

## 课程大纲 COURSE SYLLABUS

1.	<b>课程代码/名称</b> <b>Course Code/Title</b>	海洋工程混凝土结构 Marine Concrete Structures
2.	<b>课程性质</b> <b>Compulsory/Elective</b>	Compulsory 对海洋系的材料与化工专业学位硕士 Elective 对其他学生
3.	<b>课程学分/学时</b> <b>Course Credit/Hours</b>	3/48
4.	<b>授课语言</b> <b>Teaching Language</b>	双语，英文为主
5.	<b>授课教师</b> <b>Instructor(s)</b>	Professor Jian Fei Chen 陈建飞讲席教授
6.	<b>是否面向本科生开放</b> <b>Open to undergraduates or not</b>	是 Yes
7.	<b>先修要求</b> <b>Pre-requisites</b>	(如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)  材料力学或结构力学 Strength of Materials or Structural Mechanics.
8.	<b>教学目标</b> <b>Course Objectives</b>	
	<p>通过该门课程的学习，使学生掌握混凝土结构的基本原理和基本计算方法，能根据所学知识解决实际混凝土结构工程问题，对纤维增强复合材料在混凝土结构的基本原理和计算有一定了解，了解新型混凝土结构在海洋工程中的实际应用。</p> <p>After completing this course, students would understand the behaviour of steel reinforced concrete structures, the design concepts and basic calculation methods of concrete structures. They would be able to design common concrete members in engineering problems. In addition, students would develop a basic understanding of the principle and calculation of fiber reinforced polymer (FRP) concrete; and have basic knowledge of the current status and perspectives of novel concrete structures in ocean engineering.</p>	
9.	<b>教学方法</b> <b>Teaching Methods</b>	
	<p>讲授 40 小时，习题课 8 小时 40 lectures and 8 tutorials.</p>	
10.	<b>教学内容</b> <b>Course Contents</b>	
	(如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)	
	<b>Section 1</b>	<p>课程绪论 (2 学时)</p> <p>工程结构设计的一般步骤，配筋混凝土结构的特点，混凝土结构国内外应用及的发展简况。</p> <p>Introduction (2 hours)</p> <p>Procedure of engineering structure design, characteristics of steel reinforced concrete structures, applications of concrete structures, history of concrete structures, FRP reinforced concrete structures</p>

<b>Section 2</b>	<p>材料的物理力学性能（4 学时）</p> <p>钢筋，混凝土，纤维增强复合材料（FRP），钢筋与混凝土的粘结性能，FRP 与混凝土的粘结性能</p> <p>Mechanical properties of reinforced concrete materials (4hours)</p> <p>Steel reinforced bars, concrete, fibre reinforced polymer (FRP) and FRP bars, bond between concrete and rebar, bond between concrete and FRP</p>
<b>Section 3</b>	<p>结构设计方法基础（4 学时）</p> <p>结构的作用，作用效应，结构抗力，结构可靠度理论，概率极限状态设计法，规范</p> <p>Basics of Structural Design (4 hours)</p> <p>Loads and load combinations, structure resistance, structure reliability theory, probabilistic limit state design method, codes and specifications.</p>
<b>Section 4</b>	<p>受弯构件正截面承载力（8 学时）</p> <p>受弯构件正截面受力性能设计分析，受弯构件正截面承载能力计算，单筋矩形截面设计，双筋矩形截面梁设计，工字梁，深梁</p> <p>Sectional moment capacity of flexural members (8 hours)</p> <p>Analysis and design of flexural members, calculation of sectional moment capacity of flexural members, design of singly reinforced rectangular sections, doubly reinforced rectangular beams, T-section beams, deep beams.</p>
<b>Section 5</b>	<p>受弯构件斜截面承载力（6 学时）</p> <p>受弯构件斜截面抗剪承载力计算</p> <p>Sectional shear capacity of flexural member (6 hours)</p> <p>Calculation of sectional shear capacity of flexural members</p>
<b>Section 6</b>	<p>受压构件（6 学时）</p> <p>轴心受压构件承载力，偏心受压构件承载力，矩形截面偏压构件设计计算，圆形截面偏压构件设计计算</p> <p>Compressive strength of members (6 hours)</p> <p>Load bearing capacity of axially loaded members and of eccentrically loaded members, design of rectangular columns with eccentric loading, design of circular columns with eccentric loading.</p>
<b>Section 7</b>	<p>工作极限状态及耐久性（4 学时）</p> <p>混凝土构件的裂缝、变形验算，混凝土结构的耐久性</p> <p>Service limit state and durability (4 hours)</p> <p>Crack and deflection control of reinforced concrete members, durability of concrete structures</p>
<b>Section 8</b>	<p>新型材料在海洋混凝土结构中的应用概论（4 学时）</p> <p>纤维增强复合材料（FRP），超高性能混凝土（UHPC），海水海砂混凝土（SSC），FRP 加固混凝土结构</p> <p>Introduction to the application of novel materials in Marine concrete structure. (4 hours)</p> <p>Fibre reinforced polymer (FRP), ultra-high performance concrete (UHPC), Seawater sea-sand concrete (SSC). FRP reinforced concrete structures.</p>

<b>Section 9</b>	期中考试 (2 学时) Mid-term exam (2 hours)
<b>Section 10</b>	Section 10 习题/辅导/讨论 (8 学时) 隔周 1 小时 1 Tutorial every two weeks
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**11. 课程考核**  
**Course Assessment**

(①考核形式 Form of examination; ②.分数构成 grading policy; ③如面向本科生开放, 请注明区分内容。  
If the course is open to undergraduates, please indicate the difference.)

出勤 Attendance	8
课堂表现 Class Performance	12
平时作业 Assignments	20
期中考试 Mid-Term Test	20
期末考试 Final Exam	40

研究生的试卷将比本科生的多一道题目。

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

参考资料:

1. 东南大学、天津大学、同济大学三校合编. 《混凝土结构(上册)——混凝土结构设计原理》(第六版). 北京: 中国建筑工业出版社, 2015.
2. R. Park and T. Paulay. Reinforced concrete structures. New York: John Wiley and Sons, 1975.
3. Subramanian N. Design of reinforced concrete structures. Oxford University Press, 2013.
4. 沈蒲生主编, 混凝土结构基本原理(第四版), 高等教育出版社, 2012年.
5. 《混凝土结构设计规范》(GB50010-2010), 中国建筑工业出版社, 2011.