Modesto Junior College  
Course Outline of Record  
EASCI 162

I. OVERVIEW  
The following information will appear in the 2012 - 2013 catalog

EASCI 162 Introduction to Oceanography  
4 Units

Recommended for Success: Before enrolling in this course, students are strongly advised to satisfactorily complete EASCI 161 and satisfactorily complete MATH 70.

An introductory study of oceanography, the study of the world’s oceans. Topics include the ocean’s role in the earth system, marine geography, ocean basins and plate tectonics, ocean water, ocean chemistry, marine sediments, ocean-atmosphere interaction, ocean currents, ocean waves and tides, coastal processes, marine ecosystems, ocean life, ocean and climate, oceanographic techniques, and ocean stewardship. Lab activities emphasize gathering and analysis of oceanographic data to understand and predict oceanographic phenomena.

Field trips are required.  (A-F or P/NP - Student choice) Lecture /Lab  
Transfer: (CSU, UC) General Education:  (MJC-GE: A ) (CSU-GE: B1, B3 ) (IGETC: 5A )

II. LEARNING CONTEXT  
Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. COURSE CONTENT  

1. Required Content:

   a. Earth as a ‘water planet’

      i. geography of world ocean

      ii. formation of earth's atmosphere and oceans

   b. Ocean Basins and Plate Tectonics

      i. Plate Tectonic theory

      ii. plate boundaries: features and processes

   c. Marine Provinces

      i. bathymetry as a science

      ii. marine provinces: features and processes

   d. Marine Sediments

      i. types of marine sediment

      ii. marine sedimentary processes

      iii. marine sediment distribution
e. Seawater Chemistry
   i. chemical and physical properties of water
   ii. chemical and physical properties of seawater
   iii. temperature, salinity, and density of seawater

f. Air-Sea Interaction
   i. seasons
   ii. unequal heating of earth's surface
   iii. global atmospheric circulation

g. Ocean Circulation
   i. surface ocean currents
   ii. upwelling and downwelling
   iii. thermohaline circulation

h. Ocean Waves
   i. wave terminology
   ii. wind-driven waves
   iii. waves in the surf zone
   iv. tsunami

i. Tides
   i. tide generation
   ii. tidal cycles and tidal patterns
   iii. tidal phenomena

j. Beach and Shoreline
   i. coast terminology
   ii. shoreline sediment transport
   iii. erosional vs depositional shores
   iv. emergent vs. submergent shores and sea level change
   v. hard stabilization

k. Coastal Ocean
   i. coastal waters: types and characteristics
ii. marine pollution
iii. coastal wetlands

l. Marine Life
i. classification of marine organisms
ii. divisions of the marine environment
iii. adaptations to physical conditions

m. Oceans and Climate Change
i. earth’s climate system
ii. recent changes in climate
iii. changes in the oceans

2. Required Lab Content:

a. Maps, Charts, and Bathymetry
i. bathymetric profiles

b. Plate Tectonics, Isostasy, and Seismicity

c. Marine Provinces

d. Marine Sediments and Sedimentary Processes

e. Marine Chemistry
i. temperature, salinity, and density relationships

f. Coriolis Effect

g. Atmospheric Circulation

h. Ocean Currents
i. surface currents
ii. upwelling/downwelling
iii. thermohaline circulation

i. Ocean Waves

j. Ocean Tides

k. Coastal Dynamics

l. The Marine Environment
m. Climate Change

B. ENROLLMENT RESTRICTIONS

1. Advisories
Before enrolling in this course, students are strongly advised to satisfactorily complete EASCI 161 and satisfactorily complete MATH 70.

2. Requisite Skills
Before entering the course, the student will be able to:

a. Describe nature of earth sciences and perform mathematical calculations.

C. HOURS AND UNITS

<table>
<thead>
<tr>
<th>INST METHOD</th>
<th>TERM HOURS</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lect</td>
<td>54</td>
<td>3.00</td>
</tr>
<tr>
<td>Lab</td>
<td>54</td>
<td>1.00</td>
</tr>
<tr>
<td>Disc</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

D. METHODS OF INSTRUCTION (TYPICAL)

Instructors of the course might conduct the course using the following method:

1. lecture, demonstrations, and assignment of group problems during lecture
2. assignment of lab activities
3. assignment of textbook reading passages and related question sets
4. assignment of weekly summary of oceanography-related article
5. assignment of group research projects
6. take students on field trip and assign problems that involve observation, synthesis, and application of oceanographic principles

E. ASSIGNMENTS (TYPICAL)

1. EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS
**Time spent on coursework in addition to hours of instruction (lecture hours)**

a. current event article summary/analysis (weekly)

b. textbook readings (weekly)

c. question sets (weekly)

d. pre-lab activity (weekly)

e. group research project (two/semester)

f. study and prepare for lecture exams (three/semester)

g. study and prepare for lab exams (three/semester)
h. all day field trip (one/semester)

2. **EVIDENCE OF CRITICAL THINKING**
   *Assignments require the appropriate level of critical thinking*

   a. Typical Assignment
      
      i. Find, access, and read a recent oceanography-related article, summarize its main points, identify which oceanography sub-discipline it is related to, and examine ways in which the subject of the article could affect your life.

   b. Group Project
      
      i. Work interdependently with peers to design, research, compile, and present a research problem on an oceanography-related problem. (Example: "What are the causes and effects of disappearing coastal wetlands?")

   c. Lecture Exam Question
      
      i. "Describe the formation of biogenous sediment in pelagic settings."

   d. Lab Exam Problem
      
      i. Use a bathymetric map with isochrons to measure and calculate average spreading rates of a specified segment of oceanic ridge.

   e. Field Trip Problem
      
      i. Observe a coastline, characterize it with respect to erosion/deposition dominance and emergence/submergence etc., and present and defend an opinion about development along it.

