ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Sciences & Business

COURSE: GEL 1006 Introduction to Oceanography

Date: Fall 2019

Credit Hours: 3

Prerequisite(s): None

Delivery Method:

☒ **Lecture**	**3 Contact Hours**	**(1 contact = 1 credit hour)**
☐ **Seminar**	**0 Contact Hours**	**(1 contact = 1 credit hour)**
☐ **Lab**	**0 Contact Hours**	**(2-3 contact = 1 credit hour)**
☐ **Clinical**	**0 Contact Hours**	**(3 contact = 1 credit hour)**
☐ **Online**		
☐ **Blended**		

Offered: ☐ **Fall** ☒ **Spring** ☐ **Summer**

IAI Equivalent –***Only for Transfer Courses***-go to *http://www.itransfer.org*: P1 905

CATALOG DESCRIPTION:
The course focuses on the marine environment as a unique feature of the planet earth and investigates areas of intense scientific and public concern; the pervasiveness of the ocean and its effect on the earth's weather; its stunning physical size and diversity of contained life forms; its contributions to the physical and historical development of man; its impact on geopolitical and economic matters; the impact of oceanic pollutants and the potential exploitation of marine resources.

GENERAL EDUCATION GOALS ADDRESSED

[See last page for Course Competency/Assessment Methods Matrix.]

Upon completion of the course, the student will be able:

[Choose up to three goals that will be formally assessed in this course.]

☒ To apply analytical and problem solving skills to personal, social, and professional issues and situations.
☒ To communicate successfully, both orally and in writing, to a variety of audiences.
☐ To construct a critical awareness of and appreciation for diversity.
☐ To understand and use technology effectively and to understand its impact on the individual and society.
☐ To develop interpersonal capacity.
☒ To recognize what it means to act ethically and responsibly as an individual and as a member of society.
☐ To recognize what it means to develop and maintain a healthy lifestyle in terms of mind, body, and spirit.
☐ To connect learning to life.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals. See last page for more information.]

Upon completion of the course, the student will be able to:

1. Understand how science works and the characteristics of oceanography.
    - Competency 1.1: Identify the methodology of science.
    - Competency 1.2: Critically evaluate datasets and infer valid conclusions from those datasets.
    - Competency 1.3: Identify the basic concepts of oceanography as a method for the scientific study of the oceans.
    - Competency 1.4: Identify some of the key moments in the history of ocean exploration and study.
    - Competency 1.5: Identify some of the tools used by oceanographers and describe how they are used.

2. Understand the physical processes that shape the surface of the earth, and, specifically, the ocean basins and the coasts.
    - Competency 2.1: Describe the process of plate tectonics and the evidence that supports it.
    - Competency 2.2: Identify, analyze, and evaluate the features of the ocean produced by tectonic activity, and describe their origin and significance.
    - Competency 2.3: Describe the geological processes associated with waves and the coast and the landforms produced by those processes; analyze coastal landforms and describe the processes that created them.
    - Competency 2.4: Describe the geologic processes associated with the deep ocean and the landforms produced by those processes; analyze the ocean floor and describe the processes that shaped it.
    - Competency 2.5: Describe the process that produce ocean sediments, describe the abundance and locations of various types of sediments, classify sediments based on their characteristics.

3. Understand some of the current theories concerning the origin of the planet and the waters that cover its surface.
    - Competency 3.1: Describe and evaluate the scientific theories that explain the formation of the earth.
    - Competency 3.2: Describe and evaluate the scientific theories that explain the origin of the oceans.
    - Competency 3.3: Describe the solids and gasses dissolved in the ocean and explain their sources.

4. Understand the basic physical and chemical properties of the ocean in terms of the special properties of water, dissolved salts, and dissolved gases.
    - Competency 4.1: Describe the shape and polar nature of the water molecule, analyze and evaluate the effect this has on the physical and chemical properties of water.
    - Competency 4.2: Identify the densities of water and seawater, describe the factors that effect seawater density, and analyze and evaluate the effects of seawater density.
    - Competency 4.3: Identify the thermal properties of water and seawater and analyze and evaluate the effects of the thermal properties of water and seawater.
    - Competency 4.4: Describe the factors that effect the salinity of seawater, analyze and evaluate the effects of seawater salinity.
    - Competency 4.5: Describe the factors that effect light and sound in seawater.

