Lecture Contact Hours: 48-54; Homework Hours: 96-108; Total Student Learning Hours: 144-162

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

OCEANOGRAPHY 112 – INTRODUCTION TO OCEANOGRAPHY

3 hours lecture, 3 units

Catalog Description
Physical science course which examines major aspects of the marine environment. Topics include the origin of the oceans, plate tectonics, seafloor features, seawater properties, ocean climate, currents, waves, tides, coastal landforms, marine ecology, pollution, and resources. The history and development of oceanography and the present and future importance of the oceans are also discussed.

Prerequisite
None

Course Content
1) Introduction: history of oceanography, oceanography as a field of study
2) Origin of the solar system, the earth's oceans and life on Earth
3) Geography: location of oceans, seas and rivers
4) Physiography of the ocean bottom, location of major ocean bottom features
5) Geology: Earth's interior, isostacy, continental drift, seafloor spreading, plate tectonics, seafloor features, sediments
6) Physical properties and chemistry of seawater
7) Sun-air interactions, atmospheric circulation
8) Surface currents, deep-ocean circulation
9) Waves: wind waves, tsunamis, internal waves, tides
10) Coastal processes
11) Life in the sea: photosynthesis, respiration, nutrients and nutrient cycling
12) Plant and animal groups of marine life: plankton, nekton, benthos, intertidal organisms
13) Marine pollution: sources, effects and mitigation
14) Food, mineral and water resources from the sea; law of the sea
15) New research and future problems

Course Objectives
Students will be able to:
1) Apply fundamental principles of physical and biological science to the study of the ocean.
2) Discuss the basic concepts of plate tectonics and explain how the ocean floor and continental margins have been shaped by the actions of seafloor spreading and continental drift.
3) Describe the major physical features of the seafloor and explain their origins.
4) Outline the fundamental principles of waves and tides and describe their influence in shaping the shoreline.
5) Relate seawater density to depth, salinity, and temperature and describe typical profiles of each.
6) List the major chemical components of seawater and explain why the water molecule is so remarkable.
7) Model atmospheric circulation patterns and discuss the interactions between the oceans and the atmosphere in producing global weather patterns.
8) Model surface and deep water circulation patterns, including the mechanisms of geostrophic balance and thermohaline circulation.
9) Classify the main forms of marine life and describe their relationships and interactions.

10) Discuss the interactions between marine organisms and their environment, emphasizing the special conditions imposed on life by the marine environment.
11) List the resources the ocean provides humanity and discuss the long-term implications of resource extraction on the ocean environment.
12) Describe the damage to the marine environment caused by pollution.
13) List the major historical developments in the field of oceanography and explain their significance.
14) Examine the interdisciplinary relationships between physics, chemistry, geology, ecology and engineering in the context of marine studies.

Method of Evaluation
A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.
1) Classroom assessment tools, such as reading quizzes, concept quizzes, attention quizzes, muddiest point questions, and one-minute papers, that measure students' ability to apply concepts just discussed in class. An example would be a multiple choice question answered using an audience response system in which students might specify which of several proposed large-scale ocean circulation patterns best describes the patterns seen in Earth's oceans.
2) Homework that measures students' ability to interact with the course material outside the classroom and to evaluate their ability to extend the classroom and reading experience to novel situations. Questions are almost exclusively word problems. An example would be a question in which students describe where the energy comes from that drives a hurricane, how that energy is translated into hurricane-force winds, and which direction the winds blow in a hurricane.
3) Periodic quizzes and exams that evaluate student learning and retention of the material on the time scale of weeks. Questions are mostly multiple choice (because of the breadth of the field of oceanography), but also some short answer conceptual questions for depth. An example would be a question in which students describe where the energy comes from that drives a hurricane, how that energy is translated into hurricane-force winds, and which direction the winds blow in a hurricane.
4) Final examination that evaluates students' ability to integrate the course material as a whole and to assess overall retention of the material. Questions are mostly multiple choice (because of the breadth of the field of oceanography), but also some short answer conceptual questions for depth. An example would be a question in which students briefly explain the concept of plate tectonics, describe the 3 basic ways plates can interact, and describe whether earthquakes or volcanoes will result from the interaction.

Special Materials Required of Student
None

Minimum Instructional Facilities
Smart classroom with document camera

Method of Instruction
1) Lecture and discussion
2) Multimedia presentations
3) Guest speakers
4) Field trips

Out-of-Class Assignments
1) Field observation of ocean-related phenomena
2) Research projects

Texts and References

1) Required (representative example): Trujillo, A.P & H.V. Thurman. *Essentials of Oceanography*, 13th edition, 2019.
2) Supplemental: As assigned

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

1) Apply fundamental principles of physical and biological science to the study of the oceans.
2) Explain the basic concepts of plate tectonics.
3) Describe the major physical features of the seafloor and explain their origins.
4) Explain the fundamental principles of waves and tides.
5) Relate seawater density to depth, salinity and temperature, and describe typical profiles of each.
6) List the major chemical components of seawater and explain why the water molecule is so remarkable.
7) Explain the basic principles of atmospheric circulation.
8) Explain the basic principles of surface and deep water circulation, including the mechanisms of geostrophic balance and thermohaline circulation.
9) Classify the main forms of marine life.
10) Discuss the interactions between marine organisms and their environment, emphasizing the special conditions imposed on life by the marine environment.
11) List the resources the ocean provides humanity.
12) Describe the damage to the marine environment caused by pollution.
13) List the major historical developments in the field of oceanography and explain their significance.
14) Examine the interdisciplinary relationships between physics, chemistry, geology, ecology and engineering in the context of marine studies.

Student Learning Outcomes

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

1) Evaluate data and communicate information regarding human impact on the marine environment and climate change.
2) Apply the scientific inquiry process and utilize oceanographic principles to explore current areas of research and effectively communicate information about developments in the field.