

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	海洋工程监测技术 Monitoring Technology of Ocean Engineering				
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	OCE320				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业选修课 Major Elective Course				
6.	授课学期 Semester	秋季 Fall				
7.	授课语言 Teaching Language	中英双语 Chinese & English				
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)	冯伟强 海洋科学与工程系 创园 9 栋 611 室, 13715146273 Dr Wei-Qiang FENG, Department of Ocean Sciences and Engineering 9 th Chuang Yuan, 611 room, 13715146273				
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact					
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	48				48

Credit Hours

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

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

通过本课程的教学，使学生对海洋工程监测技术有一个基本了解，对各类测试技术及其功能有一全面了解,培养学生掌握传感器使用与布置的基本原则和基本方法,使其初步具有传感器总体布置和监测数据分析的能力。

Through the attending this course, students will develop a basic understanding of monitoring technology of ocean engineering. It makes the students master the basic principles and methods of sensor application and layout and cultivate the ability of arranging sensing network and analyzing measured data and lays the preliminary foundation for students engaging in engineering investigation and construction.

16. **预达学习成果 Learning Outcomes**

通过本课程的学习，(1) 了解必要的各类测试技术的基本原理、基本方法及其在工程中的应用；(2) 掌握对海底管线、海洋基础设施在施工或服役过程中的监测技术、传感器选型及布设、数据采集技术、数据分析等内容；(3) 提高学生动手能力和综合思维能力，增加试验技能，培养学生遵守规范的习惯。

By taking this course, there are three main objectives: (1) to understand the basic principles, basic methods and applications of various necessary testing technologies; (2) to master the monitoring technology of submarine pipelines, marine infrastructure, etc. during construction or service, sensor selection and layout, data collection technology, data analysis, etc.; (3) to improve students hands-on ability and critical thinking ability, increase experimental skills, and cultivate students' habit of complying with the norms.

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.)

Section 1 监测技术的基础知识（2 学时）

监测技术的意义、内容以及发展现状；监测系统的组成；监测系统的静态传递特性；误差与数据处理

Introduction of testing technology (2 hours)

Significance and development of the monitoring technology in ocean engineering; the components of the monitoring system; the characteristics of the monitoring system; error and data processing

Section 2 常用传感器类型及使用方法 (2 学时)

认识各类常用传感器类型及特点；掌握电阻式应变片、土压力盒、孔隙水压力计、光纤光栅应变温度传感器、钢弦式钢筋应变计的操作步骤及数据采集方法

Types and methods of common sensors (2 hours)

Recognize the types and characteristics of various commonly used sensors; master the operation steps and data collection methods of resistive strain gauges, earth pressure cells, pore water pressure gauges, fiber grating strain temperature sensors, steel string reinforced steel strain gauges.

Section 3 海洋工程环境及监测标准 (4 学时)

介绍基于海洋的环境下，监测的目的、内容、方法及仪器选型

Ocean engineering environment and monitoring standards (4 hours)

Introduce the purpose, content, method and instrument selection of monitoring in an ocean-based environment

Section 4 海洋岩土工程 (4 学时)

海洋土区域特征，海洋浅基础，海洋桩基础，系泊基础等力学特点

Marine geotechnical engineering (4 hours)

Characteristics of regional marine soil, Mechanical characteristics of shallow marine foundations, marine pile foundations, mooring foundations, etc.

Section 4 海底建筑物、管道和缆线监测技术 (6 学时)

海底建筑物、管道和缆线监测的目的、内容、方法及仪器选型；监测数据处理

Monitoring technology in submarine building, pipeline and cable (6 hours)

Objectives, content, methods and instrument selections of submarine building, pipeline and cable monitoring; the analysis of monitoring data

Section 6 室内模拟实验 (6 学时)

测斜仪、孔隙水压力计、地下水位计、静力水准仪的模拟实验操作步骤及方法

The monitoring technology in model experiment (6 hours)

The operation principles and steps of inclinometer, pore water pressure transducers, groundwater level gauge, etc.

Section 7 海洋地基土监测技术 (2 学时)

Marine Soil-based monitoring technology (2 hours)

Section 8 海上风电桩基测试与监测技术 (2 学时)

桩基静力测试技术、基桩动力测试技术、管桩静动力测试工程实例

Offshore wind power pile testing technology (2 hours)

Static monitoring technology of offshore wind power pile foundation, dynamic monitoring technology of offshore wind power pile foundation, pipe pile static and dynamic testing examples

Section 9 隧道施工监测技术 (4 学时)

地下隧道新奥法施工监测；岩体隧道施工监测

Tunnel Construction Monitoring Technology (4 hours)

New Austrian tunneling construction monitoring of underground tunnel; Rock tunnel construction monitoring

Section 10 地铁隧道施工监测技术 (4 学时)

盾构隧道监测内容；盾构隧道监测方案及监测点布置

Metro Tunnel Construction Monitoring Technology (4 hours)

Shield tunnel monitoring content; shield tunnel monitoring scheme and layout of monitoring points.

Section 11 无损检测及声发射技术 (2 学时)

无损检测技术基本理论；超声波发射技术原理及应用

Nondestructive testing and acoustic emission technology (2 hours)

Basic theory of nondestructive testing technology; principle and application of ultrasonic transmission technology

Section 12 典型传感技术在实际工程中的案例分析 (2 学时)

Case analysis of various types of sensing technology in ocean engineering (2 hours)

Section 13 课程展示与讨论 (8 学时)

学生将自主选择题目，进行研究、展示与课堂讨论。

In-class presentation and debate: (8 hours)

Students will conduct research on a topic of their choice, produce a written report, and present their findings in the class.

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

教材:

1. 任建喜、年廷凯、赵毅. 岩土工程测试技术. 武汉理工大学出版社, 2014 年.

参考资料:

2. 宰金珉《岩土工程测试与监测技术》中国建筑工业出版社, 2008 年.
3. 王保田《土工测试技术》, 河海大学出版社, 2000 年.
4. 《岩土工程勘察规范》GB 50021-2001, 中国建筑工业出版社, 2002 年.
5. 龚晓南.《海洋土木工程概论》, 中国建筑工业出版社.
6. 李治彬.《海洋工程结构》, 哈尔滨工程大学出版社.

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		10		
课堂表现 Class Performance				
小测验 Quiz		5		
课程项目 Projects		60		
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		25		
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

