

## 课程大纲 COURSE SYLLABUS

1.	<b>课程代码/名称</b> <b>Course Code/Title</b>	海洋结构物分析与设计 Analysis and Design of Offshore Structures
2.	<b>课程性质</b> <b>Compulsory/Elective</b>	专业选修课
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>	英 English
5.	<b>授课教师</b> <b>Instructor(s)</b>	冯兴亚
6.	<b>是否面向本科生开放</b> <b>Open to undergraduates or not</b>	是
7.	<b>先修要求</b> <b>Pre-requisites</b>	<p>(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.)</p> <p>硕士: 无 Graduate: NA.</p> <p>本科生: 高等数学、大学物理、理论力学或材料力学或流体力学 Undergraduate: Calculus、General Physics、Theoretical/Material/Fluid Mechanics</p>
8.	<b>教学目标</b> <b>Course Objectives</b>	<p>(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.)</p> <p>本课程使学生能够了解海洋工程结构物的类型、用途、结构形式、组成部分和布置情况, 熟悉世界主流工业生产制造设计标准和规范, 掌握海洋建筑设施的分析方法、设计流程和建设方式, 掌握相关工业设计软件的使用和分析, 培养从事海洋基础设施建设相关工作的知识技能和项目管理实施能力。对于研究生, 要求掌握海洋工程设计的深入力学理论, 对于本科生以实现工业应用为教学目标。</p> <p>This course shall enable the students to obtain the basic knowledge of the classifications, functions, characteristics, components and typical arrangements of offshore structures. Students will be trained to be familiar with the industry standards, rules and principles of design of ocean engineering structures which are commonly used in the marine offshore industry. Students will have the opportunities to have a taste of the software tools utilized in the real project practice. This course helps students to master the fundamental knowledge of offshore infrastructure and construction and management of offshore project</p>
9.	<b>教学方法</b> <b>Teaching Methods</b>	<p>(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.)</p> <p>课程以理论课为主, 结合软件操作和课程 group project。 研究生的阅读资料比本科生更加深入全面。Group project 的负责人必须是研究生。</p>
10.	<b>教学内容</b> <b>Course Contents</b>	<p>(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.)</p>

<b>Section 1</b>	<p>课程介绍和行业现状（2 学时）：海洋结构物的类型、发展历史和现状，各种海洋结构物的组成部分和各部分功能；工程案例。</p> <p>Introduction: typical types of offshore structures, their development history and state of the date; typical components of offshore structures and their functions; examples of offshore structures. (2 hours)</p>
<b>Section 2</b>	<p>海工设计规范及其发展（4 学时）：世界主流的海洋平台设计规范 API 的基本内容和历史发展，工程经验教训，大型海洋工程的最新挑战。</p> <p>Development of API rules for platform design: The development, lesions learnt, the improvement and new mega project challenges (4 hours)</p>
<b>Section 3</b>	<p>海洋工程环境（6 学时）：波浪和洋流相关理论和描述、波浪荷载、莫里森方程应用、海洋波浪能量谱、设计标准的选取。</p> <p>Offshore environment and loading: Ocean waves and current; wave and current loading; Ocean wave energy spectrum; short term statistics, long term statistics; Selection of design criteria. (6 hours)</p>
<b>Section 4</b>	<p>海洋结构动态响应（4 学时）：海洋结构物响应运动方程、传递函数 RAO、简谐振动、自由运动、运动阻尼、运动模态</p> <p>Reponses of offshore structures: Motion equation, transfer function RAO, harmonic response, free vibrations, damped motions. (4 hours)</p>
<b>Section 5</b>	<p>结构设计和强度分析（4 学时）：设计标准、整体分析和局部分析、导管架推倒分析、圆形结点强度分析、结构疲劳。</p> <p>Structural design and strength analysis: Design guideline and criteria, total analysis and member analysis, push-over analysis of jacket platform, tubular joint strength, fatigue analysis. (4 hours)</p>
<b>Section 6</b>	<p>系泊系统（4 学时）：工业设计标准、系泊系统组成部分、系泊布置、分散系泊和单点系泊、荷载、缆绳与锚链。</p> <p>Mooring system: Mooring requirement and design guide, components of mooring system, arrangement of mooring lines, load mechanism, spread mooring and single point mooring, mooring lines and chain anchor. (4 hours)</p>
<b>Section 7</b>	<p>地基基础（4 学时）：海洋土壤特性、设计荷载、P-Y 曲线法、实验法、循环测试、导管架圆管基础、吸力桶基础。</p> <p>Foundations: Soil exploration, design lateral load, vertical load, overturning moment, P-Y curve, field testing, cyclic test, jacket pile foundation, suction foundation. (4 hours)</p>
<b>Section 8</b>	<p>施工、运输与安装（6 学时）：海洋工程施工方法、出坞、吊装分析与设计、拖拽运输、海洋环境安装方法、导管架结构入水与安装。</p> <p>Construction, transportation and installation: Construction procedure and method for offshore structures, loadout, transportation, lifting analysis and design, offshore installation method, jacket upending and launching. (6 hours)</p>
<b>Section 9</b>	<p>浮体稳定性（4 学时）：水静力特性、浮力、稳心、恢复力矩、原始稳定、破坏稳定、稳定准则。</p> <p>Marine stability: Hydrostatic, buoyancy, metacenter, righting moment, intact stability, damage stability, stability criteria (4 hours)</p>
<b>Section 10</b>	<p>半潜式平台设计工程案例（4 学时）：选址环境、半潜式平台布置、选型、载重设计、稳定性分析、浮体质量特性、波浪力、自然频率、运动响应。</p> <p>Design of semisubmersible: Site environment, arrangement of semi, weight of platform, stability analysis, mass properties, wave loads, natural frequency</p>

		computation, response analysis. (4 hours)
	<b>Section 11</b>	<p>课程设计项目展示（6 学时）：分组展示半潜式平台的初步设计方案。</p> <p>Mini design project presentation: Students will present their group design of their offshore structures (6 hours)</p>
<b>11.</b>	<b>课程考核</b> <b>Course Assessment</b>	
		<p>（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.）</p> <p>出勤 Attendance 10 课堂表现 Class Performance 10 课程项目 Projects 30 平时作业 Assignments 10 期末考试 Final Exam 40</p>
<b>12.</b>	<b>教材及其它参考资料</b> <b>Textbook and Supplementary Readings</b>	
		<p>教材：Subrata Chakrabarti, Handbook of Offshore Engineering. Elsevier Science, ISBN 978-0-08-044381-2, 2005 参考资料：Notes on Design of Offshore Structures</p>