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	微生物海洋学野外实习 Field Trip of Microbial 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	OCE475
4.	课程学分 Credit Value	2
5.	课程类别 Course Type	专业选修课 Major Elective Courses
6.	授课学期 Semester	夏季 Summer
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）	侯圣伟 海洋科学与工程系 工学院南楼 407 0755-88010164 Prof. Shengwei Hou Department of Ocean Sciences and Engineering Room 407, College of Engineering 0755-88010164
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	郭静 海洋科学与工程系 工学院南楼 447 0755-88018796 Ms. Jing Guo Department of Ocean Sciences and Engineering Room 447, College of Engineering 0755-88018796
10.	选课人数限额(可不填) Maximum Enrolment（Optional）	30

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			64		64

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	OCE308 微生物海洋学 Microbial Oceanography
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

南方科技大学海洋科学与工程系致力于推动海洋多学科交叉融合，不断开拓跨学科研究新局面，为国家培养复合型海洋人才。野外实习是海洋科学教学中必不可少的环节，对培养学生积极探索精神和认真负责的态度具有重要意义。

河口及毗邻海域作为海陆交互最为活跃的区域，是碳氮硫磷等生物地球化学元素循环较为活跃的区域。海洋微生物占海洋生物总量的 90%以上，是海洋碳氮循环的主要驱动者，也是海洋生态系统平衡的最主要维持者。本次实习将让同学们走出课堂，在野外体验海洋微生物的多样性，旨在通过实践加深对专业知识的理解，培养对海洋科学的兴趣，学会使用不同采样工具进行野外样品的采集，理化参数的测定，微生物物种鉴定及丰度分析等实验技能。我们将以粤港澳大湾区两个典型河口边缘海环境（珠海市万山岛和惠州市三门岛）为例，在实践中培养学生的科研热情和动手能力，提高海洋微生物学领域的研究水平。

The Department of Ocean Science and Engineering of Southern University of Science and Technology is committed to promoting the cross-integration of marine multi-disciplines, constantly opening up new prospects for interdisciplinary research, and cultivating compound marine talents for the country. Field trip is an indispensable link in marine science teaching, and it is of great significance for cultivating students' active exploration spirit and serious and responsible attitude.

Estuaries and adjacent sea areas are the most active areas of sea-land interaction and are areas where biogeochemical element cycles such as carbon, nitrogen, sulphur, and phosphorus are very active. Marine microorganisms account for more than 90% of the total marine organisms. They are the main drivers of the marine carbon and nitrogen cycle and the main maintainer of the balance of the marine ecosystem. This field trip will allow students to go out of the classroom and experience the diversity of marine microorganisms in the sea. It aims to deepen their understanding of professional knowledge through practice and learn to use different sampling tools to collect field samples, determine physical and chemical parameters, identify microbial species and analyse abundance. We will take samples from one of the two typical estuarine marginal sea environments (Wanshan Island or Sanmen Island) to cultivate students' scientific research enthusiasm and practical ability in practice, and contribute to improving the research level in the field of microbial oceanography .

16. 预达学习成果 Learning Outcomes

通过本次实习，使学生具备下列基本技能：

1、学会野外采样记录，掌握先进海洋调查仪器的工作原理和操作流程，进行边缘海海水样环境参数测定，学会野外样品采集工作的基本步骤、程序和方法，以便能独立地进行野外样品采集工作；

2、了解如何使用无人机飞行器进行远程海水样品采集海洋调查，学会无人机阵列高密度平面样品观测与样品采集；

3、学会边缘海环境样品 DNA 提取、扩增和纯化，利用分子生物学手段分析海洋水体和沉积物微生物群落；

4、掌握解决实际环境问题的能力，学会实验数据的整理并运用相关理论知识进行分析处理，撰写实习报告；

5、系统掌握海洋微生物资源分离与培养研究。

1. Learn to record the field sample, master the operation process of advanced marine survey instruments, measure the physical and chemical parameters of seawater samples in the marginal sea, and learn the basic steps, procedures and methods of field sampling, so as to be able to independently sample in the field;

2. Understand how to use unmanned aerial vehicles for seawater sample collection during the marine surveys, and learn to continuously observe and collect samples of circadian rhythms in short time scales of unmanned aerial vehicles;

3. Learn DNA extraction, amplification and purification of environmental samples from marginal seas, and use high-throughput data to analyze microbial communities in sea water and sediments;

4. Master the ability to solve practical environmental problems, learn to organize experimental data and use relevant theoretical knowledge for analysis and processing, and write internship reports;

5. Systematically master the research on separation and cultivation of marine microbial resources.

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.)

