

# **茅以升学院测绘类“卓越班”专业培养方案**

## **Surveying and Mapping Engineering Undergraduate Training Program for the “Excellent Engineer Class” in Mao Yisheng Honors College**

### **I.专业介绍 Introduction**

西南交通大学测绘工程专业定位在轨道交通特色鲜明、国内一流、具有国际影响力的高端测绘人才培养基地。

西南交通大学测绘工程专业学科历史悠久，在中国大陆现存最早的大学毕业证上就有测量与抄平课程。1959 年创办“铁路航测专门化”专业方向，1977 年设铁道航空勘察与定线专业，1985 年更名为摄影测量与遥感专业，2015 年按测绘大类招生。本专业一直是我国轨道交通领域和西南地区领先的测绘教育基地，本校测绘学科是国家首批“双一流”、“协同创新中心”、“211 工程”和“特色 985 工程”等计划的建设学科。

(1) 西南交通大学测绘工程专业历史悠久，具有鲜明的轨道交通特色，一直引领和主导铁路测绘，培养了包括国家勘察大师在内的一大批专业技术人才，构成了中国铁路测绘的中坚力量。

(2) 通过国际化示范学院建设，建立了高度国际化高水平师资队伍，强力支撑培养具有国际化视野的测绘人才培养，直接服务于“中国铁路走出去”战略和“一带一路”倡议。

(3) 把握住中国高铁大发展的历史机遇，加速了测绘工程专业的建设和与发展，拥有国地联合工程实验室、国家级虚拟仿真实验教学中心、国家级工程实践教育中心、教育部创新团队等“产学研用”人才培养平台，形成了国内一流独具特色的测绘人才培养生态环境。

The undergraduate programs of Southwest Jiaotong University (SWJTU) for specialty of Surveying Engineering aims to cultivate entrepreneurs, engineers etc. on surveying engineering with also knowledge of rail transit related. The prospect in the near future is to join the first-tier programs of China and be influential surveying program globally.

The program has a long history and the surveying related course was printed on the early SWJTU graduation certificate which is also the oldest existing college graduation certificate in mainland China. In 1959, SWJTU launched an aerial surveying specialization in the Department of Railway Construction. The specialization was changed into photogrammetry and remote sensing program in 1985 and begin to enroll students as the program of surveying and mapping in 2015. At present, this program is the top one in rail transit and in southwest area of China. The program's construction is supported by the national "Double-First Class" project, "Collaborative Innovation Center", "211" project and "985" project. The program has advantages of follows.

(1) The undergraduate program of SWJTU for specialty of Surveying Engineering is the leading one in the area of railway related and has a long history. Many professional talents working in the railway surveying area have even been educated here.

(2) The teachers have been prepared for the program's internationalization by the chance of constructing the international school. This enables them to contribute directly to the Belt and Road Initiative, and the Globalization Strategy of China's High-Speed Railway.

(3) The various high-quality platforms for talents cultivation are available, including the National United Engineering Laboratory of Integrated and Intelligent Transportation, a National (Virtual simulation) Experimental Teaching Demonstration Center, and a national center of engineering practice and education.

专业代码: 081201

Program Code: 081201

专业名称: 测绘工程

Program Name: Surveying Engineering

## **II.培养目标      Objectives**

培养信念执着、品德优秀、崇尚科学、追求卓越、德智体美全面发展，具有扎实的基础理论和专业应用知识、宽广的国际视野、团队协作精神、良好的组织管理能力、创新能力、继续学习能力的测绘与空间信息科学领域的复合型创新性人才。

茅以升学院测绘类“卓越班”本科毕业生，在毕业 5 年内将达到以下目标：

(1) 能够在与测绘工程或与测绘相关的专业领域里成功就业或学习研究生课

程；

(2) 熟悉测绘工程项目生产工作的各个环节，能够在技术岗位上独挡一面，成为测绘与空间信息科学领域的业务骨干和工程师；

(3) 具有学习新技术、新工艺的基础和适应测绘技术发展的能力，能够在技术岗位上实现测绘技术创新和充分利用新技术开展生产实践；

(4) 能够在跨职能团队工作和交流并担任领导角色，通过继续教育或其它终身学习渠道增加知识和提升能力；

(5) 具有高尚的职业道德，愿意为地方、国家及全球的社会服务。

This program aims to mentor the development of students on solid knowledge about surveying theories and technologies, encourage all-around personal development morally, intellectually, physically and esthetically. The students are supposed to have international visions, teamwork spirit, organizational and managing abilities, innovation capability, ability of learning sequentially in engineering areas especially in geomatics and Spatial information science.

