

## 课程大纲 COURSE SYLLABUS

1.	<b>课程代码/名称 Course Code/Title</b>	海洋分子生物学 Marine Molecular Biology
2.	<b>课程性质 Compulsory/Elective</b>	专业选修课 Major Elective Courses
3.	<b>课程学分/学时 Course Credit/Hours</b>	3 Credit Value/ 48 Credit Hours
4.	<b>授课语言 Teaching Language</b>	中文 Chinese
5.	<b>授课教师 Instructor(s)</b>	曾芝瑞 Zeng Zhirui
6.	<b>先修要求 Pre-requisites</b>	N/A
7.	<b>教学目标 Course Objectives</b>	<p>每一升的海水里有超过十亿个微生物---它们组成了全世界海洋 98%的有机物，生产出超过全球一半的氧气量。它们还是温室气体的主要制造者，意味着它们对全球气候变化起关键作用。</p> <p>这门课程目标是教授学生掌握海洋分子生物学的基本原理概念，及其技术在海洋微生物学的应用。这是一门入门级课程，不要求选课的学生有分子生物学基础。课程主要包括如下四个方面的内容：（1）海洋生物的遗传学；（2）基因的表达和调控；（3）海洋细菌和、真核生物、菌的基因特征（4）重点介绍基因编辑技术在海洋微生物的应用。</p> <p>More than a billion microbes live in each liter of seawater—they comprise 98% of the biomass of the world's oceans, supply more than half the world's oxygen and are the major producer of the world's greenhouse gases, which means they could potentially effects of climate change.</p> <p>The objective of this course is to provide the students with the concepts that enable them to follow advances of the knowledge and technology in the field of marine molecular biology. This is an enteral level course, and do not require students with molecular biology background. The course is designed around a set of primary topics, including 1) the genetics of marine life; 2) mechanisms of gene expression and regulation; 3) the genetic properties of marine bacteria, eucarya, archaea. 4) Gene editing technologies for marine microbes will be emphasized.</p>
8.	<b>教学方法 Teaching Methods</b>	<p>讲授 Lectures 40hr</p> <p>习题/辅导/讨论 Tutorials 8hr</p>
9.	<b>教学内容 Course Contents</b>	<p><b>Section 1</b></p> <p>课程介绍 course introduction（2 课时）</p> <p>介绍海洋微生物学 introduction marine microbiology</p> <p>介绍海洋分子生物学 introduction marine molecular biology</p>

<b>Section 2</b>	细胞形态和结构 cell morphology and structure (2 课时) 细胞形态观察 cell morphology 细胞膜、细胞器、细胞核结构 cell structure
<b>Section 3</b>	细胞生长代谢 cell growth and metabolism (2 课时) 细胞生长周期 cell growth cycle 细胞能量代谢方式 cell metabolism
<b>Section 4</b>	基因的表达调控 gene expression regulation (2 课时) 基因转录调控 transcription regulation 蛋白表达调控 translation regulation
<b>Section 5</b>	基因转移 gene transfer (2 课时) 基因在海洋细菌间的转移 gene transfer in marine bacteria 基因在海洋古菌和其他生物的转移 gene transfer in marine archaea and other organisms
<b>Section 6</b>	海洋细菌 marine bacteria (2 课时) 海洋细菌种类和生态功能 marine bacteria diversity and ecological function 海洋细菌分子遗传学 marine bacteria genetics
<b>Section 7</b>	海洋真核生物 marine Eucarya (2 课时) 海洋真核生物分类和特征 marine Eucarya diversity and function 海洋真核生物分子遗传特点 marine Eucarya genetics
<b>Section 8</b>	海洋古菌 marine archaea (2 课时) 海洋古菌种类和生态功能 marine archaea diversity and function 海洋古菌分子遗传学 marine archaea genetics
<b>Section 9</b>	海洋病毒 marine virus (2 课时) 海洋病毒种类和结构 marine virus diversity and structure 海洋病毒分子遗传学 marine virus genetics
<b>Section 10</b>	质粒 plasmids (2 课时) 质粒的结构元件 plasmids structure 质粒克隆操作 plasmid cloning
<b>Section 11</b>	聚合酶链式反应 PCR (2 课时) PCR 的原理和方法 PCR principle and methods PCR 的设计和解决问题 design PCR primers and trouble shooting
<b>Section 12</b>	基因编辑 gene editing (4 课时) 基因敲除 gene knockout 基因沉默 gene silence 基因点突变技术 gene site mutation CRISPR 技术 CRISPR technology
<b>Section 13</b>	基因和蛋白分子技术 gene and protein technology (2 课时) 基因表达技术 gene expression technology 蛋白质纯化技术 protein purification technology
<b>Section 14</b>	基因蛋白组学 genomics and proteomics (4 课时) 基因组、宏基因组介绍 introduction to genomics and metagenomics 基因组学的应用技术 the application of genomics 转录组学 transcriptomics 蛋白组学 proteomics

	<b>Section 15</b>	脂质组学研究 lipidomics (2 课时) 脂质组在海洋科学的应用 lipidomics in marine science 脂质分子的提取和分析技术 lipid extraction and analysis
	<b>Section 16</b>	可视化标记技术 visualization (2 课时) 同位素标记技术 isotopic labeling 荧光原位杂交技术 FISH
	<b>Section 17</b>	海洋合成生物学 marine synthetic biology (2 课时) 合成生物学的原理和概念 the principle of synthetic biology 合成生物学技术和例子 technology of synthetic biology
	<b>Section 18</b>	海洋分子生物学前沿 frontier of marine molecular biology (2 课时) 海洋分子生物学最新进展 the progress in marine molecular biology 探讨海洋分子生物学的未来发展 the prospective of marine molecular biology
<b>10.</b>	<b>课程考核</b> <b>Course Assessment</b>	
	请再此注明：①考查/考试；②分数构成。 出勤 Attendance 20% 课堂表现 Class Performance 20% 期中考试 Mid-Term Test 30% 期末考试 Final Presentation 30%	
<b>11.</b>	<b>教材及其它参考资料</b> <b>Textbook and Supplementary Readings</b>	
	《Brock Biology of Microorganisms》 Michael Madigan, John Martinko, Kelly Bender, Daniel Buckley, and David Stahl. 14 <sup>th</sup> Edition.	