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	土力学与地基基础 Soil mechanics and foundation
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	OCE319
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业选修课 Major Elective Courses
6.	授课学期 Semester	秋季 Fall
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）	王誉泽 海洋科学与工程系 创园 9 栋 211，0755-88015278 Yuze Wang , Department of Ocean Sciences and Engineering Chuang Yuan 9-211, 0755-88015278
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	无 NA
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	48				48

Credit Hours					

14. 其它要求修读本课程的学系 Cross-listing Dept.	
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	

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，使学生对土力学与地基基础在海洋工程中的应用有一个基本了解，并激发学生对海洋工程的兴趣和热情，为今后的专业乃至职业选择提供参考依据。

By attending this course, students will have a basic understanding of soil mechanics and foundation, and their applications in ocean engineering. This course will stimulate students' interest and enthusiasm in ocean engineering and help them to decide whether to pursue a degree in Ocean Engineering and a future career in relevant areas.

16. 预达学习成果 Learning Outcomes

土力学与地基基础是建设海洋工程构筑物，如围填海、海上堤坝工程、人工岛、海上和海底物资储藏设施、跨海桥梁、海底隧道工程以及海底管道等工程的重要基础。通过本课程的学习，学生将初步了解土力学特征以及计算方法及相关规范，懂得土力学这门土木工程基础学科在海洋工程中的重要作用。首先，通过对土的物理性质及工程分类的学习，了解土的成因与组成以及物理性质指标，掌握无粘性土与粘性土的物理性质的区别，掌握土的结构性、压实性以及工程分类等。然后，通过土的渗透性和渗流的学习懂得土体作为由颗粒构成的多孔介质，土颗粒与孔隙水之间的相互作用，导致土体具有渗流特性以及有效应力原理等。进而进一步学习掌握地基中的应力计算方法。通过土体的压缩性、固结理论以及地基沉降计算，掌握土体的变形规律和计算方法。通过土的抗剪强度、地基承载力以及边坡稳定分析掌握土体强度计算方法以及稳定性分析的方法。通过土力学的学习，学生掌握土体力学分析计算的基本方法，为进一步学习海洋工程结构物的基础的设计奠定基础。

Soil mechanics and foundation is essential for the design and construction of marine engineering structures, such as reclamation, offshore dams, artificial islands, offshore and submarine material storage facilities, cross-sea bridges, subsea tunnel projects, submarine pipelines etc. By learning this course, students will understand the characteristics of soil mechanics, its calculation methods and related specifications, and understand the important role of soil mechanics in ocean engineering. First, by studying the physical properties and engineering classification of soil, students will understand the formation and composition of the soil, the physical property index, the difference between the physical properties of non-cohesive soil and cohesive soil, as well as the structure, compaction and engineering classification of soil. By studying soil permeability and seepage, students will understand that because soil as a particle aggregation porous medium, the interaction between soil particles and pore water are very important in the analysis of soil mechanics, and will understand the soil seepage characteristics and effective stress principle, as well as the calculation method of stress in foundations. By studying the compressibility of soil, consolidation theory and calculation of foundation settlement, students will understand the deformation law and calculation method of soil. By studying the soil shear strength, foundation bearing capacity and slope stability analysis, students will understand the calculation method of soil strength and stability analysis method. In all, by attending this course, students will grasp the basic methods of soil mechanics analysis and calculation, which will be the fundamental knowledge for further studying of the design of the foundation of ocean engineering structures.

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 课程绪论（2 学时）

土力学与地基基础发展史，特性以及在海洋工程中的应用

Introduction of the course (2 hours)

History of soil mechanics and foundation, the specialty of soil mechanics compared to other types of mechanics, and the application of soil mechanics in ocean engineering

Section 2 海床沉积土的物理性质与工程分类 (6 学时)

土的形成与组成，土的物理状态，土的结构，土的工程分类，土的压实性

Physical characteristic of soil and engineering classification of soil (6 hours)

The formation and content of soil, the physical parameter of soil, the structure of soil, the engineering category of soil and the compacity of soil

Section 3 土的渗透性和渗流（6 学时）

土的渗透性和渗流规律，平面渗流与流网，渗透力与渗透变形

The permeability of soil and seepage (6 hours)

Soil permeability and seepage law, planeflow and flownets, seepage force and seepage deformation

Section 4 地基中的应力计算（6 学时）

应力状态及应力应变关系，自重应力， 附加应力，基底压力计算，有效应力原理，常规三轴压缩试验

Stress in foundation (6 hours)

Stress state and stress-strain relationship, stress in foundation by self-weight, stress in foundation by loads, foundation base pressure, effective stress principle, triaxial test

Section 5 土体的压缩性和地基沉降计算（8 学时）

土的压缩性测试方法，一维压缩性及其指标，地基的最终沉降量计算，饱和土体的渗流固结理论

Calculation of soil compressibility and foundation settlement (8 hours)

Soil compressibility testing method, one-dimensional compressibility and its indicators, calculation of final settlement of

foundation, consolidation theory of saturated soil

Section 6 土的抗剪强度（8 学时）

Shear strength (8 hours)

土体破坏与土的强度理论, 土的抗剪强度的测定试验, 应力路径与破坏主应力线, 土的抗剪强度指标

Soil failure and soil strength theory, soil shear strength test, stress path and failure principal stress line, soil shear strength index

Section 7 挡土结构物上的土压力（4 学时）

挡土结构物及土压力，朗肯土压力理论，库仑土压力理论，常见主动土压力计算

Retaining structure and earth pressure, Rankine earth pressure theory, Coulomb earth pressure theory, common active earth pressure calculation

Section 8 边坡稳定性分析（4 学时）

Soil slope stability analysis (4 hours)

无粘性土坡的稳定性分析，粘性土坡的稳定分析，边坡分析的总应力法与有效应力法

Stability analysis of non-cohesive soil slopes, stability analysis of cohesive soil slopes, total stress method and effective stress method

Section 9 地基承载力（4 学时）

Bearing capacity of foundation (4 hours)

外荷载下地基破坏形式，地基极限承载力，地基容许承载力

Calculation of foundation failure form, foundation ultimate bearing capacity, foundation allowable bearing capacity

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

教材：

李广信，张丙印，于玉贞《土力学第 2 版》，清华大学出版社

陈希哲，叶菁《土力学地基基础》，清华大学出版社

其它参考资料:

Wood D.M. Soil Mechanics- A One-Dimensional Introduction-CUP (2009), Cambridge University Press

Powrie, William. Soil Mechanics : Concepts and Applications, Third Edition(2013), CRC Press

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		30		
课程项目 Projects		30		
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam		30		
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

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