

## 课程大纲

### COURSE SYLLABUS

1.	<b>课程代码/名称</b> <b>Course Code/Title</b>	古海洋与古气候学 Paleooceanography and Paleoclimatology
2.	<b>课程性质</b> <b>Compulsory/Elective</b>	专业选修课 Major Elective Courses
3.	<b>课程学分/学时</b> <b>Course Credit/Hours</b>	3 学分 credit /48 学时 total credit hours
4.	<b>授课语言</b> <b>Teaching Language</b>	中文 Chinese
5.	<b>授课教师</b> <b>Instructor(s)</b>	姚炜琪 Weiqi Yao
6.	<b>是否面向本科生开放</b> <b>Open to undergraduates or not</b>	否 No
7.	<b>先修要求</b> <b>Pre-requisites</b>	无 n. a.
8.	<b>教学目标</b> <b>Course Objectives</b>	
	<p>通过开设本课程学，对古海洋和古气候学领域各类示踪指标和重大地质事件进行较为系统的介绍，从而让学生对地球系统演变、大气圈-水圈-生物圈-岩石圈相互作用、生物地球化学循环、古环境研究指标、“将古论今”和“将古论今”应用等有所了解，为今后从事海洋领域的科研工作奠定良好的专业基础、储备基本的专业技能。</p> <p>This course delivers systematic introduction of major geological events in the Earth history and archives for paleoceanographic and paleoclimatic reconstruction. The curriculum covers but is not limited to the content of Earth system evolution, atmosphere-hydrosphere-biosphere-lithosphere interactions, biogeochemical cycles, paleoenvironmental tracers, and the linkage between the past and the future. The goal is to equip students with basic knowledge of marine sciences and to provide professional skill sets for their future research.</p>	
9.	<b>教学方法</b> <b>Teaching Methods</b>	
	授课 Lectures	
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>	<b>全球变化 (6 学时)</b> Global changes (6 credit hours) 雏菊世界-系统简介 Daisy world: An Introduction to Systems, 全球能源平衡 Global Energy Balance
	<b>Section 2</b>	<b>气候系统介绍 (6 学时)</b>

	<p>Introduction to climate system (6 credit hours)</p> <p>大气环流 Atmospheric circulation, 气候变化成因 causes of climate change, 长期气候调节 long-term climate regulation</p>
<b>Section 3</b>	<p><b>海洋系统介绍 (6 学时)</b></p> <p>Introduction to ocean system (6 credit hours)</p> <p>大洋环流 Ocean circulation, 温盐环流 thermohaline circulation, 海水化学 Seawater chemistry</p>
<b>Section 4</b>	<p><b>板块构造学 (3 学时)</b></p> <p>Plate Tectonics (3 credit hours)</p> <p>固体地球环流 Circulation of the Solid Earth</p>
<b>Section 5</b>	<p><b>元素的循环 (6 学时)</b></p> <p>Recycling of the Elements (6 学时)</p> <p>碳和营养元生物地球化学循环 biogeochemical cycles of carbon and nutrients</p>
<b>Section 6</b>	<p><b>地质年代与测年技术 (3 学时)</b></p> <p>Geological timescales and dating techniques (3 credit hours)</p> <p>取芯技术 Coring techniques, 古生代-中生代-新生代 Paleozoic-Mesozoic-Cenozoic</p>
<b>Section 7</b>	<p><b>古环境重建方法 (9 学时)</b></p> <p>Paleoenvironmental reconstruction (9 credit hours)</p> <p>示踪指标 (如有孔虫、钙质超微化石、硅藻、孢粉、珊瑚、年轮、冰芯、自生矿物) proxies (e.g., foraminifera, calcareous nanofossils, diatoms, pollens, corals, tree rings, ice cores, authigenic minerals), 古生物学 paleontology, 元素与稳定同位地球化学 elemental and stable isotopes geochemistry, 沉积学 sedimentology</p>
<b>Section 8</b>	<p><b>地球和生命起源 (3 学时)</b></p> <p>Origin of the Earth and of Life (3 credit hours)</p> <p>地球历史上的生物多样性 Biodiversity through Earth history, 生命对大气的影响: 氧气和臭氧的增加 Effect of life on the atmosphere: The rise of oxygen and ozon</p>
<b>Section 9</b>	<p><b>温室与冰室气候事件 (3 学时)</b></p> <p>Greenhouse and icehouse climatic events (3 credit hours)</p> <p>更新世大冰期、始新世-渐新世大冰期、古新世-始新世极热事件、二叠纪-三叠纪边界事件 Pleistocene Glaciations, Eocene-Oligocene Glaciations, Paleocene-Eocene</p>

	Thermal Maximum, Permian-Triassic boundary event
<b>Section 10</b>	<p>大洋环流变迁与氧化还原 (3 学时)</p> <p>The evolution of ocean circulation and redox conditions (3 credit hours)</p> <p>中新世末地中海变干事件 The Messinian Salinity Crisis, 新生代大洋环流与气候急剧变冷 Cenozoic ocean circulation and abrupt cooling, 白垩纪大洋缺氧事件 Cretaceous Oceanic Anoxic Events</p>
<b>11. 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><b>考核形式: 考查</b></p> <p><b>十三级等级制 Letter Grading</b></p> <p><b>出勤 Attendance 10%</b></p> <p><b>平时作业 Assignments 30%</b></p> <p><b>期末考试 Final Exam 60%</b></p>
<b>12. 教材及其它参考资料</b>	
	<p><b>教材:</b> Lee R. Kump, James F. Kasting, Robert G. Crane (2010) The Earth System. 3<sup>rd</sup> edition. Pearson Education, UK. William W. Hay (2012) Experimenting on a Small Planet: A Scholarly Entertainment. Springer, Germany.</p> <p><b>参考书:</b> John Wright, Angela Colling (1995) Seawater: its Composition, Properties and Behaviour. 2<sup>nd</sup> edition. Elsevier, Amsterdam. Open University Course Team (2001) Ocean Circulation. 2<sup>nd</sup> edition. Butterworth-Heinemann, Oxford. Open University Course Team (2005) Marine Biogeochemical Cycles. 2<sup>nd</sup> edition. Butterworth-Heinemann, Oxford.</p>