

## 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.	<b>课程名称 Course Title</b>	水动力实验 Hydrodynamics Lab
2.	<b>授课院系 Originating Department</b>	海洋科学与工程系 Department of Ocean Science and Engineering
3.	<b>课程编号 Course Code</b>	OCE328
4.	<b>课程学分 Credit Value</b>	1
5.	<b>课程类别 Course Type</b>	专业核心课 Major Core Courses
6.	<b>授课学期 Semester</b>	春季 Spring
7.	<b>授课语言 Teaching Language</b>	英语 English
8.	<b>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 &amp; Contact (For team teaching, please list all instructors)</b>	冯兴亚 海洋科学与工程系 工学院 Feng, Xingya; Department of Ocean Sciences and Engineering College of Engineering
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	待公布 To be announced
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	

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			32		32
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

本课程使学生能够

- ✓ 熟悉流体力学实验的基本知识与操作；
- ✓ 通过实际的实验操作增强学生对流体力学知识的理解；
- ✓ 掌握量测基本水力要素（水位、流速、流量、压强等）的方法；
- ✓ 通过造波水槽试验加强对于波浪基本要素的理解和波浪特性的测量方法掌握。

This course shall equip the students with basic concepts and fundamentals of fluid mechanics and hydrodynamics. The course is

- ✓ To familiarize students with fundamentals of fluid mechanics experiments;
- ✓ To improve the understanding of fluid mechanics knowledge through practical lab experiments;
- ✓ To train students to practice hands-on fundamental hydraulic experiments, and elements of fluids (head, velocity, flow rate, pressure and so on);
- ✓ To provide students with experience of making waves in a wave tank, and to understand the waves and wave properties and methods for measuring wave properties.

#### 16. 预达学习成果 Learning Outcomes

通过本课程的学习，学生将掌握以下内容：认识到实验研究对流体力学的重要性；理解并有能力独立操作基本水力学实验和造波试验；有能力独立处理和分析实验数据、以及撰写实验报告；。

Upon completion of this course, students will obtain the following knowledge and skills: Appreciate the importance of lab experiments to fluid mechanics; Demonstrate the understanding and ability to operate fundamental hydraulic experiments and use the wave flume to generate waves; Ability to process and analyze experimental data, and write up lab reports independently.

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.)**

本课程以英文授课为主，以中文为辅助解释，帮助学生理解。

**Section 1 课程介绍：（2 学时）**

实验课程目的、涵盖内容及其实验装置介绍

Introduction: the purpose, contents and experiment equipments of fluid mechanics and hydrodynamics; (2 hours)

**Section 2 流体力学和水动力学实验基本原理回顾：（2 学时）**

流速、流量、压强测量；伯努利方程；雷诺实验；水波基本波浪要素；相似原理

Fundamentals of experiments for fluid mechanics and hydrodynamics: velocity, flow rate, pressure; Bernoulli equation; Reynolds experiments; wave theory; wave properties; Similitude (2 hours)

**Section 3 实验装置工作原理：（2 学时）**

流体力学多功能实验台；造波水槽。

Introduction to experiment equipments: multi-function experiment platform; wave flume. (2 hours)

**Section 4 流体力学实验演示：（2 学时）**

基本流体实验演示。

Demonstration: basic fluid mechanics experiments. (2 hours)

**Section 5 水动力学实验演示：（2 学时）**

造波水槽造波、波高仪校准、波高测量、动水压力测量。

Demonstration: hydrodynamics: wave making in the flume, calibration of wave gauges, wave elevation measurement, dynamic pressure measurement. (2 hours)

**Section 6 流体力学基本实验 1：（2 学时）**

静水压强；孔板流量实验；水头损失。

Fundamental Fluid Mechanics Practice 1: Hydrostatic pressure; Flow rate meter; Head loss. (4 hours)

**Section 7 流体力学基本实验 2：（2 学时）**

恒定总流伯努利方程综合性实验。

Fundamental Fluid Mechanics Practice 2: Bernoulli equation for steady flows. (2 hours)

Section 8 文丘里综合型实验: (2 学时)

连续性方程, 压差计原理

Venturi meter: Continuity equation. (2hours)

Section 9 动量定律实验: (2 学时)

恒定流动量方程验证

Momentum conservation: Momentum equation. (2 hours)

Section 10 造波试验设计和造波水槽操作 (2 学时)

Design and Practice: Design of wave-making experiments, and hands-on of wave flume

Section 11 水槽规则波试验 (4 学时)

浪高仪使用和校准, 规则波特性、造波原理、消波和反射

Regular waves in the wave flume: wave gauge calibration, wave properties, wave generation, wave absorption, wave reflection. (4 hours)

Section 12 水槽非规则波试验 (2 学时)

波浪谱, 谱分析原理, 傅里叶变换

Irregular waves in the wave flume: wave spectrum, spectral analysis, Fourier transform. (2 hours)

Section 13 动水压强试验 (2 学时)

Wave dynamic pressure: distribution and magnitude. (2 hours)

Section 14 波浪实验数据处理方法: (4 学时)

规则波、非规则波参数, 傅里叶变换, 谱分析方法, 水槽传递函数, 反射系数。

Wave data process: Parameters for regular and irregular waves, Fourier transform, Spectral analysis, transfer function, wave flume reflection coefficient. (4 hours)

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

教材:

1. 毛根海, 章军军, 陈少庆, 胡卫红, 《应用流体力学实验》, 高等教育出版社, 2008.
2. 吴持恭, 《水力学》, 高等教育出版社出版, 2003年11月第3版

参考资料:

3. Robert G. Dean, Robert A. Dalrymple, Water wave mechanics for engineers and scientists. World Scientific, 1991.
4. E. John Finnemore and Joseph B. Franzini, Fluid Mechanics with Engineering Applications, McGraw-Hill, 2001.

### 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		10		
小测验 Quiz				
课程项目 Projects		30		
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		50		
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



南方科技大学  
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

**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

