Course Name: Oceanography - LOB 10203
Number of credits: 3 credit (5 ECTS)
Period: January/July Semester

Program Coordinator	Ms. Rasidah Shafiee
Credits	3 credit (5 ECTS)
Lecturers	1. Ts. Norazlina Abdul Nasir 2. Assoc. Prof. Ts. Dr. Aminuddin Md Arof 3. Ts. Amayrol Zakaria
Level	Bachelor
Host institution	Universiti Kuala Lumpur – Malaysian Institute of Marine Engineering Technology (UniKL-MIMET)
Course duration	17 weeks
New/revised	Revised

Summary
This 3-credit (4 ECTS) course is offered as a core subject to the Bachelor of Maritime Operations (BMO) programme to expose students to the marine and coastal environment. The knowledge imparted to students concerning the natural forces at sea such as current, wave, tide, wind and the geological aspects of marine and coastal environment will give them the understanding required in order to be involved in maritime operations and the management of maritime activities. Amongst others, the knowledge garnered will enable them to plan port activities, port expansion and scheduling ships passages.

Target student audiences
Bachelor students majoring in maritime operations, marine engineering and naval architecture.
Year 1, Semester 2

Prerequisites
None.

Aims and objectives.
The main course objective is to expose participants to the physical aspects of the marine and coastal environment, which will provide essential knowledge to those that will be involved in maritime operations and the management of maritime activities. Environmental forces that come from wind, waves, tidal forces, currents and tsunamis will be covered to ensure basic understanding among students. Additionally, students will be exposed to the evolution of the ocean and ocean basins, features of the marine and coastal provinces and the quality of sea water.

The Authentic Tasks are:

General learning outcomes:
By the end of the course, successful students:

Knowledge - will be able to explain the evolution of the ocean and ocean basin and demonstrate good comprehension on features of coastal and marine provinces.

Comprehensive - will be able to demonstrate an understanding of air-sea interaction, ocean circulation, waves, tides and tidal stream and their effects on human activities.

Application - will be able demonstrate the ability to use oceanographic equipment such thermometer, echo sounder, current meter, salinity meter, anemometer and other related equipment, and interpret the results.

-will be able to calculate the height of tide at the required time or location.

Analysis - will demonstrate the ability to evaluate the effect of marine environmental forces on human activities.

- will be able to analyze the quality of sea water, marine sediment and the health of the coastal and marine environment.

Overview of sessions and teaching methods

Teaching and learning will be via blended learning involving F2F lectures, interactive virtual classes through the use of online platform designed to support the implementation of an innovative interactive learning approach and practical sessions conducted in the nautical science lab and on site. The online platform (UniKL VLE and MS-TEAMS) will also serve as a virtual space for students to interact with each other. Collaborative learning, and group discussions will also be done online. Students are required to do self-learning based on given topics in preparation for continuous assessments. Students will be assessed through written tests, individual and group assignments.

Learning methods	- Online lectures and presentations - Moderated in-class discussions - Group assignments (field work) - Moderated in-class discussions. - Individual laboratory work	
Course outline	Week 1-3	**1. INTRODUCTION TO OCEANOGRAPHY** 1.1 Characteristics and geographic features of Earth's principal oceans 1.2 Differences between an ocean and a sea 1.3 Early history of ocean exploration 1.4 Origin of atmosphere and oceans. **2. PLATE TECTONICS AND THE OCEAN FLOOR** 2.1 The continental drift theory 2.2 The theory of plate tectonics 2.3 Types of plate boundaries 2.4 Plate tectonics and evolution of ocean islands.
	Week 4-5	**3. MARINE PROVINCES** 3.1 Methods of direct and remote sea floor investigation 3.2 Features of the continental margins, ocean basin floor and mid-ocean ridge 3.3 Active and passive continental margins 3.4 Origin of submarine canyons and turbidity currents 3.5 Subduction zones and associated deep-sea trenches 3.6 Differences between transform faults and fracture zones. **4. MARINE SEDIMENTS** 4.1 Lithogenous sediments 4.2 Biogenous Sediments 4.3 Hydrogenous sediments 4.4 Cosmogenous sediments 4.5 Mixtures 4.6 Distribution of neritic and pelagic deposits.

