

地图学与地理信息系统 (070503)

Cartography and Geographical Information System

学科门类：理学 (07) 一级学科：地理学 (0705)

Discipline Category: Science (07)

First-Class Discipline: Geography (0705)

一、学科简介

河海大学 2000 年开始招收地理信息系统 (GIS) 本科生, 2003 年起开始招收地图学与地理信息系统专业硕士生, 2007 年起, 按地理学一级学科招收硕士研究生, 2017-2019 年软科发布的“中国最好学科排名”, 地理学连续 3 年位列全国前 13%, 迄今本专业已毕业研究生 200 余人。地图学与地理信息系统属地理学一级学科, 是在地图学、遥感与地理信息系统基础上发展起来。该学科以地图、遥感影像和调查统计数据为信息源, 采用数学、地理学、信息论与系统论的相关理论以及计算机技术、3S 技术进行地理认知与建模、地理信息分析与表达、地理信息应用与服务。河海大学地图学与地理信息系统学科以地理信息系统技术与应用研究为重点, 以数字流域与地理信息系统集成建模研究为特色, 着重研究地理信息认知、空间分析与专业建模、遥感机理与定量反演, 为全球变化、区域资源环境、数字流域以及防灾减灾等重大问题决策提供辅助决策和技术支撑。

本学科拥有一支优秀的教师队伍, 现有教学科研人员 24 人, 其中教授 6 人、副教授 13 人, 80% 以上的教师拥有博士学位。近年来, 本学科教师主持和参与了国家自然科学基金以及国家重点研发计划、国家支撑计划等重大课题, 多项研究成果获得省部级奖励。水文水资源与水利工程科学国家重点实验室、洪涝灾害风险预警与防控应急管理部重点实验室、中国气象局-河海大学水文气象联合实验室、河海大学地理空间智能与流域科学研究中心是本学科研究支撑平台。研究生就业主要面向自然资源、生态环境、信息、水利、交通等国民经济各部门, 可从事资源环境、区域可持续发展、全球变化研究工作。

I. Discipline Overview

Hohai University began recruiting Geographic Information system (GIS) undergraduate in 2000. It started enrolling Master majoring in this discipline in 2013. Master students were enrolled with the first-class discipline of Geography since 2007. According to the "Best Chinese Subjects Ranking" released by Shanghai Ranking in 2017-2019, geography has ranked among the top 13% in China for three consecutive years. So far, more than 200 graduate students have graduated from this major. Cartography and geographic information system belongs to the first-class discipline of geography, which is developed on the basis of cartography, remote sensing and geographic information system. This discipline takes maps, remote sensing images and survey statistics as the information source, and adopts the relevant theories of mathematics, geography, information theory and system theory, computer technology and 3S technology to carry out geographic cognition and modeling, geographic information analysis and expression, geographic information application and service. The disciplines of Cartography and Geographical Information System in Hohai University focuses on the GIS technology and application research, taking the digital watershed and GIS integrated modeling as the significant research field and laying stress on the research of geographic information cognition, spatial analysis and professional modeling, remote sensing mechanism and quantitative inversion. These researches can provide auxiliary decision-making and technical support for major issues such as global change, regional resource environment, digital watershed and disaster prevention and mitigation.

The discipline has an excellent team of teachers. There are 24 teaching and research personnel, including 6 professors and 13 associate professors. More than 80% of the teachers have doctoral degrees. In recent years, teachers of this discipline have presided over and participated in major projects such as the National Natural Science Foundation of China, the National Key R&D Program, and a number of research achievements have won provincial and ministerial awards. State Key Laboratory of Hydrology- Water Resources and Hydraulic Engineering, Key Laboratory of Flood Disaster Risk Early Warning and Emergency Management Department, China Meteorological Administration-Hohai University Joint Laboratory of Hydrology and Meteorology, and

Geospatial Intelligence and Watershed Scientific Research Center of Hohai University are the research support platform of this discipline. Most Masters can find jobs in the field of natural resources, ecological environment, information, water conservancy, transportation and other sectors of the national economy, and can be engaged in research on resources and environment, regional sustainable development, and global change.

