

LAST REVIEW: 2010-11

NEXT REVIEW: 2015-2016

STATUS: A

COURSE TITLE: Oceanography

COMMON COURSE NUMBER: OCE1001

CREDIT HOURS: 3

CONTACT HOUR BREAKDOWN

CLOCK HOURS:

Lecture: **48**

Lab:

Clinic:

Other:

PREREQUISITE(S): MAT0024 with a grade of “C” or higher

COREQUISITE(S):

PRE/COREQUISITE(S):

COURSE DESCRIPTION : A survey of the four classic disciplines of the ocean sciences: geological oceanography, chemical oceanography, physical oceanography, and biological oceanography. Course will focus on the basic principles of the ocean sciences and stress the interdisciplinary nature of oceanography.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s):

4 B

UNIT TITLES:

- 1. Reading and Writing for Oceanography**
- 2. Origins of Oceanography**
- 3. Geological Oceanography**
- 4. Physical Oceanography**
- 5. Chemical Oceanography**
- 6. Biological Oceanography**

*** Complete the following only if course is seeking general education status ***

GENERAL EDUCATION Competencies and Skills *:

In the box to the right of the Competency/Skill, enter all specific **student learning outcome** unit numbers, as indicated in the course outline (i.e. 1.1, 2.7, 4.2, 4.0 and 5.12) that apply.

Course must include <u>all</u> of the following:	
1. Read with critical comprehension**	1.0, 2.1-2.19, 3.1-3.13, 4.1-4.37, 5.1-5.13, 6.1-6.8
2. Write clearly and coherently**	1.0
3. Demonstrate literacy as appropriate within a given discipline**	a) 1.1 e) 2.5, 2.19, 3.13, 4.8, 4.10, 4.20, 4.24, 4.25, 4.28, 4.29, 4.33, 4.37, 5.12 f) 1.0 – 6.0 g) 2.1, 2.3, 4.16, 4.22, 4.31, 4.32, 4.35, 4.37, 5.9, 5.12, 5.13, 6.8
4. Apply problem solving skills or methods to make informed decisions in a variety of contexts**	2.1, 2.3, 2.7, 2.9, 3.5, 3.15, 3.16, 4.16, 4.31, 4.35, 4.36, 4.37, 5.10, 5.12, 5.13, 6.8
Course must include at least <u>one</u> of the following:	
5. Differentiate between ethical and unethical behavior	
6. Demonstrate an understanding of the physical, biological, and social environments and how individual behaviors impact this complex system.	2.1, 2.3, 2.4, 3.7, 4.16, 4.17, 4.22, 4.23, 4.35, 4.36, 4.37, 5.10, 5.12, 5.13, 6.6, 6.8
7. Demonstrate an understanding of and appreciation for human diversities and commonalities.	
8. Speak and listen effectively.	

**General Education Competencies and Skills endorsed by 2010-2011 General Education Task Force*

****Required Competencies**

1) Read with critical comprehension.

The student will be introduced to the basic texts, concepts, vocabulary, and methods necessary for developing an understanding of the discipline and meeting the required benchmarks as stated in the course outline.

2) Write clearly and coherently.

The student will demonstrate an understanding and mastery of subject matter in a variety of ways, including writing. Writing activities may include both graded and ungraded essays, short answer quizzes, summaries, reactions, journals, and various other reports.

3) Demonstrate and apply literacy across all the disciplines (indicate which ones apply).

- a) **Information literacy** means understanding how to locate needed information, using the appropriate technology for the task, managing and evaluating the extracted information and using it effectively and ethically.
- b) **Technology literacy** is the ability to responsibly and effectively use appropriate technology to access, manage, integrate, or create information, and/or use technology to accomplish a given task.
- c) **Workplace literacy** is having the appropriate knowledge and skills to communicate and work with others effectively and perform job duties, whether it is through the use of computers and/or other technology.
- d) **Cultural literacy** is recognizing, understanding, and appreciating the similarities and differences between one's own culture and the cultures of others through a study of the arts, customs, beliefs, values, and history that define a culture.
- e) **Quantitative literacy** is having the ability to formulate, solve and interpret mathematical/statistical operations and graphical/tabular representations to make informed decisions.

f) **Scientific literacy** means understanding the methodology and application of the scientific process, the physical and biological worlds, and recognizing that scientific knowledge is continuously updated or revised as new information is discovered.

g) **Environmental literacy** is creating a context within which environmental issues can be viewed, imparting knowledge to enhance one's ability to analyze the issues, make the connections between humans' decisions and actions and the challenges facing the environment, and instilling the desire to sustain the environment through ethical practices in both one's professional and personal lives.

4. Apply problem-solving skills or methods to make informed decisions in a variety of contexts.

The student will use acquired skills or methods to recognize, analyze, adapt, and apply critical thinking to solve problems and make informed decisions.

