

ESE317 课程大纲

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课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	地理信息系统与遥感应用 Application of GIS & RS
2.	授课院系 Originating Department	环境科学与工程学院 School of Environmental Science and Engineering
3.	课程编号 Course Code	ESE317
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业核心课 Major Core Courses
6.	授课学期 Semester	秋季 Fall
7.	授课语言 Teaching Language	中文 Chinese
8.	授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	姜丽光，环境科学与工程学院, jianglg@sustech.edu.cn, 88010141 Liguang Jiang, School of Environmental Science and Engineering
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
	40	0	16		56
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 N/A				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	遥感原理 Principles of Remote Sensing				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 N/A				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

1. 牢固掌握：掌握地理信息系统的基本概念和空间数据的采集、处理与组织方法；熟练使用常用地理信息系统软件；掌握地理信息系统空间分析原理与应用方法；掌握遥感物理基础、遥感成像机理和影像解译原理；掌握遥感图像专题信息提取方法和遥感应用技术。具备综合应用地理信息系统技术和遥感技术从事资源、环境与地理分析的方法与技能；
2. 一般掌握：掌握地统计学原理与应用；掌握航空照片、多光谱遥感图像、热红外遥感图像、雷达图像和高光谱遥感图像等不同类型遥感图像解译方法，以及运用遥感图像进行环境科学研究方法与技能；
3. 一般了解：了解遥感技术进展和遥感图像计算机智能解译与定量遥感等先进技术在资源调查、环境监测与灾害评估等领域中的应用。

This course is designed for Hydrology, Environmental Engineering, and Geoscience students who seek to broaden their understanding of Geographic Information System (GIS) and Remote Sensing (RS) technologies. This course familiarizes students with the theory and application of GIS and RS technologies and trains students to fluently use common GIS and RS software. The GIS part of this course focuses on vector and raster data models, their relationship with databases, creating high-quality maps, spatial complex analysis, geodatabase, programming with Python, geoprocessing tools, and advanced multi-criteria analysis. The RS part of this course presents the technical and methodological skills needed to interpret various types of aerial images as a source of information in various applications, including geography, forestry, urban planning, crop and soil science, among many others. Exercises will utilize an extensive set of digital aerial images displaying a wide variety of environments (urban, rural, residential, agricultural) where students can practice the interpretation skills lectured in the course and apply them to decision-making across various disciplines.

16. 预达学习成果 Learning Outcomes

通过本课程的学习，学生系统掌握地理信息系统与遥感技术的理论框架，熟练使用 GIS 软件进行空间数据的构建、处理、分析与可视化，掌握常用的空间分析方法，理解电磁波谱与地物波谱特征理论，掌握遥感成像和影像增强原理，熟练应用遥感图像分类技术，具备综合应用 GIS 和 RS 进行水文与环境科学问题建模的能力。

After the course, students will be familiar with the basic theory of Geographic Information System (GIS) and Remote Sensing (RS). Students are able to use GIS software to create, process, analyze, and visualize geospatial data and to perform geospatial analysis with geo-processing tools. Students fully understand the fundamental theory of electromagnetic and earth object spectrum and have the ability to perform imagery classification and object extraction with RS software. Finally, students are able to resolve modeling problems associated with hydrology and environmental problems by integrated using of GIS and RS techniques.

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

序号 NO.	内容 Content	学时安排 Hours				学时汇总 Sub- total
		理论 Theoretic Teaching	实验 Experiment	实践 Exercise	上机操作 Computer Operation	
1	地理信息系统绪论 Introduction to GIS	3			0	3
2	空间坐标系与地图投影 Spatial Reference System and Map Projections	3			1	4
3	矢量数据模型与处理 Vector Data Model and Processing	3			1	4
4	矢量空间查询和空间分析 Spatial Query and Spatial Analysis	2			1	3
5	栅格数据模型与处理 Raster Data Model and Processing	3			1	4
6	栅格空间分析 Raster Data Analysis	3			2	5
7	GIS 数据获取 Acquisition of GIS data	2			1	3
8	数字河网提取 River network and watershed delineation	4			2	6
8	遥感绪论与电磁辐射 Introduction to Remote Sensing and Electromagnetic Radiation	5			1	6
9	遥感图像处理与融合 Image Processing and Fusion	4			2	6
10	遥感图像分类 Image Classification	4			2	6
12	GIS 与 RS 综合应用 Integrated Application of GIS and RS	4			2	6
Total		40			16	56