5. Understand the motions of the seas--including currents, waves (wind, tides, seiches, and tsunamis), and storm surges.
    - Competency 5.1: Identify, analyze, and evaluate the movement of water in a wave.
    - Competency 5.2: Identify, analyze, and evaluate the causes of waves.
    - Competency 5.3: Describe several methods for the classification of waves. (Including disturbing force, restoring force, and depth.)
    - Competency 5.4: Identify, analyze, and evaluate the effects of waves.
    - Competency 5.5: Identify, analyze, and evaluate the forces that create and effect the ocean's currents.
    - Competency 5.6: Describe the different types of currents.
    - Competency 5.7: Identify, analyze, and evaluate the effects of ocean currents.

6. Understand the basic concepts of weather and climate.
    - Competency 6.1: Identify, analyze, and evaluate the forces that effect the earth's atmosphere.
    - Competency 6.2: Identify, analyze, and evaluate basic weather patterns (including monsoons, tropical cyclones, and extra tropical cyclones.
    - Competency 6.3: Identify, analyze, and evaluate the effects of the ocean on climate and weather.

7. Understand the basic nature of life in the ocean.
    - Competency 7.1: Describe the evidence supporting the theory of the evolution of life through natural selection and analyze and evaluate the effects of evolution on life in the ocean.
    - Competency 7.2: Describe, analyze, and evaluate the adaptations of organisms to life in the ocean.

Competency 7.3: Describe, analyze and evaluate the distribution of life in the ocean.
Competency 7.4: Identify the major phyla of life in the ocean and describe their features.
Competency 7.5: Describe, analyze and evaluate ocean ecosystems and their properties.
Competency 7.6: Describe, analyze and evaluate the movement of energy through ocean ecosystems and the factors that effect primary productivity.

8. Understand the resources of the sea in terms of minerals, energy, and food.
   Competency 8.1: Identify some of the biological resources of the sea and analyze and evaluate their origin, availability and use.
   Competency 8.2: Identify some of the energy resources of the sea and analyze and evaluate their origin, availability and use.
   Competency 8.3: Identify some of the mineral resources of the sea and analyze and evaluate their origin, availability and use.

9. Understand the interactions between humans and the ocean.
   Competency 9.1: Identify, analyze and evaluate the impact of humans on the ocean.
   Competency 9.2: Identify, analyze, and evaluate the causes of, effects of, and responses to marine pollution.

MAPPING LEARNING OUTCOMES TO GENERAL EDUCATION GOALS

[For each of the goals selected above, indicate which outcomes align with the goal.]

Goals	Outcomes
First Goal	
To apply analytical and problem-solving skills to personal, social, and professional issues and situations.	1. Understand how science works and the characteristics of oceanography. 2. Understand the physical processes that shape the surface of the earth, and, specifically, the ocean basins and the coasts. 7. Understand the basic nature of life in the ocean. 9. Understand the interactions between humans and the ocean.
Second Goal	
To communicate successfully, both orally and in writing, to a variety of audiences.	1. Understand how science works and the characteristics of oceanography. 2. Understand the physical processes that shape the surface of the earth, and, specifically, the ocean basins and the coasts. 3. Understand some of the current theories concerning the origin of the planet and the waters that cover its surface. 4. Understand the basic physical and chemical properties of the ocean in terms of the special properties of water, dissolved salts, and dissolved gases.

	5. Understand the motions of the seas--including currents, waves (wind, tides, seiches, and tsunamis), and storm surges. 6. Understand the basic concepts of weather and climate. 7. Understand the basic nature of life in the ocean. 8. Understand the resources of the sea in terms of minerals, energy, and food. 9. Understand the interactions between humans and the ocean.
Third Goal	
To recognize what it means to act ethically and responsibly as an individual and as a member of society.	8. Understand the resources of the sea in terms of minerals, energy, and food. 9. Understand the interactions between humans and the ocean.