EVALUATION:

In the box to the right of the Methods of Assessment, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 4.0, 4.2 and 5.12) that apply.

1. Portfolio	
2. Short essays	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8
3. Research Papers	
4. Group projects	
5. Discussions (In class and online)	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8
6. Multiple Choice tests	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8
7. Presentations	
8. Service Learning Projects	
9. Quizzes (pop, announced, etc.)	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8
10. Take-home tests	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8
11. Summaries, critiques, and analyses	
12. Reaction papers	
13. Surveys	
14. Performance	
15. Short answer tests	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8
16. Classroom debates and colloquia	
17. Blogs, wikis, web pages	
18. Other (Please explain)	

Unit 1: Reading and Writing for Oceanography

General Outcome:

1.0 The student shall: be able to clearly communicate in writing, meaningful information derived from course related reading assignments, lectures and lecture demonstrations, and any other methods used to convey subject information (maps, charts, drawings, pictures, paintings, internet sources, graphs, databases, etc.) to meet the required course outcomes benchmarks outlined in Units 2 through 6 of this course outline.

Specific Measurable Learning Outcomes:

1.1 Demonstrate in writing the ability to recall knowledge, comprehend information, organize ideas, analyze and synthesize data, problem solve, and apply meaningful knowledge, relevant to the science of Oceanography from course related readings.

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UNITS

Unit 2 Origins of oceanography

General Outcome:

2.0 The student shall: be able to demonstrate basic knowledge and comprehension of the major contributions made to the science of oceanography throughout history.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1 Discuss the ocean's role in human history.**
- 2.2 Describe the development of ocean science.**
- 2.3 Evaluate how ocean science contributes to human activities.**
- 2.4 Describe how advances in technology have changed the way we study the ocean.**
- 2.5 Describe the extent and boundaries of the world ocean and land masses.**
- 2.6 Describe the physiography of the ocean basins and land masses.**
- 2.7 Locate marginal seas, basins, bays, estuaries, gulfs, straits, major rivers, and key continental features which influence ocean processes.**
- 2.8 Explain the global hydrologic cycle and relate to global heat transport.**
- 2.9 Use the cartesian coordinate system used for site location and navigation (latitude, longitude, nautical mile, degrees, minutes, seconds).**
- 2.10 Explain the meaning of northern, southern, eastern, and western hemispheres.**
- 2.11 Discuss the origin of the solar system, earth, oceans, and life.**

Common Course Number: OCE1001

Unit 3 Geological Oceanography

General Outcome:

- 3.0 The student shall: be able to demonstrate basic knowledge and comprehension of the geologic principles that have contributed to the formation and evolution of Earth's oceans , ocean basins, seawater characteristics, atmosphere, and climate.**

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 3.1 Describe the Earth's interior structure**
- 3.2 Define isostasy and discuss how this concept relates to the Earth's plates.**
- 3.3 Compare the theory of plate tectonics to sea floor spreading and continental drift.**
- 3.4 Describe hot spots.**
- 3.5 Describe magnetic anomalies and paleo-magnetism and their relation to plate tectonics.**
- 3.6 Discuss hydrothermal circulation at mid ocean ridges.**
- 3.7 Compare and contrast active and passive margins.**
- 3.8 Describe mantle convection and its relationship to plate tectonics.**
- 3.9 Discuss the geologic history of the Atlantic, Pacific and Indian Ocean basins.**
- 3.10 Compare and contrast the sources and transport of marine sediment particles.**
- 3.11 Compare and contrast the characteristics of terrigenous, biogenous, hydrogenous and cosmogenous sediments.**
- 3.12 Compare the relationship between sea level and sediment deposits.**
- 3.13 Analyze the distribution of sediment types in the world's oceans.**
- 3.14 Interpret the record of ocean history and global climate change recorded in sediment deposits.**
- 3.15 Identify resources derived from marine sediments.**
- 3.16 Describe the different types of shorelines and the processes that have helped shaped coastal areas.**

Common Course Number: OCE1001

Unit 4 Physical Oceanography

General Outcome:

4.0 The student shall: be able to demonstrate basic knowledge and comprehension of the processes that govern the physics of the ocean and atmosphere.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1 List the most important elements of weather and climate, such as rain, wind, temperature, etc.**
- 4.2 List the major and variable components of air.**
- 4.3 Describe the extent and structure of the oceans and atmosphere.**
- 4.4 Describe how the oceans and atmosphere are heated.**
- 4.5 Explain the causes of the seasons.**
- 4.6 Describe and evaluate the general distribution of global air and surface water temperatures.**
- 4.7 Evaluate and describe the processes that cause water to change from one state of matter to another.**
- 4.8 Calculate latent heats of vaporization and melting, condensation and freezing.**
- 4.9 Identify the three processes that initiate the vertical movement of air.**
- 4.10 Describe air pressure, how it is measured, and why it changes with altitude.**
- 4.11 Explain how the pressure gradient force, Coriolis effect, and friction influence wind.**
- 4.12 Describe and evaluate the idealized global patterns of pressure and wind.**
- 4.13 Relate the global distribution of precipitation to the global wind patterns.**
- 4.14 Classify air masses based on their climate characteristics.**
- 4.15 Compare and contrast warm fronts and cold fronts.**
- 4.16 List and explain the atmospheric conditions that produce hurricanes.**
- 4.17 Discuss what is meant by the Earth's climate system.**
- 4.18 Describe and analyze the water and heat budget of the oceans.**
- 4.19 Describe the oceans vertical structure and oceanic depth zones.**