The students should obtain the following objectives five years after graduated.

(1) Take up an occupation or start a graduate program in surveying and mapping engineering or other related areas.

(2) Have the practical ability as an engineer and technical expert. Can solve the surveying-related problems in practice and finish the projects and tasks on surveying engineering independently.

(3) Have the sense of innovative and systematic thinking ability to solve the surveying problems in practice. Be able to develop innovative surveying approaches in necessity.

(4) Can well communicate with relevant personals. Be able to manage and conduct the projects. Be able to promote the professional abilities by life-long study or participating continuing education.

(5) Commit to professional ethics, be willing to serve the local, national and global society.

### **III.专业毕业要求 Graduation Requirements**

**(1) 工程知识：**能够将数学、自然科学、工程基础和专业知识应用于测绘工程实践，并解决测绘领域的复杂工程问题。

**(2) 问题分析：**能够应用数学、自然科学和测绘学科的基本原理，并通过文献检索、资料检索、资料查询及现代信息技术获取的信息，对测绘领域的复杂工程问题进行分析研究，以获得有效结论。

**(3) 设计/开发解决方案：**能够应用测绘学科的基本原理和方法，针对测绘领域的复杂工程问题，设计开发解决方案和满足特定需求的系统，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

**(4) 研究：**能够基于科学原理并采用科学方法对测绘领域的复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

**(5) 使用现代工具：**针对测绘领域的复杂工程问题，能够开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。

**(6) 工程与社会：**能够基于测绘学科相关背景知识，对复杂工程问题进行合理分析，评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

**(7) 环境和可持续发展：**能够理解和评价针对测绘领域的复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

**(8) 职业规范：**具有人文社会科学素养、社会责任感，能够在测绘工程实践中理解并遵守工程职业道德和规范，履行责任。

**(9) 个人和团队：**能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

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

**(11) 项目管理：**理解并掌握工程管理原理与经济决策方法，并能在土木、交通、测绘等多学科环境中应用上述原理和方法。

**(12) 终身学习：**了解测绘学科领域的新理论、新方法和国内外发展动态，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。

**(1) Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and professional knowledge to the surveying practice and the solution of complex engineering problems in surveying.

(2) **Problem analysis:** Identify formulate, review research literature, and analyze complex problems in surveying engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and surveying.

(3) **Design/development of solutions:** Design solutions for complex surveying engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

(4) **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

(5) **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex surveying engineering activities with an understanding of the limitations.

(6) **The engineer and society:** Apply reasoning informed by the contextual knowledge of surveying to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional surveying engineering practice.

(7) **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

(8) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the surveying engineering practice.

(9) **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

(10) **Communication:** Communicate effectively on complex surveying engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

(11) **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments including civil engineering, rail transit, surveying etc.

(12) **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of

technological change.

#### IV.学制与学位 Duration and Degree

学制：4 年

Duration: 4 years

学位：工学学士学位

Degree: Bachelor of Engineering

#### V.主干学科与专业核心课程 Main Subject and Specialized Core Course

主干学科：测绘科学与技术

Main Subject: Surveying and Mapping

专业核心课程：数字地形测量学、误差理论与测量平差基础、大地测量学基础、遥感原理与应用、摄影测量学基础、数字图像处理、地理信息系统原理、卫星导航定位原理、地图制图学基础。

Specialized Core Course: Digital Topography, Error Theory and Foundation of Surveying Adjustment, Foundation of Geodesy, Principles and Applications of Remote Sensing, Foundations of Photogrammetry, Digital Image Processing, Principles of Geographic Information Systems, Principles of Global Navigation Satellite System, Foundation of Cartography.