二、培养目标

1. 河海大学硕士层次外国留学生应当在地图学与地理信息系统领域中具有较好的国际视野，能够在多个国家的实际环境中运用和发展地图学与地理信息系统的知识、技能和方法，并具备参与国际事务和国际竞争的能力。

2. 以英语为专业教学语言的学科、专业中，外国留学生毕业时，硕士研究生的中文能力应当至少达到《国际汉语能力标准》三级水平。

3. 本学科注重培养求实创新的科学态度和端正严谨的诚信学风，着重培养具有较高地理学素养的地理信息系统理论与应用技术方面的高层次人才，能够胜任教学、科研或大型地理信息应用项目的设计、开发和管理的工作。要求具有数学、地理学及计算机应用方面的理论知识；具有扎实的地理信息系统、遥感、地图学及“3S”技术等方面的技术能力；能够进行学术交流，掌握本学科的理论和技术前沿动态；能够进行大型 GIS 应用系统和遥感信息工程的开发与研究，具有解决实际问题的能力。

II. Training Objectives

1. International master graduates of Hohai University are expected to have good international view, to apply and develop the theories, skills, and methodologies in the actual environment of several countries, and to participate in the international academic affairs.

2. International master graduates must meet the requirement of Level 3 in Chinese Language Proficiency Scales upon graduation if they conduct their coursework in English.

3. This specialty focuses on cultivating a realistic and innovative scientific attitude and a rigorous and honest style of integrity, and emphasizes on cultivating high level talents of geographic information system

theory and application technology with high geography literacy, who are capable of teaching and scientific research or designing, developing, and managing large geographic Information application project. Students of this major should master theoretical knowledge of mathematics, geography and computer applications and command solid technical capacity of GIS, RS, Cartography and "3S" technology. They should also be able to carry out academic exchanges, grasp the theoretical and technological frontiers of the subject and have the capacity for developing and investigating large GIS application system, remote sensing information engineering and solving practical problems.

三、主要研究方向

1. GIS 空间分析与建模
2. GIS 设计、开发与应用
3. 遥感信息机理与定量方法
4. 遥感信息工程
5. 数字流域、数字城市

III. Research Directions

1. GIS-based Spatial Analysis and Modeling
2. GIS Design, Development and Applications
3. Qualitative Remote Sensing and its Mechanism
4. Remote Sensing Information Engineering
5. Digital Watershed and Digital City

四、学制和学习年限

学术学位全英文硕士留学研究生的标准学制为 3 年。实行弹性学制，学习年限最短不少于 2 年，最长不超过 5 年。

IV. Number of Years Requirement

The master program typically requires 3 years to complete. However, the completing time may vary to 2 years as the minimum and 5 years as the maximum.

五、学分要求和课程设置

1. 学术学位全英文硕士留学研究生课程总学分为 28 学分，其中学位课程为 21 学分，非学位课程为 7 学分。另设教学环节。所有课程学习一般应在入学后 1 年内完成。

2. 汉语课每学分为 24 学时，中国概况课每学分为 18 学时，其他课程每学分为 16 学时。

3. 中国国情教育（水韵课堂）为系列专题讲座，要求学生按照要求完成规定的学习任务。

4. 对于汉语水平已达到毕业要求的学生，可申请免修汉语，具体要求详见留学生课程免修有关规定。

具体课程设置如下：

V. Credit Requirements and Curriculum

1. International academic master students will complete 28 credits, 21 of which are from degree courses, and 7 of which are from non-degree courses. Students will also complete academic activities. Coursework will be completed in one year after registration.

2. Each credit of Chinese language course is 24 credit hours. Each credit of Introduction to China is 18 credit hours. For other courses, each credit is 16 credit hours.

3. “Water Harmony Lectures” is a series of seminars, which require students to complete the specified learning tasks.

4. For students who have met the Chinese language requirement for the master degree, Chinese language courses can be exempted, of which the details can be referred to in relevant regulations.