	Week 6-8	**5. PROPERTIES OF SEA WATER** 5.1 Structure, geometry and polarity of mater molecule 5.2 Thermal properties of water 5.3 The importance of water in transferring heat around the earth 5.4 Seawater salinity and salinity process 5.5 Seawater density and ocean layering 5.6 Pycnocline, thermocline and halocline.. **6. AIR-SEA INTERACTION** 6.1 Causes of uneven solar heating on earth 6.2 Nature, origin and consequences of Coriolis effect 6.3 Circulation cells 6.4 Pressure belts, wind belts and boundaries 6.5 Weather and climate 6.6 Formation of tropical revolving storms and types of destruction caused by them.
	Week 9-12	**7. OCEAN CIRCULATION** 7.1 Measurement of ocean currents 7.2 Subtropical surface gyres 7.3 Western intensification and boundary currents 7.4 Ekman transport 7.5 Upwelling, down welling and their effects on marine life 7.6 Origin and effects of deep-water circulation 7.7 El Nino Southern Oscillation 8. **WAVES** 8.1 Origin of waves 8.2 Orbital motion and differences between deep and shallow-water waves 8.3 Relationship between a "sea" and a swell 8.4 The wave trains 8.5 Destructive and constructive interference 8.6 Wave reflection and refraction 8.7 Origin, coastal effects and hazards associated with tsunamis 8.8 Continental Shelf 8.9 High Seas 8.10 Deep Seabed (The Area)
	Week 13-16	9. **TIDES AND TIDAL STREAMS** 9.1 The theories of tides 9.2 Monthly tidal cycle 9.3 Variations in the orbit of the earth and moon and changes to tidal forces 9.4 Diurnal, semidiurnal and mixed tidal patterns 9.5 Types of tidal currents and their effects 9.6 Understanding Tide Table and tidal calculation

		10. **BEACHES AND SHORELINE PROCESSES** 10.1 Characteristics of beaches and coastal regions 10.2 Seasonal changes on beaches 10.3 Longshore currents and longshore drifts 10.4 Formation of coastal beaches 10.5 Local changes in coastline elevation 10.6 Climate change and nature of coastline 10.7 Formation and evolution of barrier islands 10.8 Types of hard stabilization and their effects on shorelines
	Week 17	**PROJECT PRESENTATION**

Literature

Compulsory

1. Trujillo, Alan P. & Thurman, Harold V (2019), Essentials of Oceanography,13th Edition, Pearson Prentice Hall, New Jersey.

Recommended

1. Pinet, P. R. (2019). Invitation to oceanography. Jones & Bartlett Learning.
2. Komatsu, T., Ceccaldi, H. J., Yoshida, J., Prouzet, P., & Henocque, Y. (Eds.). (2019). Oceanography Challenges to Future Earth: Human and Natural Impacts on Our Seas. Springer.

Course workload

The table below summarizes course workload distribution:

Activities	**Learning outcomes**	**Assessment**	**Estimated workload (hours)**
In-class activities (54 hours)			
Lectures	Explain the evolution of the ocean and ocean basin and demonstrate good comprehension on marine provinces, quality of sea water and environmental forces of the oceans.	Class participation.	37
Moderated in-class discussions	Identify environmental problems and evaluate mitigation strategies.	Class participation and preparedness for discussions.	10
In-class assessments	Demonstrate understanding of airsea interaction, elements of ocean circulation, waves, tides and tidal stream and their effects on shipping and human activities.	Written test and quizzes.	3

Individual assignments	Individual assignments in using various oceanographic equipment and interpreting their results.	Individual assignments.	6
Group assignment	Field study in determining the health and condition of selected coastal and marine environment.	Group assignment and presentation.	4
Independent work (66 hours)			
Lectures	Explain the evolution of the ocean and ocean basin and demonstrate good comprehension on marine provinces, quality of sea water and environmental forces of the oceans.	Class participation.	18
Moderated in-class discussions	Identify environmental problems and evaluate problem-solving strategies	Class participation and preparation for discussions.	4
In-class assessments	Understand airsea interaction, elements of ocean circulation, waves, tides and tidal stream and their effects on shipping and human activities.	Written test and quizzes.	8
Individual assignments	Utilization and analyzing of various oceanographic equipment and their results. .	Individual assignments.	10
Group assignment	Field study in determining the health and condition of selected coastal and marine environment.	Group assignment and presentation.	20
TOTAL			**120**

Grading

The students' performance will be based on the following:

Assessment	- <u>Continuous assessment (60%):</u> - Quizzes (15%): students have to undertake quizzes covering topics covered throughout the semester - Written Test (30%): students have to undertake written test covering topics covered throughout the semester. - Individual Assignments (15%): students have to complete the practical tasks given for selected topics. - Group Assignment (40%): The students will be divided into groups of 4-5 students and each group will be given a topic to conduct field study on the health and condition of selected coastal and marine environments. Peer Assessment will constitute 5% of the group assignment. -

Evaluation

Mark	Grade	Point Value
80-100	A	4.00
75-79	A-	3.67
70-74	B+	3.33
65-69	B	3.00
60-64	B-	2.67
55-59	C+	2.33
50-54	C	2.00
45-49	C-	1.67
40-44	D	1.00
0-39	F	0.00