#### VI.毕业学分基本要求 Basic Requirements of Credits for Graduation

课程体系 Curriculum System		学分要求 Credits Requirements						
		必修 Compulsory		限修 Distributional Electives		选修 Free Electives		小计 Subtotal
		理论 Theory	实践 Practice	理论 Theory	实践 Practice	理论 Theory	实践 Practice	
公共基础 课程 Public Basic Courses	思政类 Ideological Politics Courses	15	2					17
	军事类 Military Courses	2	2					4
	外语类 Foreign Language Courses	6		2				8
	体育类 Physical Education Courses		4					4

通识与多元化课程 General Education and Diversified Courses	“交通天下”通识教育课程（含跨学科课程） Core General Education Courses（Interdisciplinary Courses）							
	多元化课程 Diversified Courses							
	国际课程 International Courses					10		10
	大学生心理健康教育课程 University Student Psychological Health Courses							
	学生成长与发展规划课程 Student Growth and Development Planning Courses							
	新生研讨课 Freshman Seminar	2						2
	劳动教育课程 Labor Education Courses	2						2
	公共艺术课程 Public Art Courses	2						2
学科与专业基础课程 Discipline and Specialty Foundational Courses	数学类 Mathematics Courses	16						16
	物理类 Physics Courses	8	2					10
	计算机基础类 Basic Computer Courses	2	1					3
	自然科学基础类 Natural Science Courses	3						3
	专业基础课 Professional Foundational Courses	19.5	2.5					22
专业教育课程 Specialized Courses	专业核心课 Specialized Core Course	12.5	1.5					14
	专业限选课 Specialized Restricted Courses			8-9.5	6.5-8			16
实践教学环节 Practice Courses	集中性实践教学环节：基本技能训练、工程实践、综合课程设计、社会与文化素质和实践、毕业实习与毕业设计 Centralized Practical Teaching Process: Basic Skills Training, Practical Training, Integrated Curriculum Design, Social and		20					20

	Cultural Quality Practice, Graduation Internship and Graduation Design							
	创新创业实践：创新创业训练计划项目、个性化实验、学科竞赛、创新讲座等 Innovation and Entrepreneurship Practice: Innovation and Entrepreneurship Training Program, Personalized Experiments, Subject Competition, Innovation Lectures, etc				2			2
必修环节 A Compulsory Part	“第二课堂”项目：思想政治与道德素养类项目、学术科技与创新创业类项目、艺术体验与审美修养类项目、文化沟通与交往能力类项目、心理素质与身体素质类项目、社会工作与领导能力类项目、社会实践与志愿服务类项目 "The Second Lesson" Project: Ideological and Political Education and Moral Literacy Projects, Academic and Technological Innovation and Entrepreneurship Projects, Art Experience and Aesthetic Education Projects, Cultural Communication and Interpersonal Skills Projects, Psychological and Physical Health Projects, Social Work and Leadership Development Projects, Social Practice and Volunteering Projects	0						0
	大学生综合素质提升、学生体质达标测评 Comprehensive Quality Improvement Courses for College Students, Assessment of Students' Physical Fitness	0						0
	总 计 Total							155