18. 教材及其它参考资料 Textbook and Supplementary Readings

1. 课程教材/Textbooks

[1] 普赖斯著. ArcGIS 地理信息系统教程 (第五版). 北京: 电子工业出版社, 2012

[2] Jensen, John R. (2006) Remote Sensing of the Environment: an Earth Resources Perspective, Hall and Prentice, New Jersey, 2nd ed.

2. 主要参考书目/References for Further Reading

[1] 张康聪著. 地理信息系统导论 (第 7 版). 北京: 电子工业出版社, 2014.

[2] 汤国安等编著. 地理信息系统. 北京: 科学出版社, 2010.

[3] Jones, H. G and Vaughan, R. A. (2010) Remote Sensing of Vegetation, OUP, Oxford.

[4] Lillesand, T., Kiefer, R. and Chipman, J. (2004) Remote Sensing and Image Interpretation. John Wiley and Sons, NY, 5th ed.

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance	1-16	5%		
课堂表现 Class Performance	1-16	5%		
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments	1-16	40%		
期中考试 Mid-Term Test				
期末考试 Final Exam	2hours	50%		
期末报告 Final Presentation				
其它 (可根据需要 改写以上评估方式) Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

- A. 十三级等级制 Letter Grading
- B. 二级记分制 (通过/不通过) Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
This Course has been approved by the following person or committee of authority

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5.	课程类别 Course Type	专业选修课 Major Elective Courses
6.	授课学期 Semester	秋季 Fall
7.	授课语言 Teaching Language	中文 Chinese
8.	授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	田勇，环境科学与工程学院, tiany@sustech.edu.cn, 88010816 Yong Tian, School of Environmental Science and Engineering
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
	38	0	16		54
学时数 Credit Hours					
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	先选/Co-requisites: 计算机程序设计基础 Introduction to Computer Programming , 地球科学概论/Introduction to Earth Sciences				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	遥感原理 Principles of Remote Sensing				
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2. 一般掌握：掌握地统计学原理与应用；掌握航空照片、多光谱遥感图像、热红外遥感图像、雷达图像和高光谱遥感图像等不同类型遥感图像解译方法，以及运用遥感图像进行环境科学研究方法与技能；
3. 一般了解：了解地理信息系统的二次开发方法。了解遥感技术进展和遥感图像计算机智能解译与定量遥感等先进技术在资源调查、环境监测与灾害评估等领域中的应用。

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3	矢量数据模型与处理 Vector Data Model and Processing	2			1	3
4	空间查询和空间分析 Spatial Query and Spatial Analysis	2			1	3
5	栅格数据模型与处理 Raster Data Model and Processing	2			1	3
6	二维与三维空间数据分析与制图 2D-3D Spatial Data Analysis and Map Production	4			2	6
7	空间地统计学与应用 Geostatistics and Application	2			1	3
8	遥感绪论与电磁辐射 Introduction to Remote Sensing and Electromagnetic Radiation	5			1	6
9	遥感图像处理与融合 Image Processing and Fusion	4			2	6
10	遥感图像分类 Image Classification	4			2	6
11	超光谱图像分析与应用 Hyperspectral Analysis and Application 超光谱图像分析应用	4			2	6
12	GIS 与 RS 综合应用 Integrated Application of GIS and RS	4			2	6
Total		38			16	54

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其它 (可根据需要 改写以上评估方式) Others (The above may be modified as necessary)				

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