The specific curriculum is as follows:

地图学与地理信息系统全英文学术型留学硕士研究生课程设置

Curriculum for English Taught International Academic Master Students in Cartography and Geographical Information System

| 课程类别 Category | | 课程代码 Course Code | 课程名称 Course Name | 学分 Credit | 学时 Hours | 开课学期 Term | 备注 Remarks |
|---------------------------------------|---|---|---|--------------|-------------|--|--|
| 学位课程 Degree Course 21 学分 | 公共课程 General Course | 2022LM000001 | 汉语 I Chinese Language I | 2 | 48 | 秋 Autumn | 必修 Compulsory |
| | | 2022LM000002 | 汉语 II Chinese Language II | 2 | 48 | 春 Spring | |
| | | 2022LM000003 | 中国概况 Introduction to China | 2 | 36 | 秋 Autumn | |
| | | 2022LM110001 | 论文写作指导 Guide of Thesis Writing | 2 | 32 | 秋、春 Autumn/ Spring | |
| | 基础课程 Basic Course | 2022LM880001 | 矩阵论 Matrix Theory | 2 | 32 | 春 Spring | 选修 7 学分 Optional 7 credits at least |
| | | 2022LM880002 | 最优化方法 Optimization Methods | 2 | 32 | 秋 Autumn | |
| | | 2022LM880003 | 数值分析 Numerical Analysis | 3 | 48 | 秋 Autumn | |
| | | 2022LM330001 | 程序设计方法 Methods of Programming | 2 | 32 | 秋 Autumn | |
| | | 2022LM991001 | 环境大地测量学 Environmental Geodesy | 2 | 32 | 秋 Autumn | 必修 Compulsory |
| | 专业课程 Major Course | 2022LM100103 | 地理信息系统原理与应用 Advanced GIS | 2 | 32 | 春 Spring | 选修 4 学分 Optional 4 credits at least |
| | | 2022LM010201 | 高级遥感 Advanced Remote Sensing | 2 | 32 | 秋 Autumn | |
| | | 2022LM010202 | 区域发展规划 Regional Development Planning | 2 | 32 | 秋 Autumn | |
| | 非学位课程 Non-degree Course 7 学分 | 2022LM110002 | 中国国情教育（水韵课堂） Water Harmony Lectures | 1 | 16 | 秋、春 Autumn/ Spring | 必修 Compulsory |
| 2022LM010203 | | 地理数据分析 Geographic Data Analysis | 2 | 32 | 春 Spring | 选修 6 学分 Optional 6 credits at least | |
| 2022LM010204 | | 水文遥感 Hydrologic Remote Sensing | 2 | 32 | 秋 Autumn | | |
| 2022LM990103 | | 水资源规划与管理 Water Resources Planning and Management | 2 | 32 | 春 Spring | | |
| 2022LM010101 | | 现代水文模拟及预报 Modern Hydrological Modeling | 2 | 32 | 春 Spring | | |
| 2022LM010102 | | 水信息采集与处理 Collection of Water Information and Data Processing | 2 | 32 | 春 Spring | | |
| 选修硕士课程 Optional courses for master | | | | | | 选修 Optional | |
| 教学环节 Academic Activity | 学术活动（含博导讲座） Seminar and Conferences (including seminars by PhD advisors) | | | | | 必修 Compulsory | |
| | 实践活动 Practice Activity | | | | | | |
| | 科学研究 Scientific Research | | | | | | |

六、教学环节

1. 个人培养计划

学术学位硕士研究生入学后，应在导师指导下，在规定时间内按照培养方案和学位论文工作有关规定，结合研究方向和本人实际情况制定个人培养计划，其中学习计划在入学 2 个月内提交。

2. 学术活动

学术学位硕士研究生学术活动包括参加国内外学术会议、专家学术讲座，以及研究生学术研讨活动等。申请学位论文答辩前必须参加 10 次以上的学术交流活动，其中博导讲座至少 2 次。研究生参加学术活动必须填写相关学术活动登记本。

3. 实践活动

为培养劳动实践能力和责任意识，学术学位硕士研究生必须参加实践活动，实践活动形式包括助教、助管、助研、生产实践、社会实践等。由导师对学生实践环节的时长和效果进行考核和评价。

VI. Academic Activities

1. Study Proposal

The master students must prepare a study proposal on how they will complete the master degree by considering their research interests, advice from their research advisors, and other requirements mentioned in this document. The proposal must be submitted in two months after official registration.