## VII.课程设置细化表 Course Programs Table

公共基础课程 Public Basic Courses 共 33 学分，其中必修 31 学分，限修 2 学分，选修 0 学分 A total credits of 33, including 31 for compulsory courses, 2 for distributional electives and 0 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践学分 In-class Practice Credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
思政类 Ideological Politics Courses	思想道德与法治 Ideological and Moral Education and the Rule of Law	必修 Compulsory	3	0.4	第 1 学期 Semester 1	马克思主义学院 School of Marxism	6.2,8.3	
	中国近现代史纲要 Conspectus of Chinese Modern History	必修 Compulsory	3	0.4	第 2 学期 Semester 2	马克思主义学院 School of Marxism	8.1	
	马克思主义基本原理 The Basic Principles of Marxism	必修 Compulsory	3	0.4	第 3 学期 Semester 3	马克思主义学院 School of Marxism	8.1,11.1	
	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Theoretical System of Socialism with Chinese Characteristics	必修 Compulsory	3	0.4	第 4 学期 Semester 4	马克思主义学院 School of Marxism	8.2	
	习近平新时代中国特色社会主义思想概论 Outline of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	必修 Compulsory	3	0.4	第 6 学期 Semester 6	马克思主义学院 School of Marxism	8.2	
	形势与政策 I Situation and Policy I	必修 Compulsory	0	0	第 1 学期 Semester 1	马克思主义学院 School of Marxism	8.2	
	形势与政策II Situation and Policy II	必修 Compulsory	0	0	第 2 学期 Semester 2	马克思主义学院 School of Marxism	8.2	
	形势与政策III Situation and Policy III	必修 Compulsory	0	0	第 3 学期 Semester 3	马克思主义学院 School of Marxism	8.2	
	形势与政策IV Situation and Policy IV	必修 Compulsory	0	0	第 4 学期 Semester 4	马克思主义学院 School of Marxism	8.2	
	形势与政策 V Situation and Policy V	必修 Compulsory	0	0	第 5 学期 Semester 5	马克思主义学院 School of Marxism	8.2	

	形势与政策VI Situation and Policy VI	必修 Compulsory	0	0	第 6 学期 Semester 6	马克思主义学院 School of Marxism	8.2	
	形势与政策VII Situation and Policy VII	必修 Compulsory	0	0	第 7 学期 Semester 7	马克思主义学院 School of Marxism	8.2	
	形势与政策VIII Situation and Policy VIII	必修 Compulsory	2	0	第 8 学期 Semester 8	马克思主义学院 School of Marxism	8.2	
军事类 Military Courses	军事理论 Military Theories	必修 Compulsory	2	0	第 1 学期 Semester 1	武装部 Security Office	6.2,8.3	
	军事技能 Military Skills	必修 Compulsory	2	2	第 1 学期 Semester 1	武装部 Security Office	8.3,9.2	
外语类 Foreign Language Courses	英语 I College English I	必修 Compulsory	2	0	第 1 学期 Semester 1	外国语学院 School of Foreign languages	10.3	
	英语II College English II	必修 Compulsory	2	0	第 2 学期 Semester 2	外国语学院 School of Foreign languages	10.3	
	通用学术英语 English for General Academic Purposes	必修 Compulsory	2	0	第 3 学期 Semester 3	外国语学院 School of Foreign languages	10.3	
	职场英语 Workplace English	限修 Distributional Elective	2	0	第 4 学期 Semester 4	外国语学院 School of Foreign languages	10.3	限修 1 门, 2 学分 Limited to 1 course, 2 credits
	交际与文化视听说 Viewing, Listening & Speaking in English -- Communication & Culture							
	语言、文化与翻译 Language, Culture and Translation							
	英语公共演讲 Public Speaking in English							
体育类 Physical Education Courses	体育 I Physical Education I	必修 Compulsory	1	1	第 1 学期 Semester 1	体育学院 School of Physical Education	8.3,9.2,9.3	
	体育II Physical Education II	必修 Compulsory	1	1	第 2 学期 Semester 2	体育学院 School of Physical Education	8.3,9.2,9.3	
	体育III Physical Education III	必修 Compulsory	0.5	0.5	第 3 学期 Semester 3	体育学院 School of Physical Education	8.3,9.2,9.3	
	体育IV Physical Education IV	必修 Compulsory	0.5	0.5	第 4 学期 Semester 4	体育学院 School of Physical Education	8.3,9.2,9.3	
	体育健康课程 I Diversified Physical Education Courses I	必修 Compulsory	0.5	0.5	第 5 学期 Semester 5	体育学院 School of Physical Education	8.3,9.2,9.3	

