(2)	3	52	52			4		3	理学院
		物理实验(1-2) Physics Experiment(1-2)	2	60		60				3-4	理学院
		工程制图与识图 Engineering Drawing and Interpreting	3	44	44				4	2	理学院
	必	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
大		自然地理学 Physical geography	2	32	32					1	地理信息科学系
	修	测绘地理信息概论 Introduction to Geomatics	1	16	16					1	测绘学院
类		CAD 基础与应用 CAD Basic and Application	2	32	16	16				1	测绘工程系
基		数字地形测量学★ Digital Topographic Surveying	4	64	52	12				2	测绘工程系
础		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)									
课		The Principle of Geographic Information System	3	48	40	8				3	地理信息科学系
		遥感原理	0	20	20					0	应成工和系
		Principles of Remote Sensing	2	32	32					3	遥感工程系
-		小 计	46	764	644	120		8	32		
		现代测绘技术应用									
		Application of Modern Surveying and	1	16	8	8				2	测绘工程系
		Mapping Technology									
	选	GIS 基础应用技能 GIS base Application Skill	1	16	8	8					地理信息科学系
	修	遥感应用前景	1	16	8	8				3	遥感工程系
		Remote Sensing Application Prospect									
		小 计	3	48	24	24					
		大类学科基础课合计 47	学分	,必	修 46	学分:	,选值	多1学	:分		

		航空航天数据获取 Aerospace data										
		机工机入数据状取 Aerospace data acquisition	2	32	28	4				4	遥感工程系	
专业核心课	必	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	
	修	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											
\dashv		卫星导航定位技术 Technology of Satellite										
	必修	navigation and positioning	2	32	28	4				5	测绘工程系	
		面向对象程序设计 object oriented	2	32	32					4	遥感工程系	
		programming		32	32					4	迪 您工住水	
		误差理论与测量平差基础 Fundamentals of	3	48	48					4	 测绘工程系	
		Error Theory and Surveying Adjustment 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(研讨式教学)Applications of	2	32	16	16				6	遥感工程系	
-		Remote Sensing (seminar)	_		10						28.21.23	
		小 计	11	176	148	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	
专		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	
业方		新型航空遥感数据处理技术 Modern aerial remote sensing data processing technology	2	32	32					7	遥感工程系	
向		大地测量基础 Geodesy Fundamental	2	32	24	8				4	测绘工程系	
课		高光谱遥感 Hyperspectral remote sensing	2	32	24	8				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	16	16			8		5	图书馆	
		深度学习与模式识别概论 An introduction to deep learning and pattern recognition	1	16	16					7	遥感工程系	
		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				5	遥感工程系	
		小计	21	336	258	78					~~~~	
}	专业方向合计 21.5 学分, 必修 11 学分, 选修 10.5 学分											

表 2 遥感科学与技术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
	军事理论 Military Theory	2	36	36		1	1-3	武装部
	军训 Military Training	2	40	40		1		
	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	19	遥感工程系
	地理信息系统原理实习 The Principle of Geographic Information System Practice	2	40	40		3	19-20	地理信息科学系
	遥感数字图像处理实习 Digital Image Processing Practice	2	40	40		5	19-20	遥感工程系
课	航空航天数据获取 Aerospace data Acquisition Practice	1	20	20		4	18	遥感工程系
内	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 Natural geography and remote sensing image interpretation Practice	2	40	40		6	16-17	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	2	40	40		7	16-17	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	39	936	936				
课外	遥感科学与技术创新实践及科研 创新实践及科研 训练	2	40	40		6		遥感工程系
<u> グ</u> ド	训练 测绘技能大赛实训 Surveying and Mapping Skills Practice Contest	2	40	40		4		测绘工程系

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
	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
	则泰杯全国论文大赛 Mostrule Cup-National Paper Contest	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		4		地理信息科学系
	学院测绘技能大赛 School of Surveying and Mapping Skills Contest	1	20	20		4		测绘工程系
	Esri 杯、航天宏图杯等遥感应用开 发竞赛 学院遥感应用选拔比赛 学院 GIS 选拔比赛 全国 GIS 选拔比赛 则泰杯全国论文大赛	获奖 可得 1分						遥感工程系
	小计	9	160	160				

实践环节合计 41 学分, 其中课内 39 学分, 课外 2 学分(创新实践及科研训练必修 2 学分)