

OCES1001 – The Earth as a Blue Planet

Class Schedule: Monday and Wednesday 9:00 – 10:20 am

Venue: Lecture Theater E

Course Description

“Earth” is the name we call the planet on which we live, yet over 70% of its surface is ocean and from space our world appears as a blue planet. The ocean is essential for life producing half of the world’s oxygen and constitutes the largest ecosystem on Earth, supporting vast biodiversity ranging from coral reefs to deep-sea ecosystems that provide food and other essential resources for billions of people. Ocean currents influence weather patterns and climate, thus awareness of the critical role the ocean plays in the global carbon cycle is key to understanding and adapting to climate change. Ocean science is therefore an interdisciplinary study that integrates knowledge from various fields, and this course provides a broad introduction exploring some of the major topics involved, including physical oceanography, marine chemistry, marine geology, marine biology, and investigates the impacts of humans on the marine environment. Through interactive lectures, laboratory and university aquarium visits, students will discover the importance of ocean literacy – understanding how the ocean affects our lives and recognizing the fundamental role the ocean plays in global systems.

Course Intended Learning Outcomes (CILOs)

On successful completion of this course, students will be able to:

- 1) Describe the physical, chemical, geological, and biological characteristics of the ocean.
- 2) Demonstrate knowledge of the diversity of marine life and marine ecosystems.
- 3) Understand fundamental ocean processes through the integration of cross-disciplinary core scientific concepts.
- 4) Explain how ocean processes influence Earth’s climate and biodiversity.
- 5) Recognize the role of humans in shaping the ocean’s future and evaluate solutions for sustainable ocean stewardship.

Course Instructors

Prof. Masayuki USHIO (ushio@ust.hk)

Guest Instructor: Prof. Cindy LAM (envscindy@ust.hk)

Prof. Cynthia YAU (cynthiastyau@ust.hk)

Recommended Textbook

The recommended textbook is:

“*Oceanography: An Invitation to Marine Science*” by Tom Garrison (8th edition). Brooks/Cole.

(<https://lbdiscover.ust.hk/bib/991012856168803412>)

Course Assessment Scheme (Letter Grades)

Assessment	Percentage	Content
• 1 Midterm Examination	40%	Based on lecture content
• 1 Final Examination	60%	Based on lecture content

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Midterm Examination	ILO 1, ILO 2, ILO 3, ILO 4	This task assesses students’ understanding of the physical, chemical, geological, and biological characteristics of the ocean (ILO 1) and tests their knowledge of the diversity of marine life (ILO 2). The task also tests the students’ ability to connect core scientific concepts with complex ocean and climate processes (ILO 3, ILO 4).
Final Exam	ILO 1, ILO 2, ILO 3, ILO 4, ILO 5	This task assesses students’ understanding of the physical, chemical, geological, and biological characteristics of the ocean (ILO 1) and their knowledge of the diversity of life in the ocean (ILO 2). The task also tests the students’ ability to connect core scientific concepts with complex ocean and climate processes (ILO 3, ILO 4), and their competency to critically evaluate the impacts of anthropogenic activities on the ocean (ILO 5).

Final Grade Descriptors

Grades	Short Description	Elaboration on Subject Grading Description
A	Excellent Performance	Students who achieve a Grade A demonstrate an exceptional understanding of the course materials and fundamental ocean science concepts, including physical, chemical, and biological oceanographic characteristics and processes. They exhibit in-depth comprehension of the complex inter-connectedness between the atmosphere and the ocean in terms of ocean circulation, climate and climate change, and are able to critically assess the impacts of humans on global ocean systems.
B	Good Performance	Students who achieve a Grade B display a strong grasp of the course materials and fundamental ocean science concepts, with a good understanding of the physical, chemical, and biological oceanographic characteristics and processes, but may not fully appreciate the complex inter-connectedness of air-sea interactions and between human impacts and global ocean systems.

C	Satisfactory Performance	Students who achieve a Grade C show a satisfactory understanding of fundamental ocean science concepts, with an adequate knowledge of the physical, chemical, and biological processes. They demonstrate awareness of human impacts on ocean systems but may lack deeper insights. They have a reasonable understanding of the course materials but may not fully comprehend the complexity of ocean processes and marine ecosystems or be able to critically assess the effects of human activities on ocean health.
D	Marginal Pass	Students who achieve a Grade D exhibit a minimal knowledge of ocean science concepts, with only a basic comprehension of the physical, chemical, and biological processes, and show limited understanding of the connection between ocean processes and global marine systems. Their ability to critically evaluate human impacts on ocean systems is weak, and their examination results reflect a superficial grasp of the course materials, barely meeting the minimum required standards.
F	Fail	Students who achieve a Grade F demonstrate poor knowledge of basic ocean science concepts, with little to no comprehension of the physical, chemical, and biological characteristics of the ocean and its processes, and are unable to evaluate human impacts on ocean systems correctly. Their performance in the examinations indicates a lack of understanding of the course materials, failing to meet the minimum required standards.

Communication and Feedback

Assessment marks for the Midterm and Final Examinations will be released via Canvas within two weeks of submission.

Course AI Policy

The use of Generative AI is not applicable for this course as both the Midterm and Final Examinations are closed book.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to [Academic Integrity – HKUST – Academic Registry](#) for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

TENTATIVE: OCES1001 The Earth as a Blue Planet (Spring 2025-26)

Monday and Wednesday 9:00 – 10:20 am

Venue: LT-E

Week	Date	Topic	Instructor
1	2 Feb	1. Earth as a Blue Planet: introduction to ocean science	MU
	4 Feb	2. Visit to OCES Teaching Lab (CYT-UG002) – Group A	MU
2	9 Feb	3. Visit to OCES Teaching Lab (CYT-UG002) – Group B	MU
	11 Feb	4. Visit to OCES Teaching Lab (CYT-UG002) – Group C	MU
3	16 Feb	5. Visit to OCES Teaching Lab (CYT-UG002) – Group D	MU
	18 Feb	<i>Chinese New Year</i>	
Part 1. Structures of the Earth and Ocean			
4	23 Feb	6. Earth's structure, formation of the ocean and plate tectonics	MU
	25 Feb	7. Ocean topography and sediments	MU
Part 2. Physics and Chemistry of the Ocean			
5	2 Mar	8. Water and ocean structure: molecular characteristics, temperature, density, and ocean stratification	MU
	4 Mar	9. Circulation of the atmosphere	MU
6	9 Mar	10. Circulation of the ocean	MU
	11 Mar	11. Waves and tides	MU
7	16 Mar	12. Seawater chemistry	MU
Part 3. Life in the Ocean			
	18 Mar	13. Phytoplankton and primary production	MU
8	23 Mar	<i>Midterm Exam (45 min)</i>	MU
	25 Mar	14. Zooplankton and the microbial food web	CY
9	30 Mar	15. Marine biodiversity: invertebrates I	CL
	1 Apr	16. Marine biodiversity: invertebrates II	CL
10	6 Apr	<i>Mid-Term Break</i>	
	8 Apr	<i>Mid-Term Break</i>	
11	13 Apr	17. Marine biodiversity: Fish Population Biology	MU
	15 Apr	18. Marine biodiversity: Marine Mammals	MU
12	20 Apr	19. Ecology of corals in Hong Kong	CY
	22 Apr	20. Deep-sea ecology	CY
Part 4. Human Impacts on the Ocean			
13	27 Apr	21. Human impacts on the ocean I	CL
	29 Apr	22. Human impacts on the ocean II	CL, CY
14	4 May	23. Climate change and the ocean	MU
	6 May	24. Course Review	MU