	体育健康课程II Diversified Physical Education Courses II	必修 Compulsory	0.5	0.5	第 6 学期 Semester 6	体育学院 School of Physical Education	8.3,9.2,9.3	
<b>通识与多元化课程</b> <b>General Education and Diversified Courses</b> 共 16 学分，其中必修 6 学分，限修 0 学分，选修 10 学分 A total credits of 16, including 6 for compulsory courses, 0 for distributional electives and 10 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实 践学分 In-class practice credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
“交通天下”通识教育课程（含跨学科课程） Core General Education Courses (Interdisciplinary Courses)	“交通天下”通识课程 General Studies on Transportation	选修 Free Elective	4	0	2-7 学期 Semester 2-7	全校 The whole school	7.3,8.2,10.3,11 .1,12.1	见备注 1 See Note 1
新生研讨课 Freshman Seminar	测绘学漫谈 Surveying and Mapping	必修 Compulsory	2	0	第 1 学期 Semester 1	地球科学与环境工程学院 Faculty of Geosciences and Environmental Engineering	10.2,10.3	
多元化课程 Diversified Courses	全校跨学科课程 Interdisciplinary Course of University	选修 Free Elective	4	0	2-7 学期 Semester 2-7	全校 The whole school	10.1,12.2	选修 4 学 分 Free Elective 4 Credits
	学科竞赛课程 Subject Competition Courses of University	选修 Free Elective	2	0	2-7 学期 Semester 2-7	全校 The whole school	10.1,12.2	选修 2 学 分，每个 类别最多 2 学分； 学科竞赛 课程限测 绘类/数学 类/信息类 Subject Competiti on
	全校个性化选修课程 Personalized Elective Courses of University	选修 Free Elective			2-7 学期 Semester 2-7	全校 The whole school	10.1,12.2	Courses of Geomatics /Mathemat ics/Informat ion courses
劳动教育课程 Labor Education Courses	劳动教育课程 Labor Education Courses	必修 Compulsory	2	0	2-7 学期 Semester 2-7	全校 The whole school	10.1,12.2	

公共艺术课程 Public Art Courses	公共艺术课程 Public Art Courses	必修 Compulsory	2	0	2-7 学期 Semester 2-7	全校 The whole school	10.1,12.2	
学科与专业基础课程 <b>Discipline and Specialty foundational Courses</b> 共 54 学分，其中必修 54 学分，限修 0 学分，选修 0 学分 A total credits of 54, including 54 for compulsory courses, 0 for distributional electives and 0 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实 践学分 In-class practice credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
数学类 Mathematics Courses	高等数学I Advanced Mathematics I	必修 Compulsory	5	0	第 1 学期 Semester 1	数学学院 School of Mathemati cs	1.1	
	线性代数 B Linear Algebra B	必修 Compulsory	3	0	第 1 学期 Semester 1	数学学院 School of Mathemati cs	1.3	
	高等数学II Advanced Mathematics II	必修 Compulsory	5	0	第 2 学期 Semester 2	数学学院 School of Mathemati cs	1.1	
	概率论与数理统计 Probability and Mathematical Statistics	必修 Compulsory	3	0	第 2 学期 Semester 2	数学学院 School of Mathemati cs	1.1	
物理类 Physics Courses	大学物理 MI College Physics MI	必修 Compulsory	4	0	第 2 学期 Semester 2	物理科学 与技术学 院 School of Physical and Technolog y	1.1,4.1,12.2	
	大学物理实验 MI Experiments of College Physics MI	必修 Compulsory	1	1	第 2 学期 Semester 2		1.1,4.1,12.2	
	大学物理 MII College Physics M II	必修 Compulsory	4	0	第 3 学期 Semester 3		1.1,4.1,12.2	
	大学物理实验 MII Experiments of College Physics MII	必修 Compulsory	1	1	第 3 学期 Semester 3		1.1,4.1,12.2	
计算机基础类 Basic Computer Courses	计算机程序设计基础 Foundations of Computer Programming	必修 Compulsory	3	1	第 1 学期 Semester 1	计算机与 人工智能 学院 School of Computing and Artificial Intelligence	3.1	
自然科学基础类 Natural Science Courses	地球科学概论 A Concept of Geosciences A	必修 Compulsory	3	0	第 4 学期 Semester 4	地球科学 与环境工 程学院 Faculty of	1.1,7.1,7.3	

