

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	计算海洋学基础 Introduction to Computational Oceanography				
2.	授课院系 Originating Department	海洋科学与工程系 Department of Ocean Science and Engineering				
3.	课程编号 Course Code	OCE304				
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				
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)	郭震 海洋科学与工程系 创园 9 栋 403, 0755-88018621 Dr. Zhen Guo, Department of Ocean Sciences and Engineering Chuang Yuan 9-403, 0755-88018621				
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	李世林 海洋科学与工程系 创园 9 栋 403, 151-2005-2755 Shilin Li, Department of Ocean Sciences and Engineering Chuang Yuan 9-403, 151-2005-2755				
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	CS102B 计算机程序设计基础 Basis of Computer Programming B
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**

海洋科学是一门观测和理论并重的交叉学科，涉及到不同子学科的数据处理和理论计算，需要学生掌握不同的计算方法和手段。本课程旨在以实践和理论相结合的方式，使学生熟练掌握相关计算方法和软件应用。

Introduction to Computational Oceanography will introduce various methods of numerical simulation and data processing in oceanography and provide students with practical trainings on widely-used software.

16. 预达学习成果 **Learning Outcomes**

本课程将培养学生利用数学手段解决与海洋地球科学相关科学问题的能力，激发学生对于海洋地球科学的兴趣与热情。

It is also designed to cultivate students' ability and enthusiasm to solve problems in Oceanography using mathematical concepts.

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.)

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| 1. Introduction (3 hours) | |
| 课程简介，介绍数值发展历史，研究进展 | (3 学时) |
| 2. Data extraction (3 hours) | |
| 海洋数据提取 | (3 学时) |
| 3. Data processing (3 hours) | |
| 海洋数据处理 | (3 学时) |
| 4. Finite difference (3 hours) | |
| 数值方法原理介绍-有限差分 | (3 学时) |
| 5. Finite element (3 hours) | |
| 数值方法原理介绍-有限元 | (3 学时) |
| 6. Spectral element (3 hours) | |
| 数值方法原理介绍-谱元法 | (3 学时) |
| 7. The seismic wave equation (1) (3 hours) | |

三维波动方程导出 I (3 学时)

8. The seismic wave equation (2) (3 hours)

三维波动方程导出 II (3 学时)

9. Solving 3-D seismic wave equation in Cartesian coordinate (3 hours)

三维波动方程求解 I (3 学时)

10. Solving 3-D seismic wave in equation Spherical coordinate (3 hours)

三维波动方程在球坐标系下的求解 (3 学时)

11. Solving 2-D acoustic wave equation using finite difference (1) (3 hours)

有限差分求解二维声波传播方程 I (3 学时)

12. Solving 2-D acoustic wave equation using finite difference (2) (3 hours)

有限差分求解二维声波传播方程 II (3 学时)

13. Generalized linear inversion (3 hours)

广义线性反演理论介绍 (3 学时)

14. Non-linear inversion (3 hours)

非线性反演理论介绍 (3 学时)

15. Travel-time inversion (1) (3 hours)

走时数据反演 I (3 学时)

16. Travel-time inversion (2) (3 hours)

走时数据反演 II (3 学时)

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

Kennett, B. L. N., The Seismic wavefield, Cambridge University Press, NY, USA (ISBN: 0-521-00663-5), 2001.

Telford, W. M., L. P. Geldart, and P. E. Sheriff, Applied Geophysics Second Edition, Cambridge University Press, NY, USA (ISBN: 0-521-33938-3), 1990.

Dahlen, F. A. and J. Tromp, Theoretical Global Seismology, Princeton University Press, New Jersey, USA (ISBN: 0-691-00116-2), 1998.

Lay, T. and T. Wallac, Introduction to Global Seismology

万永革, 地震学导论

万永革, 数字信号处理的 matlab 实现

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				
课堂表现 Class Performance		10%		
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments				
期中考试 Mid-Term Test		20%		
期末考试 Final Exam				
期末报告 Final Presentation		70%		
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

<input checked="" type="checkbox"/> A. 十三级等级制 Letter Grading <input type="checkbox"/> 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

海洋科学与工程系本科教学委员会 Department of Ocean Science and Engineering Undergraduate Committee
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