

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	地质学原理 Principles of Geology
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	ESS102
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业核心课 Major Core Course
6.	授课学期 Semester	春季 Spring
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)	陈斌, 地球与空间科学系 邮箱: chenb6@sustech.edu.cn 电话: 0755-88015516 办公室: 创园 9 栋 407 Bin Chen, Department of Earth and Space Sciences Email: chenb6@sustech.edu.cn Tel: 0755-88015516 Office: Innovation Park #9-407
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

本课程主要介绍地质学基本概念和基本理论，各种地质作用的特征、过程和地球动力学机制，地球圈层结构的形成和演化，以及对理解地外行星的起源和演化的意义。

This course introduces the basic concepts and theories of Geology; the characteristics, processes and dynamics of different geological activities; the formation and evolution of the Earth's sphere structures, and implications for understanding the origin and evolution of extraterrestrial planets.

16. 预达学习成果 Learning Outcomes

学生完成本课程后，将会掌握以下知识：

1. 地球圈层结构的基本特征、圈层相互作用和演化、地质年代学；
2. 岩浆作用起源、岩浆房过程和相关地球动力学环境；
3. 大陆风化作用、沉积作用的特征和过程、沉积环境；
4. 构造运动的性质、构造行迹和成因，全球大地构造；
5. 俯冲带过程、变质作用和造山带的形成演化；
6. 矿产资源的形成、分布及其与壳幔相互作用的关系；
7. 通过比较行星学方法，理解地外行星的地貌特征、行星起源和演化。

Upon completing the course, students will be able to:

1. Essential features of the Earth's sphere structures, interaction and evolution of spheres, and geochronology;
2. Magma generation, magma chamber processes, and associated geodynamic settings;
3. Continental weathering, sedimentation and sedimentary settings;
4. Characteristics, patterns, and formation mechanism of structural activities; global tectonics;
5. Subduction zone processes, metamorphism, and formation/evolution of orogenic belts;
6. Formation and distribution of ore deposits, and relationship with mantle-crustal

interaction;

7. To understand the surface characteristics, origin and evolution of extraterrestrial planets through comparative planetary studies.

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 地质学简介（2 学时）

地质学发展简史，地质学主要研究内容和应用，地质学主要学科分支；

第二章 地球的结构和组成（2 学时）

地球的圈层结构和组成；火成岩的分类、结构构造和成分；

第三章 沉积岩和大陆风化作用（6 学时）

沉积岩的分类；沉积作用的过程、条件和沉积相分析；大陆风化作用的类型、特征；

第四章 岩浆作用起源和构造背景（6 学时）

幔源和壳源岩浆作用的形成条件、岩浆的运移和岩浆房演化，岩浆作用的地球动力学背景；

第五章 全球大地构造和构造作用（16 学时）

板块构造的起源和发展，地幔柱构造的形成和演化，巨型构造带的形成与地球动力学关系；不同地壳层次构造行迹的特征和成因，包括中浅层次地壳的脆性和脆-韧性断裂/褶皱、中深层次地壳的韧性变形和流变特征等；破裂和变形力学机制分析；

第六章 变质作用和造山带演化（4 学时）

变质作用和变质相系的类型、分布，变质作用 P-T-t 轨迹，变质作用与造山带演化的关系；

第七章 成矿作用（4 学时）

主要金属和非金属矿床的类型、分布、成矿机理，成矿作用与构造-岩浆-水热体系的形成和演化的关系；

第八章 石油地质学（4 学时）

石油地质的基本原理、研究方法和油气藏勘探；

第九章 行星地质学（4 学时）

太阳系行星表面地貌学，行星表面风化作用（物理风化和化学风化），太空风化和行星质量损耗过程（太阳辐射、微陨石撞击），行星构造及其对行星表面地貌的改造，陨石冲击作用的机制和影响，以及同位素地球化学对研究行星的形成和演化的意义；

Chapter 1 A brief introduction to Geology (2 hours)

A brief history of the development of Geology, contents and application of Geology, main branches of Geology;

Chapter 2 Sphere structures and compositions of the Earth (2 hours)

Earth's sphere structures and compositions, igneous rock types and their constituent minerals, textures and chemical compositions;

Chapter 3 Sedimentary rocks and continental weathering (6 hours)

Classification of sedimentary rocks; sedimentary processes and conditions, sedimentary phase analyses; types and characteristics of continental weathering,

Chapter 4 Magmatism and tectonic settings (6 hours)

Mantle-derived and crustal melts and their petrogenesis, magma ascent and magma chamber progresses, tectonic settings of magma generation;

Chapter 5 Global tectonics and structural geology (16 hours)

The development of plate tectonics theories, formation and evolution of mantle plume tectonics, relationship between the formation of the giant global orogenic belts and geodynamics, characteristics and formation mechanisms of different structural patterns of different crustal levels, including the mid- to upper-crustal brittle and brittle-ductile faulting/folding and lower-crustal ductile- and rheological properties; mechanics of fracturing and deformation.

Chapter 6 Metamorphism and evolution of orogenic belts (4 hours)

Types and distribution of metamorphism/metamorphic phases, P-T-t paths of metamorphic processes, metamorphism and evolution of orogenic belts;

Chapter 7 Ore-forming processes (4 hours)

Mineralization types, distribution and ore-forming mechanisms of main metal and non-metal deposits, relationship between ore-formation process and tectonic-magma-hydrothermal system;

Chapter 8 Petroleum Geology (4 hours)

Fundamentals of Petroleum Geology, main research methods of Petroleum Geology, and exploration of oil and gas;

Chapter 9 Planetary Geology (4 hours)

Surface-shaping of solar-system bodies (rocky planets, icy satellite, asteroids, and comets), space weathering (physical and chemical weathering) and relationship with mass loss of planets, planetary tectonics and tectonic geomorphology, cratering as a geological process, application of isotope geochemistry in planetary sciences;

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

1. Myron G. Best. *Igneous and Metamorphic Petrology* (Second Edition). Blackwell, 2003.
2. “地质学基础”，杨坤光、袁晏明主编，2009，中国地质大学出版社。
3. “构造地质学”，李忠权、刘顺主编，2010，地质出版社，ISBN 9787116064966。

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		5		
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam		90		
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