						Geosciences and Environmental Engineering		
专业基础课 Professional Foundational Courses	数据结构 Data Structure	必修 Compulsory	3	0.5	第 2 学期 Semester 2	地球科学与环境工程学院 Faculty of Geosciences and Environmental Engineering	2.1,2.3	
	数字地形测量学 Digital Topography	必修 Compulsory	3	0	第 2 学期 Semester 2		1.3,4.2,5.2	
	大地测量学基础 Foundations of Geodesy	必修 Compulsory	3	0.5	第 3 学期 Semester 3		1.3,2.2,4.1	
	误差理论与测量平差基础 Error Theory and Foundations of Surveying Adjustment	必修 Compulsory	3	0.5	第 3 学期 Semester 3		1.3,1.4,4.1, 4.4	
	地图制图学基础 Foundations of Cartography	必修 Compulsory	2	0.5	第 3 学期 Semester 3	地球科学与环境工程学院 Faculty of Geosciences and Environmental Engineering	4.2,5.3	
	测绘编程技术 Programming Techniques of Surveying and Mapping	必修 Compulsory	2	0	第 3 学期 Semester 3		3.1,5.3	
	数据库原理与应用 Database Principles and Applications	必修 Compulsory	3	0	第 3 学期 Semester 3		2.3,5.1	
	数字图像处理 Digital Image Processing	必修 Compulsory	3	0.5	第 5 学期 Semester 5		2.3,5.2	
专业教育课程 Specialized Courses 共 30 学分，其中必修 14 学分，限修 16 学分，选修 0 学分 A total credits of 30, including 14 for compulsory courses, 16 for distributional electives and 0 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践学分 In-class practice credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
专业核心课 Specialized Core Course	摄影测量学基础 Foundations of Photogrammetry	必修 Compulsory	3	0.5	第 4 学期 Semester 4	地球科学与环境工程学院 Faculty of Geosciences and Environmental Engineering	1.4,2.1,2.2, 4.2	
	遥感原理与应用 Principles and Applications of Remote Sensing	必修 Compulsory	3	0.5	第 4 学期 Semester 4		2.1,3.4,5.1, 7.3	
	地理信息系统原理 Principles of Geographic Information Systems	必修 Compulsory	3	0	第 4 学期 Semester 4		2.3,4.4,5.1, 5.3,7.3	
	工程测量学 Surveying Engineering	必修 Compulsory	2	0.5	第 6 学期 Semester 6		2.2,3.2,9.1, 11.2	
	卫星导航定位原理 Principles of Global Navigation Satellite System	必修 Compulsory	3	0	第 4 学期 Semester 4		1.4,1.3,4.4, 5.1	
专业限选课 Specialized Restricted Courses	遥感影像地学解译 B Geoscience Interpretation of Remote Sensing Images	限修 Distributional Electives	2	1	第 7 学期 Semester 7	地球科学与环境工程学院 Faculty of Geosciences and Environmental Engineering	1.1,2.1,3.4, 5.2	限修 16 学分；至少选修其中一个方向的全部课程
摄影测量与遥感方向模块 Photogrammetry	定量遥感 B Quantitative Remote Sensing	限修 Distributional Electives	2	1	第 6 学期 Semester 6		1.4,2.1,2.3	
	微波遥感原理与应用	限修	3	1	第 6 学期		1.1,1.4,2.3	