- 4.20 Evaluate temperature-salinity relationships in the oceans.**
- 4.21 Discuss the formation and effects of sea ice on the oceans.**
- 4.22 Compare and contrast the characteristics of the El Niño – Southern Oscillation (ENSO).**
- 4.23 Examine and discuss the movement of the ocean surface and subsurface currents.**
- 4.24 Relate the Ekman Spiral to wind driven currents.**
- 4.25 Describe geostrophic current flow and ocean basin gyres.**
- 4.26 Describe thermohaline circulation and bottom water formation.**
- 4.27 Describe the formation and basic structure of waves.**
- 4.28 Calculate the celerity of deep and shallow water waves.**
- 4.29 Calculate resulting wave heights due to wave interference**
- 4.30 Differentiate between shallow water and deep-water waves.**
- 4.31 Discuss how waves modify the shorelines**
- 4.32 Describe the formation of storm surges and tsunamis.**
- 4.33 Discuss the general features and analyze the patterns of ocean tides**
- 4.34 Describe coastal waters such as estuaries, lagoons and marginal seas.**
- 4.35 Discuss the importance of coastal wetlands.**
- 4.36 Identify the types of marine pollution.**
- 4.37 Discuss the processes that cause global climate change, including the Milankovitch cycles and the collective effects of changes in the Earth's orbital parameters upon its climate**

Common Course Number: OCE1001

Unit 5 Chemical Oceanography

General Outcome:

5.0 The student shall: be able to demonstrate a basic understanding of the processes that govern the chemistry of the ocean.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1 Describe the molecular structure of water.**
- 5.2 Describe the structure of water ice.**
- 5.3 Evaluate how temperature affects water.**
- 5.4 Discuss seawater viscosity and the influence on marine organisms.**
- 5.5 Define salinity.**
- 5.6 Relate ocean water density to water column stability.**
- 5.7 Discuss the effects of salinity on the physical properties of water.**
- 5.8 List the atmospheric gases dissolved in water and discuss their importance.**
- 5.9 Explain the importance of acidity and alkalinity of seawater.**
- 5.10 Describe the carbon cycle and relate this cycle to global climates and primary production.**
- 5.11 Compare the physical and biological processes controlling sea salt composition.**
- 5.12 Calculate residence times for the dissolved constituents in seawater and relate to biological, physical and geological ocean processes.**
- 5.13 List the resources derived from seawater.**

Common Course Number: OCE1001

Unit 6 Biological Oceanography

General Outcome:

6.0 The student shall: be able to demonstrate a basic understanding of the processes that control the distribution and abundance of life in the ocean

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

6.1 List and discuss marine habitats and life-styles

6.1.1 Define plankton and nekton.

6.1.2 Define phytoplankton, zooplankton, holoplankton, and meroplankton, giving examples each and discussing their role in marine ecosystems

6.1.3 Evaluate life strategies and adaptations of open ocean plankton and nekton such as feeding, defense, reproduction, migration.

6.1.4 Identify representative marine mammals, seabirds, reptiles and evaluate their role in marine and ecosystems.

6.1.5 Discuss the benthic marine environment and how benthic organisms compete for space and food (life strategies).

6.1.6 Discuss the distribution and controls on marine life in the intertidal zone

6.1.7 Compare and contrast the distribution and controls on marine life in the sandy and rocky shore intertidal zones, tide pools, muddy bottom, and sandy bottom communities, salt marshes and sea grass beds, kelp forests, oyster reefs, coral reefs, mangrove reefs, and deep ocean benthos

6.1.8 Discuss the distribution and controls on deep ocean vent communities.

6.2 List the principal features of an oceanic ecosystem such as salinity, temperature, pressure, and density and discuss how each affect marine life distribution.

6.3 Define and discuss primary and secondary production in the ocean, food chains, and food webs.

6.4 Explain how marine organisms affect seawater.

6.5 Relate the controls on primary production and its distribution in the ocean with respect to light limitation and nutrient levels.

6.6 Illustrate and explain the primary nutrient cycles and controls.

6.7 Define chemosynthesis and give examples.

6.8 Explain what is meant by maximum sustainable yield.