F. **TEXTS AND OTHER READINGS (TYPICAL)**


III. **DESIRED LEARNING**

   A. **COURSE GOAL**
      
      *As a result of satisfactory completion of this course, the student should be prepared to:*

      explain and predict oceanographic phenomena by accessing and analyzing a wide array of oceanographic information and using basic oceanographic concepts

   B. **STUDENT LEARNING GOALS**
      
      *Mastery of the following learning goals will enable the student to achieve the overall course goal.*

      1. **Required Learning Goals**
         
         *Upon satisfactory completion of this course, the student will be able to:*

         a. Describe the role of the ocean in the earth system including it's formation during the evolution of the layered earth

         b. Describe plate tectonics and explain how tectonic processes have produced the features of the ocean basins
c. Relate the features and processes of the various marine provinces

d. Explain how marine sediment distribution and thickness is related to ocean and terrestrial processes

e. Relate the unique chemical properties of seawater to oceanic processes

f. Relate important ocean-atmosphere interactions to specific physical patterns and processes such as seasons, global atmospheric circulation, and storms

g. Describe the causes and consequences of circulation patterns, and circulation changes, within the oceans

h. Relate the causes and properties of various types of ocean waves to their consequences in terms of coastal processes, coastal hazards, and potential as an energy resource

i. Describe the causes and consequences of the harmonic patterns of tides in the ocean

j. Explain the relationship between coastal processes, coastal landforms, and challenges to coastal development

k. Relate the unique characteristics of coastal waters to specific issues and challenges that face coastal areas

l. Relate the specific physical properties of various marine environments to specific adaptations of marine organisms

m. Describe the effects of climate change on the world's oceans

2. **Lab Learning Goals**

   Upon satisfactory completion of the lab portion of this course, the student will be able to:

   a. Produce, analyze, and describe the differences between bathymetric maps and various types of map projections, using appropriate mapping software

   b. Use both Mercator and equal-area projections to locate areas on the earth's surface

   c. Interpret fisheries catch data to analyze a fishery's carrying capacity and maximum sustainable yield

   d. Construct bathymetric maps, both manually and digitally, and bathymetric profiles, both manually and digitally

   e. Interpret environmental properties of marine life zones and relate them to adaptations found in marine organisms living there

   f. Analyze patterns of seafloor magnetic anomalies and relate them to tectonic processes and seafloor features

   g. Analyze and interpret particle size fraction data of marine sediment

   h. Identify and describe various types of marine sediment

   i. Determine, analyze, and interpret temperature-salinity-density and layering relations of seawater using temperature-salinity charts and float profile data

   j. Calculate and predict concentrations of salts and pollutants in seawater

   k. Analyze and relate dynamic sea surface topography, Ekman transport, coastal upwelling, equatorial upwelling, and geostrophic flow

   l. Analyze the state of the tropical Pacific with respect to the El Nino-Southern Oscillation (ENSO) and predict the effects on the temperature and precipitation in various parts of the world
m. Infer relations between the speed, wavelength, and period of waves as they approach the shore using a simple model

n. Analyze and relate patterns of surface winds over the open ocean to the production of large swells using near real-time observations and wave model predictions

o. Interpret tidal data to solve problems related to coastal activities and navigation

p. Relate lunar phases to local tidal patterns

q. Analyze and interpret coastal processes from observations of a wave-tank model and aerial photographs

r. Evaluate the open ocean effects and coastal hazards posed by tropical storms from satellite imagery, air pressure data, buoy and float data, and sea-level data.

s. Analyze biological productivity and relate it to upwelling processes using models and satellite ocean color data.

t. Interpret coastal processes from observation made in the field

3. **Recommended Learning Goals**

   **Upon satisfactory completion of the course (when the related recommended content is covered) the student will be able to:**

   a. Describe the marine ecology of Monterey Bay and the factors that influence it (field trip)

   b. Describe how the ocean influences the climate of coastal California (field trip)

   c. Describe the importance and challenges of marine resource management such as fisheries and pollution management

   d. Describe how ocean policy can affect the health of marine ecosystems

IV. **METHODS OF ASSESSMENT (TYPICAL)**

A. **FORMATIVE ASSESSMENT**

   1. Article Summary/Analysis

   2. Lab Activities

   3. Midterm Exams

   4. Question Sets

   5. Lab Midterms

   6. Group Poster Project

B. **SUMMATIVE ASSESSMENT**

   1. Final Exam

   2. Group Project Presentations

   3. Lab Final