南方科技大学 SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

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**	地球与空间科学导论 Introduction to Earth and Space Sciences
2.	**授课院系 Originating Department**	地球与空间科学系 Department of Earth and Space Sciences
3.	**课程编号 Course Code**	ESS201
4.	**课程学分 Credit Value**	3
5.	**课程类别 Course Type**	专业基础课 Major Foundational Courses
6.	**授课学期 Semester**	春季 Spring / 秋季 Fall
7.	**授课语言 Teaching Language**	中英双语 English & 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）**	景志成，地球与空间科学系 邮箱：jingzc@sustech.edu.cn 电话：0755-88018831 办公室：创园 9 栋 406A Zhicheng Jing, Department of Earth and Space Sciences Email: jingzc@sustech.edu.cn Phone: 0755-88018831 Office: 9-406A Innovation Park
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
学时数 Credit Hours	48				48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	
14. 其它要求修读本课程的学系 Cross-listing Dept.	

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程介绍地球物理学、空间物理学和行星科学的基本原理、研究方法和应用，使学生了解地球与空间科学的基本概念，为进一步深入学习及从事地球与空间科学研究工作奠定良好的基础。

This course introduces fundamental principles, methods, and applications of geophysics, space physics, and planetary science. This course will help students understand the basic concepts of Earth and space sciences, providing the basics for further studies and research in Earth and space sciences.

16. 预达学习成果 Learning Outcomes

学生完成本课程后，将会：

1. 熟悉地球、空间和行星科学的基本概念和基本过程；
2. 掌握关于地球内部、地球空间及太阳系其他行星的结构、组成、演化和运行方式等方面的基本知识；
3. 了解地球物理、空间物理和行星科学的研究方法和研究方向；
4. 提高对于科学研究过程的理解。

Upon completion of the course, students will:

1. gain familiarity with fundamental concepts and processes as applied to Earth, space, and planetary sciences;
2. master the basic knowledge of the structure, composition, evolution, and dynamics of the Earth’s interior, the Earth’s space, and other Solar System planets;
3. get to know the research methods and research directions in geophysics, space physics, and planetary science;
4. improve understanding of the scientific research processes.

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.)

第一章：引言（2 学时）
课程内容、目标和评估方法简介，地球、空间和行星科学简介

第二章：太阳系行星简介 （4 学时）
行星的探测方法和基本性质，行星体的分类，太阳系行星性质简介

第三章：宇宙和太阳系的起源和物质组成 （4 学时）
宇宙的起源和元素的合成，太阳系的形成，组成行星的元素、矿物和岩石

第四章：地震、地震学和地球内部结构 （6 学时）
地震和断层，地震波的传播，地球的内部结构，地球内部各圈层的化学成分和矿物组成

第五章：地球的重力和空间大地测量（4 学时）
地球的重力场，地球的形状，重力场的观测和空间大地测量，重力均衡和重力异常

第六章：地球的化学分异和演化 （4 学时）
地球的化学分异，地幔的熔融，地壳和地核的形成

期中考试（2 学时）

第七章：地球的内部运动 （6 学时）
地球内部的生热和地球年龄，热传递和地幔对流，板块构造

第八章：地球和行星的大气和磁场 （6 学时）
地球的磁场，地磁场起源和变化，地球和行星的大气和磁层，太阳风和极光

第九章：自然灾害 （2 学时）
地震、滑坡和火山等自然灾害

第十章：地球物理勘探 （4 学时）
地震勘探，电法、磁法和重力勘探

第十一章：系外行星和可宜居行星 （2 学时）
系外行星的主要探测手段和目前进展；适合生命居住的条件。

学期论文口头报告 （2 学时）

Chapter 1: Introduction (2 hours)
Introduction to the course contents, goals, assessment; introduction to Earth, space, and planetary sciences

Chapter 2: Introduction to the Solar System planets (4 hours)
Exploration and basic properties of the planets; classification of planetary bodies; introduction to the properties of the Solar System planets

Chapter 3: Formation of the universe and the Solar System and their constituting materials (4 hours)
Origin of the universe and synthesis of elements; formation of the Solar System; elements, minerals, and rocks as constituting materials of planets

Chapter 4: Earthquakes, seismology, and the internal structure of Earth (6 hours)
Earthquakes and faults; propagation of seismic waves; the internal structure of Earth; the chemical composition and mineralogy of the internal layers of Earth

Chapter 5: Earth's gravity and geodesy (4 hours)
Earth's gravity field; shape of Earth; observation of the gravity field and geodesy; isostacy and gravity anomalies

Chapter 6: Chemical differentiation and evolution of Earth (4 hours)
The chemical differentiation of Earth; melting of mantle; crust and core formation

Mid-term exam (2 hours)

Chapter 7: The internal dynamics of Earth (6 hours)
Internal hear production of Earth; heat transfer and mantle convection, plate tectonics

Chapter 8: The atmosphere and magnetic field of Earth and planets (6 hours)
The Earth's magnetic field; the origin and variation of the geomagnetic field; the atmosphere and magnetosphere of Earth and planets; solar wind and aurora

Chapter 9: Natural hazards (2 hours)
Natural hazards due to earthquakes, landslide, and volcanoes

Chapter 10: Geophysical exploration (4 hours)
Seismic exploration; electrical prospecting, magnetic prospecting, and gravity exploration

Chapter 11: Extra-solar planets and habitable planets (2 hours)
Basic techniques and current progresses for extra-solar planets detection; conditions for a planet to be habitable

Oral presentations for the term paper (2 hours)

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

1. An Introduction to the Solar System, revised edition, Rothery et al., Cambridge University Press, 2011.
2. Fundamentals of Geophysics, 2nd edition, W. Lowrie, Cambridge University Press, 2007.
3. Fundamental Planetary Sciences: Physics, Chemistry and Habitability, I. de Pater and J.J. Lissauer, Cambridge University Press, 2013

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		5		
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects		20		
平时作业 Assignments		25		
期中考试 Mid-Term Test		25		
期末考试 Final Exam		25		
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