COURSE TOPICS AND CONTENT REQUIREMENTS:

1. Foundations of Oceanography (10%)
   Provides a description of the basic concepts of oceanography including scientific analysis and the history of ocean exploration and research. Provides a discussion on the features and use of charts and navigation.
   - A. Introduction to oceanography
   - B. Introduction to Scientific Investigation
   - C. Charts & navigation
   - D. Remote Sensing Imagery

2. Ocean Basins (25%)
   Provides a discussion of ocean basins, islands and coasts including their formation and evolution. Describes the origin and deposition of sediments.
   - A. Plate tectonics and the ocean floor.
   - B. Islands
   - C. Coasts
   - D. sediments

3. Ocean Processes (25%)
   Provides a discussion of processes that effect the ocean. Includes a discussion of the physical processes that move the water and the atmosphere
   - A. Waves
     - (1) Wind waves
     - (2) Tides
     - (3) Seiches and tsunamis
     - (4) Storm surges
   - B. Currents
   - C. Weather & Climate

4. Ocean Chemistry and Physics (10%)

Provides a description of the physics and chemistry of ocean water. Includes a discussion of the physical and chemical properties of water and seawater and the effects of those properties on the ocean.

A. The water molecule
B. Thermal properties of water and seawater
C. Salinity and dissolved solids in seawater
D. Dissolved gasses in seawater
E. Light in seawater
F. Sound in seawater

5. Life in the Ocean (25%)

Provides a description of the nature of life in the ocean. Includes a discussion of the development of life through time, adaptations to life in the ocean, and the properties of ecosystems.

A. Organic evolution through natural selection
B. Ecosystems and ecosystem properties
C. Characteristics of life in the ocean
D. Major phyla of ocean life

6. Ocean Resources and Human Impact (5%)

Provides a description of ocean resources and the nature and impact of human interactions with the ocean.

A. Energy and mineral resources
B. Biological resources
C. Ocean pollution

INSTRUCTIONAL METHODS:

1. On-campus course
   A. Lectures
   B. Discussions - may include individual oral presentations on specified topics
   C. Demonstrations
   D. Audio-visual Aids - films, video tapes, filmstrips, transparencies with overhead projector, slides, charts, and maps
   E. Supplemental Reading
      i Journals and periodicals
      ii Newspapers
      iii Books
      iv Pamphlets and brochures
      v Internet sites

INSTRUCTIONAL MATERIALS:

Text: *Oceanography,* Garrison, T., (current edition)
Instructional videos:
Supplements: Transparencies, charts, maps, slides, publications, www sites

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

1. Regular attendance and participation in discussion (5%)
2. Written assignments (30%)
3. Exams (60%)

4. Quizzes (5%)
5. Classroom Assessment (non grade-based)

Grading scale:

90 - 100%	A
80 - 89%	B
70 - 79%	C
60 - 69%	D
< 60%	F

OTHER REFERENCES

1. Journals such as: *Geology, Journal of Geoscience Education, Geotimes, GSA Today, Environment, Scientific American, EPA Journal, National Geographic,* and others.
2. Reference texts and books such as:
   Geology and Society, Coates, 1985
   Earth: An Introduction to Physical Geology. Tarbuck, E.J. and Lutgens, F.K., (6th edition), 1999
   Oceanography, Garrison, T., current edition
   Understanding Earth, Press and Seiver, 1997
   Earth's Dynamic Systems, Hamblin, W.K., Christensen, E.H., 1998
   The Dynamic Earth, Skinner, B.J. and Porter, S.C., 1992
   Process Geomorphology, Ritter, Kochel, and Miller, 2012
   To Interpret the Earth: Ten Ways to be Wrong, Schumm, 1991
   Beach Processes and Sedimentation, Komar, P.D., 1976
3. Numerous other books, pamphlets, and journals on a wide variety of environmental topics published by the government are available in the Federal Depository section of our library.

Course Competency/Assessment Methods Matrix

GEL 1006 Introduction to Oceanography	**Assessment Options**																														
For each competency/outcome place an "X" below the method of assessment to be used.	**Assessment of Student Learning**	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	**Direct/ Indirect**	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D			X			
1.1 Identify the methodology of science.							X		X				X														X				X
1.2 Critically evaluate datasets and infer valid conclusions from those datasets.							X		X				X														X				X
1.3 Identify the basic concepts of oceanography as a method for the scientific study of the oceans.							X	X	X				X														X				X
1.4 Identify some of the key moments in the history of ocean exploration and study.							X	X	X				X														X				X
1.5 Identify some of the tools used by oceanographers and describe how they are used.							X	X	X				X														X				X
2.1 Describe the process of plate tectonics and the evidence that supports it.							X	X	X				X														X				X