2. Seminars and Presentations

Master students must participate in academic conferences, seminars by experts and PhD advisors, and discussion panels. Before their dissertation defense, master students must participate in seminars and conferences over 10 times, including at least 2 seminars by PhD advisors. All the seminars and presentations should be recorded in relevant record book.

3. Practice Activities

Master students are required to participate in practice activities to prepare professional development. Practice activities include teaching assistantship, research assistantship, management assistantship, and

industry engagement etc., which are to be assessed by the advisors.

七、论文工作

学术学位硕士学位论文研究工作必须经过文献阅读、论文选题、论文计划及开题报告、论文中期检查、科研成果产出、学位论文预审、学位论文评阅、学位论文答辩等环节。具体按照《河海大学硕士学位论文工作管理办法》和学院相关文件执行。留学硕士研究生可使用英文撰写论文。

VII. Dissertation

The dissertations of academic master students are required to complete the stages of literature review, topic selection, dissertation plan and dissertation proposal, mid-term examination, output of scientific research achievements, pre-examination, review and assessment, and dissertation defense. Detailed requirements can be referred to in “Hohai University Master's Dissertation Management Measures” and relevant documents in College of Hydrology and Water Resources. Dissertation in English is acceptable.

八、本学科推荐阅读的重要书目、专著和学术期刊

VIII. Recommended Bibliographies, Monographs and Academic Journals of the Discipline

1. 伍光和, 王乃昂, 胡双熙, 等. 自然地理学(第四版) [M]. 北京:高等教育出版社, 2008.
2. 梅安新, 彭望球, 秦其明, 等. 遥感概论[M]. 北京:高等教育出版社, 2001.
3. 赵英时. 遥感应用分析原理与方法[M]. 北京:科学出版社, 2003.
4. 陈述彭, 鲁学军, 周成虎. 地理信息系统导论[M]. 北京:科学出版社, 2000.
5. 陈述彭. 地球信息科学[M]. 北京: 高等教育出版社, 2007.
6. 邬伦, 刘瑜, 张晶, 等.地理信息系统-原理、方法和应用[M]. 北京:科学出版社, 2001.
7. 朱长青,史文中.空间分析建模与原理[M]. 北京:科学出版社, 2006.
8. 朱诚, 马春梅, 陈刚, 等. 全球变化科学导论(第四版) [M]. 北京:科学出版社, 2017.

9. 梁顺林, 张杰, 陈利军, 等. 全球变化遥感产品的生产与应用[M]. 北京:科学出版社, 2017.
10. 郭华东. 全球变化科学卫星[M]. 北京:科学出版社, 2014.
11. 何冬华, 邱杰华, 袁媛, 等. 国土空间规划——面向国家治理现代化的地方创新实践[M]. 北京:中国建筑工业出版社, 2020.
12. 吴传钧. 中国经济地理[M]. 北京:科学出版社, 2018.
13. 郭华东. 雷达对地观测理论与应用[M]. 北京:科学出版社, 2000.
14. 李小文, 汪骏发, 王锦地, 等. 多角度与热红外对地遥感[M]. 北京:科学出版社, 2001.
15. 童庆禧, 张兵, 郑兰芬. 高光谱遥感—原理、技术与应用[M]. 北京:高等教育出版社, 2006.
16. 田国良. 热红外遥感[M]. 北京:电子工业出版社, 2006.
17. 童庆禧, 张兵, 郑兰芬. 高光谱遥感的多学科应用[M]. 北京: 电子工业出版社, 2006.
18. 李征航, 黄劲松. GPS 测量与数据处理[M]. 武汉: 武汉大学出版社, 2006.
19. 龚健雅. 当代地理信息技术[M]. 北京: 科学出版社, 2004.
20. 冯学智, 王结臣, 周卫, 等. “3S”技术与集成[M]. 北京:商务印书馆, 2007.
21. 龙毅, 温永宁, 盛业华. 电子地图学[M]. 北京:科学出版社, 2006.
22. 黄杏元, 马劲松, 汤勤. 地理信息系统概论(修订版)[M]. 北京:高等教育出版社, 2001.
23. 王桥, 杨一鹏, 黄家柱. 环境遥感[M]. 北京:科学出版社, 2019.
24. 汤国安, 赵牡丹, 杨昕, 周毅. 地理信息系统[M]. 北京:科学出版社, 2019.
25. 梁顺林. 定量遥感: 理念与算法[M]. 北京:科学出版社, 2020.
26. 刘南威. 自然地理学[M]. 北京:科学出版社, 2019.
27. 李文华. 中国当代生态学研究: 全球变化生态学[M]. 北京:科学出版社, 2013.
28. 李增元, 柳钦火, 阎广建等. 复杂地表定量遥感模型与反演[M]. 北京:科学出版社, 2019.
29. 骆剑承, 吴田军, 吴志峰, 等. 遥感大数据智能计算[M]. 北京:科学出版社, 2020.
30. James B. Campbell, Randolph H. Wynne. Introduction to Remote Sensing, Fifth Edition. Guilford Publications, 2011.

