

## 课程大纲

### COURSE SYLLABUS

1.	<b>课程代码/名称</b> Course Code/Title	海洋工程高性能混凝土 High Performance Concrete for Marine Applications
2.	<b>课程性质</b> Compulsory/Elective	选修 Elective
3.	<b>开课单位</b> Offering Dept.	海洋科学与工程系 Department of Ocean Science and Engineering
4.	<b>课程学分/学时</b> Course Credit/Hours	3/48
5.	<b>授课语言</b> Teaching Language	中文
6.	<b>授课教师</b> Instructor(s)	魏振华 助理教授 Dr. Zhenhua Wei
7.	<b>开课学期</b> Semester	秋季 Fall
8.	<b>是否面向本科生开放</b> Open to undergraduates or not	否 No
9.	<b>先修要求</b> Pre-requisites	(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.) 无 No.
10.	<b>教学目标</b> Course Objectives	(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.) 1.深入了解高性能混凝土的基本理论、制备方法、性能及海洋工程应用; 2.掌握高性能混凝土材料研究的基本途径和方法; 3.了解高性能混凝土领域已达到的水平和取得的成果, 并能将所学知识应用到科学研究中。 1) To understand the principles of high performance concrete, its fabrication and marine applications; 2) To master basic skills and methodology for research on high performance concrete materials; 3) To understand the state of the art in R&D of high performance concrete, and apply knowledge learned from this course to research.
11.	<b>教学方法</b> Teaching Methods	(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.) 讲授 Lectures
12.	<b>教学内容</b> Course Contents	(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>	绪论 Introduction Nature, advantages and limitations of concrete and high performance concrete; development, manufacture and composition of Portland cement, cement

	admixtures
<b>Section 2</b>	水泥水化与微结构演化 Cement hydration and microstructure evolution Chemistry of hydration, hydration products, microstructure and properties of hydrated cement pastes, porosity and strength development
<b>Section 3</b>	骨料与外加剂 Aggregates and Admixtures Properties required for mix design, durability of aggregates, water reducing admixtures, air entraining admixtures, mineral admixtures and their effects on properties of fresh and hardening concrete
<b>Section 4</b>	体积变化与耐久性 Volume changes and durability Plastic and drying shrinkage, restrained shrinkage cracking, permeability of concrete, chemical transport and attack, repair and maintenance
<b>Section 5</b>	高性能混凝土 High performance concrete Mix design and proportioning, ultra-fine additives and their influences on concrete properties, batching and curing, construction practices
<b>Section 6</b>	海工混凝土腐蚀与防护 Corrosion and protection of marine concrete Mechanisms of different types of corrosion, sulfate attack, coating materials and technologies
<b>Section 7</b>	多功能混凝土及应用 Multifunctional concretes and their applications Lightweight concrete, phase change concrete, nanomaterials modified concrete
<b>Section 8</b>	可持续性混凝土技术 Sustainable concrete technologies Carbon-neutral construction materials, clinkering-free cementation, geopolymers concrete
<b>Section 9</b>	
<b>Section 10</b>	
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<b>13. 课程考核</b> <b>Course Assessment</b>	
	( 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.)  考核形式: 考查。分数形式: Attendance 10%; Assignments 30%; Final report 60%
<b>14. 教材及其它参考资料</b> <b>Textbook and Supplementary Readings</b>	
	Concrete: Microstructure, Properties, and Materials, 2013, Monteiro and Mehta, McGraw-Hill  海洋工程水泥与混凝土材料, 沈晓冬, 李宗津, 化学工业出版社