and Remote Sensing	Principle and Application of Microwave Remote Sensing	Distributional Electives			Semester 6	ntal Engineering		
	数字摄影测量 Digital Photogrammetry	限修 Distributional Electives	3	1	第 5 学期 Semester 5		1.1,2,3	
专业限选课 Specialized Restricted Courses 地理信息系统方向模块 GIS	专题制图与空间信息可视化 Thematic Mapping and Visualization of Spatial Information	限修 Distributional Electives	2	1	第 5 学期 Semester 5	地球科学与环境工程学院 Faculty of Geoscience s and Environmental Engineering	3.2,3.4,5.1, 5.2,5.3	
	GIS 数量分析方法与应用 Quantitative Analysis Method and Application of GIS	限修 Distributional Electives	2	1	第 6 学期 Semester 6		3.2,3.4,5.1, 5.2,5.3	
	三维 GIS 技术基础 3D GIS Technology Foundation	限修 Distributional Electives	2	1	第 6 学期 Semester 6		3.2,3.4,5.1, 5.2,5.3	
	WebGIS 技术与开发 WebGIS Technology and Development	限修 Distributional Electives	2	1	第 6 学期 Semester 6		3.2,3.4,5.1, 5.2,5.3	
	GIS 应用开发 GIS Application Development	限修 Distributional Electives	2	1	第 5 学期 Semester 5		3.2,3.4,5.1, 5.2,5.3	
专业限选课 Specialized Restricted Courses 测绘工程方向模块 Survey Engineering	高速铁路工程测量 Surveying Engineering of High-speed Railway	限修 Distributional Electives	2	0.5	第 7 学期 Semester 7	地球科学与环境工程学院 Faculty of Geoscience s and Environmental Engineering	2.2,2.4,3.2, 6.1,11.3	
	高等测量平差 Advanced Surveying Adjustment	限修 Distributional Electives	2	1	第 6 学期 Semester 6		2.2,2.4,11.2	
	物理大地测量学 Physical Geodesy	限修 Distributional Electives	2	1	第 5 学期 Semester 5		2.1,4.4	
	组合导航与位置服务 Multi-Mode Navigation and Location Based Services	限修 Distributional Electives	2	1	第 5 学期 Semester 5		1.4.2.4,11.2	
实践教学环节 Practice Courses 共 22 学分，其中必修 20 学分，限修 2 学分，选修 0 学分 A total credits of 22, including 20 for compulsory courses, 2 for distributional electives and 0 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践学分 In-class practice credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
集中性实践教学环节：基本技能训练、工程实践、综合课程设计、社会与文化素质和实践、毕业实习与毕业设计 Centralized Practical Teaching Process: Basic Skills Training, Practical Training, Integrated Curriculum Design, Social and	普通测量实验 General Surveying Experiments	必修 Compulsory	1	1	第 2 学期 Semester 2	地球科学与环境工程学院 Faculty of Geoscience s and Environmental Engineering	4.3,9.1	
	地理信息系统实验 Geographical Information System Experiments	必修 Compulsory	1	1	第 4 学期 Semester 4		2.1,7.2	
	测绘应用程序课程设计 Course Exercise of Surveying Application Programs	必修 Compulsory	1	1	短 2 学期 Short Semester 2		3.1,9.1,10.1	
	数字测图实习 Practice of Digital Mapping	必修 Compulsory	2	2	短 1 学期 Short Semester 1		4.2,5.2,9.1	

<b>Cultural Quality Practice, Graduation Internship and Graduation Design</b>	控制测量与平差实习 Control Survey and Adjustment Practice	必修 Compulsory	3	3	短 2 学期 Short Semester 2	地球科学与环境工程学院 Faculty of Geosciences and Environmental Engineering	4.3,6.2,7.2,9.2,9.3,11.3	
	科研实训 Scientific Practical Training	必修 Compulsory	4	4	第 7 学期 Semester 7			见备注 2 See Note 2
	摄影测量与遥感应用实习 Practice of Photogrammetry and Remote Sensing Applications	必修 Compulsory	2	2	短 3 学期 Short Semester 3		4.3,4.4,6.2,7.2,9.3,11.3	
	毕业设计(论文)-茅班 Graduation Design (Dissertation)	必修 Compulsory	6	6	第 8 学期 Semester 8		2.3,3.2,3.3,3.4,10.1,10.2,12.2	
<b>创新创业实践：创新创业训练计划项目、个性化实验、学科竞赛、创新讲座等 Innovation and Entrepreneurship Practice: Innovation and Entrepreneurship Training Program, Personalized Experiments, Subject Competition, Innovation Lectures, etc</b>	创新创业训练计划项目 Innovation and Entrepreneurship Training Program	限修 Distributional Electives	2	2	2-7 学期 Semester 2-7	地球科学与环境工程学院 Faculty of Geosciences and Environmental Engineering	10.1,12.2	主持或参与结题至少 1 项 Leading or participation at least one project conclusion
	个性化实验 Individual Experiment	限修 Distributional Electives			2-7 学期 Semester 2-7		10.1,12.2	
	大学生测绘技能竞赛 Surveying and Mapping Skills Competition for College Students	限修 Distributional Electives			2-7 学期 Semester 2-7		10.1,12.2	获省级或国家级竞赛三等奖及以上 Winning the third prize at the provincial or national level
	创新讲座 Innovative lectures	限修 Distributional Electives			2-7 学期 Semester 2-7		10.1,12.2	听全校至少 10 个科技讲座，本院不少于 5 个，提交科技报告 1 份 Listening to at least 10 lectures of science and technology and at least 5 in