31. Xianhu Wei. The Geography and Remote Sensing Analysis of Sri Lanka. Springer, 2022.
32. Simon Jones, Karin Reinke. Innovations in Remote Sensing and Photogrammetry. Springer, 2009.
33. Huajun Tang, Zhao-Liang Li. Quantitative Remote Sensing in Thermal Infrared: Theory and Applications. Springer, 2013.
34. Rémi Cresson. Deep Learning for Remote Sensing Images with Open Source Software. CRC Press, 2020.
35. Venkat Lakshmi. Remote Sensing of Hydrological Extremes. Springer, 2016.
36. Nicolas Baghdadi, Mehrez Zribi. Microwave Remote Sensing of Land Surfaces: Techniques and Methods. ISTE Press-Elsevier, 2016.
37. Dale A. Quattrochi, Elizabeth Wentz, Nina Siu-Ngan Lam. Integrating Scale in Remote Sensing and GIS. CRC Press, 2019.
38. Gottfried Konecny. Geoinformation: Remote Sensing, Photogrammetry and Geographic Information Systems, Second Edition. CRC Press, 2009.
39. Persaud, Haimwant. Geographical Information System for Community Health Monitoring. LAP Lambert Academic Publishing, 2014.
40. Peter A. Burrough, Rachael A. McDonnell, Christopher D. Lloyd. Principles of Geographical Information Systems, Oxford University Press, USA, 2015.
41. Narayan Panigrahi. Geographical Information Science. CRC Press, 2019.
42. Donald Patrick Albert. Geospatial technologies and advancing geographic decision making : issues and trends. Information Science Reference, 2012.
43. Krygier, John. Making maps: a visual guide to map design for GIS. Guilford Press, 2011.
44. 地理学报. 科学出版社
45. 地理研究. 科学出版社
46. 地理科学. 科学出版社

47. 地理科学进展. 科学出版社
48. 自然资源学报. 科学出版社
49. 中国科学: 地球科学. 《中国科学》杂志社
50. 科学通报. 《中国科学》杂志社
51. 测绘学报. 测绘出版社
52. 遥感学报. 科学出版社
53. 地球信息科学学报. 科学出版社
54. 武汉大学学报.信息科学版. 科学出版社
55. 水科学进展. 科学出版社
56. 地理与地理信息科学. 地理与地理信息科学杂志社
57. Nature. Springer
58. Nature Geoscience. Springer
59. Science. American Association for the Advancement of Science
60. PNAS. National Academies Press
61. International Journal of GIS. Taylor & Francis Group
62. Remote Sensing of Environment. Elsevier
63. ISPRS Journal of Photogrammetry and Remote Sensing. Elsevier
64. IEEE Transactions on Geoscience and Remote Sensing. IEEE Xplore
65. International Journal of Applied Earth Observation and Geoinformation. ELSEVIER
66. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. IEEE Xplore
67. Environmental Modelling & Software. Elsevier
68. Water Resources Research. Wiley
69. Global Environmental Change. Elsevier
70. Landscape and Urban Planning. Elsevier

71. Geophysical Research Letters. Wiley
72. Journal of Geophysical Research - Earth Surface. Wiley
73. Computers, Environment and Urban Systems. ELSEVIER
74. Cartography and Geographic Information Science. Taylor & Francis Group
75. Transactions in GIS. Wiley
76. Computers & Geosciences. Elsevier