2.2 Identify, analyze, and evaluate the features of the ocean produced by tectonic activity, and describe their origin and significance.							X	X	X				X														X				X
2.3 Describe the geological processes associated with waves and the coast and the landforms produced by those processes; analyze coastal landforms and describe the processes that created them.							X	X	X				X														X				X
2.4 Describe the geologic processes associated with the deep ocean and the landforms produced by those processes; analyze the ocean floor and describe the processes that shaped it.							X	X	X				X														X				X
2.5 Describe the process that produce ocean sediments, describe the abundance and locations of various types of sediments, classify sediments based on their characteristics.							X	X	X				X														X				X
3.1 Describe and evaluate the scientific theories that explain the formation of the earth.							X	X	X				X														X				X
3.2 Describe and evaluate the scientific theories that explain the origin of the oceans.							X	X	X				X														X				X
3.3 Describe the solids and gasses dissolved in the ocean and explain their sources.							X	X	X				X														X				X
4.1 Describe the shape and polar nature of the water molecule, analyze and evaluate the effect this has on the physical and chemical properties of water.							X	X	X				X														X				X

4.2 Identify the densities of water and seawater, describe the factors that effect seawater density, and analyze and evaluate the effects of seawater density.							X	X	X				X														X				X
4.3 Identify the thermal of water and seawater and analyze and evaluate the effects of the thermal properties of water and seawater.							X	X	X				X														X				X
4.4 Describe the factors that effect the salinity of seawater, analyze and evaluate the effects of seawater salinity.							X	X	X				X														X				X
4.5 Describe the factors that effect light and sound in seawater.							X	X	X				X														X				X
5.1 Identify, analyze, and evaluate the movement of water in a wave.							X	X	X				X														X				X
5.2 Identify, analyze, and evaluate the causes of waves.							X	X	X				X														X				X
5.3 Describe several methods for the classification of waves. (Including disturbing force, restoring force, and depth.)							X	X	X				X														X				X
5.4 Identify, analyze, and evaluate the effects of waves.							X	X	X				X														X				X
5.5 Identify, analyze, and evaluate the forces that create and effect the ocean's currents.							X	X	X				X														X				X
5.6 Describe the different types of currents.							X	X	X				X														X				X
5.7 Identify, analyze, and evaluate the effects of ocean currents.							X	X	X				X														X				X

6.1 Identify, analyze, and evaluate the forces that effect the earth's atmosphere.							X	X	X				X														X				X
6.2 Identify, analyze, and evaluate basic weather patterns (including monsoons, tropical cyclones, and extra tropical cyclones.							X	X	X				X														X				X
6.3 Identify, analyze, and evaluate the effects of the ocean on climate and weather.							X	X	X				X														X				X
7.1 Describe the evidence supporting the theory of the evolution of life through natural selection and analyze and evaluate the effects of evolution on life in the ocean.							X	X	X				X														X				X
7.2 Describe, analyze, and evaluate the adaptations of organisms to life in the ocean.				X		X	X	X	X				X														X				X
7.3 Describe, analyze and evaluate the distribution of life in the ocean.							X	X	X				X														X				X
7.4 Identify the major phyla of life in the ocean and describe their features.							X	X	X				X														X				X
7.5 Describe, analyze and evaluate ocean ecosystems and their properties.							X	X	X				X														X				X
7.6 Describe, analyze and evaluate the movement of energy through ocean ecosystems and the factors that effect primary productivity.							X	X	X				X														X				X
8.1 Identify some of the biological resources of the sea and analyze and evaluate their origin, availability and use.							X	X	X				X														X				X

8.2 Identify some of the energy resources of the sea and analyze and evaluate their origin, availability and use.							X	X	X				X														X				X
8.3 Identify some of the mineral resources of the sea and analyze and evaluate their origin, availability and use.							X	X	X				X														X				X
9.1 Identify, analyze and evaluate the impact of humans on the ocean.							X	X	X				X														X				X
9.2 Identify, analyze, and evaluate the causes of, effects of, and responses to marine pollution.							X	X	X				X														X				X