								this school, submitting a report of science and technology
<p style="text-align: center;"><b>必修环节</b>  <b>A compulsory part</b>            共 0 学分，其中必修 0 学分，限修 0 学分，选修 0 学分            A total credits of 0, including 0 for compulsory courses, 0 for distributional electives and 0 for free electives</p>								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践学分 In-class practice credits	开课学期 Semester	开课学院 School	支撑毕业要求指标点 Indicators which Support Graduation Requirements	备注 Notes
“第二课堂”项目：思想政治与道德素养类项目、学术科技与创新创业类项目、艺术体验与审美修养类项目、文化沟通与交往能力类项目、心理素质与身体素质类项目、社会工作与领导能力类项目、社会实践与志愿服务类项目 "The Second Lesson" Project: Ideological and Political Education and Moral Literacy Projects, Academic and Technological Innovation and Entrepreneurship Projects, Art Experience and Aesthetic Education Projects, Cultural Communication and Interpersonal Skills Projects, Psychological and Physical Health Projects, Social Work and Leadership Development Projects, Social Practice and Volunteering Projects	“第二课堂”项目 "The Second Lesson" Project	必修 Compulsory	0	0	1-8 学期 Semester 1-8	校团委 Communist Youth League Committee	8.3,9.2,9.3	
大学生综合素质提升、学生体质达标测评 Comprehensive Quality	大学生综合素质提升 Comprehensive Quality Improvement Courses for College Students	必修 Compulsory	0	0	1-8 学期 Semester 1-8	校团委 Communist Youth League Committee	8.3,9.2,9.3	

Improvement Courses for College Students, Assessment of Students' Physical Fitness	学生体质达标测评 Assessment of Students' Physical Fitness	必修 Compulsory	0	0	秋季学期 Fall semester	体育学院 School of Physical Education	8.3,9.2,9.3	
学分总计 Total Credits			155					

#### 备注 Notes:

1、通识课（必修 4 学分）要求在“交通天下”通识课程“历史、文化与人文情怀”、“哲学、智慧与批判性思维”、“艺术体验与审美修养”、“社会科学与伦理”、“生态环境与生命关怀”、“交通工程与创新世界”等 6 个模块中修读 4 学分通识课程，每模块最多选 1 门课程。（通识课程安排详见《通识教育选修手册》）。

1. Each student should take 4 credits from the six modules of the General Education Courses, and maximum one course from each module.

2、一般应在 3-6 学期完成。一般应在学业导师指导下参与科研工作，并完成研究报告。也可以在测绘类专业其它教师指导下参与科研工作并完成报告。第 7 学期根据指导老师批准的研究报告认证学分。

2. Innovation and Entrepreneurship Practice credits should be from 4 parts including Innovation and Entrepreneurship Training Program, Personalized Experiments, Subject Competition and Innovation Lectures, maximum 2 credits from each part, and should be affirmed by Faculty of Geosciences and Environmental Engineering.

3、创新创业实践可以通过创新创业训练计划项目、个性化实验、学科竞赛和创新讲座等四个类别获得学分，每个类别最多 2 学分。学分由地球科学与环境工程学院认定。

3. Innovation and entrepreneurship practice can earn credits through four categories, innovation and entrepreneurship training program, personalized experiments, subject competition, innovation lectures, etc. Each category has 2 credits, the credits are determined by faculty of geosciences and environmental engineering.

4、要求 0 学分的课程为必修环节，按照相应管理办法完成认证。

4. The courses with 0 credits are compulsory, complete the certification according to the regulations.