第一天：出发前在南科大实验室：学习边缘海区域与微生物海洋学相关的知识，实习期间的注意事项、具体安排，进行野外实验的准备工作。（8 学时）

Day 1: Before the departure, at Room 447, College of Engineering of SUSTech: Learning the knowledge related to microbial oceanography in the marginal sea area, the precautions and arrangements during the field trip, and the preparation for field experiments. (8 credit hours)

第二天：从深圳出发抵达珠海万山岛/惠州三门岛，住宿万山岛/三门岛，熟悉实习总体路线、强调注意事项，分配小组，整理分配实习所需野外物资。(8 学时)

Day 2: Departure from Shenzhen to Zhuhai Wanshan Island/Huizhou Sanmen Island and stay in Wanshan/Sanmen Island. Getting students familiar with the general route of the field trip, emphasizing the precautions during the trip, assigning groups and distributing sampling materials. (8 credit hours)

第三-五天：上午，无人机万山岛/三门岛近海试飞，野外采样物资拆包整理，讲解无人机样品采集海洋样品规范及方法，采样预演，理顺协同合作机制。下午开始连续 24 小时作业，队员编组，分三班轮流值班。利用无人机现场采取调查数据。采集海水样品及现场测定相关参数；主要包括温度、pH、电导率、盐度、悬浮物、密度和溶氧等水化学方面的数据现场测定；（实践掌握近海海洋科考的基本技能，学习海洋化学与海洋生物的基本知识）。早 7 点和晚 8 点进行人员清点、情况汇报。(72 学时)

Day 3-5: In the morning, the drone flew in the offshore ocean of Wanshan/Sanmen Island, the field sampling materials were unpacked and sorted, the specifications and methods of collecting marine samples by drone samples were explained, the sampling rehearsal, and the coordination and cooperation mechanism were rationalized. Starting in the afternoon for 24 hours of continuous work, the team members are grouped and on duty in three shifts. Utilize drone site survey data. Collect seawater samples and measure relevant parameters, such as temperature, pH, conductivity, salinity, suspended solids, density and dissolved oxygen; (Mastering the basic skills of marine scientific research, learn the basic knowledge of marine chemistry and marine biology). 7:00 a.m. and 8:00 p.m. for personnel inventory and situation reporting. (72 credit hours)

第六天：上午潮间带样品采集，下午打包采样物资。 (16 学时)。

Day 6: Intertidal sample collection in the morning, packing samples in the afternoon. (16 credit hours)

第七天：上午出发，参观学习中国水产科学研究院南海水产研究所深圳试验基地，下午参观大鹏国家基因库。(8 学时)

Day 7: Visit the Shenzhen Experimental Base of the South China Sea Fisheries Research Institute of the Chinese Academy of Fishery Sciences, and National Gene Bank. (8 credit hours)

第八天：返回深圳，整理野外样品与物资，样品进行入库登记，保存。(8 学时)

Day 8: Package and return to Shenzhen by bus. Organize the field samples and materials, and samples are stored. (8 credit hours)

第九天：海水分离与培养的培养基配制，样品的处理与分离培养实验。(8 学时)

Day 9: Preparation of medium culture, screening the marine microorganisms. (8 credit hours)

第十天 海水样品 DNA 提取实验。(8 学时)

Day 10: DNA extraction from sea water samples. (8 credit hours)

第十一天：利用定量-PCR（qPCR）技术测定海水中细菌、古菌和藻类丰度。。(8 学时)

Day 11: The abundance of bacteria, archaea and algae in seawater was determined by qPCR. (8 credit hours)

第十二天：筛选菌种基因测序。(8 学时)

Day 12: Sequencing of 16S rRNA gene from purified strain. (8 credit hours)

第十三天：生物信息入门与实验数据分析整理 (8 学时)

Day 13: Introduction to bioinformatics and analysis of experimental data. (8 credit hours)

第十四天：如何撰写实验报告撰写 (8 学时)

Day 14: Write a lab report

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

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		0		
课堂表现 Class Performance		0		
小测验 Quiz		0		
课程项目 Projects		0		
平时作业 Assignments		0		
期中考试 Mid-Term Test		0		
期末考试		0		

Final Exam				
期末报告 Final Presentation		100		
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

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