

Modesto Junior College  
**Course Outline of Record Report**  
10/18/2022

## EASCI162 : Introduction to Oceanography

### General Information

Faculty Author:	• Noah Hughes
Attachments:	EASCI-162_SU18.pdf EASCI 162.pdf CRS SRCH EASCI 162 CSU UC title Oceanography.pdf ASSIST CAS EASCI 162.pdf
Course Code (CB01) :	EASCI162
Course Title (CB02) :	Introduction to Oceanography
Department:	Earth Science
Proposal Start Date:	MJC Summer 2020
TOP Code (CB03) :	(1919.00) Oceanography
CIP Code:	(40.0607) Oceanography, Chemical and Physical
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	No
Is Distance Education Course:	No
Course Control Number (CB00) :	CCC000451917
Curriculum Committee Approval Date:	02/14/2017
Board of Trustees Approval Date:	03/08/2017
External Review Approval Date:	09/01/2015
Course Description:	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.
Proposal Type:	Course is up for periodic review. No value
Faculty Author:	No value

### Discipline(s)

Master Discipline Preferred:	• Earth Science
Bachelors or Associates Discipline Preferred:	No value

## Course Coding

<b>Basic Skill Status (CB08)</b>	<b>Course Special Class Status (CB13)</b>	<b>Grading</b>
Course is not a basic skills course.	Course is not a special class.	<ul style="list-style-type: none"> <li>• A-F or P/NP</li> </ul>
<input type="checkbox"/> Allow Students to Gain Credit by Exam/Challenge	<b>Repeatability</b>	<b>Course Prior To College Level (CB21)</b>
	0	Not applicable.
<b>Rationale For Credit By Exam/Challenge</b>	<b>Type of Repeat</b>	<input type="checkbox"/> Allow Students To Audit Course
No value	No value	
<b>Course Support Course Status (CB26)</b>		
Course is not a support course		

## Associated Programs

Course is part of a program (CB24)

Associated Program	Award Type	Active
CSU General Education Pattern	Certificate of Achievement	MJC Summer 2020 to MJC Summer 2021
IGETC Pattern	Certificate of Achievement	MJC Summer 2021 to MJC Summer 2022
IGETC Pattern	Certificate of Achievement	MJC Summer 2022
General Studies: Emphasis in Natural Sciences	A.A. Degree	MJC Summer 2020
CSU General Education Pattern	Certificate of Achievement	MJC Summer 2022
MJC-GE Pattern	MJC-GE Pattern	MJC Summer 2020 to MJC Summer 2021
MJC-GE Pattern	MJC-GE Pattern	MJC Summer 2021
IGETC Pattern	Certificate of Achievement	MJC Summer 2020 to MJC Summer 2021
CSU General Education Pattern	Certificate of Achievement	MJC Summer 2021 to MJC Summer 2022

## Transferability & Gen. Ed. Options

### Course General Education Status (CB25)

Y

### Transferability (CB05)

Transferable to both UC and CSU

### Transferability Status

Approved

<b>MJC General Education (MJC-GE)</b>	<b>Categories</b>	<b>Status</b>	<b>Approval Date</b>	<b>Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.)</b>
Area A: Natural Sciences	(MJC-GE:A)	Approved	No value	No Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable. defined.)
<hr/>				
<b>CSU General Education Breadth Pattern (CSU-GE)</b>	<b>Categories</b>	<b>Status</b>	<b>Approval Date</b>	<b>Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.)</b>
Area B1:Physical Sciences	(CSU-GE:B1)	Approved	No value	No Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable. defined.)
Area B3: Laboratory Activity	(CSU-GE:B3)	Approved	No value	No Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable. defined.)
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<b>Intersegmental General Education Transfer Curriculum (IGETC) (for CSU and UC)</b>	<b>Categories</b>	<b>Status</b>	<b>Approval Date</b>	<b>Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.)</b>
Area 5A: Physical Sciences	(IGETC: 5A)	Approved	No value	No Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable. defined.)
Area 5C: Laboratory Activity	(IGETC: 5C)	Approved	No value	No Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable. defined.)
<hr/>				
<b>YCCD Intra-district Equivalencies</b>	<b>Categories</b>	<b>Status</b>	<b>Approval Date</b>	<b>Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.)</b>
Columbia College Equivalent Course	(CC)	Approved	No value	CC: ESC 50

## Units and Hours

### Summary

<b>Minimum Credit Units (CB07)</b>	4
<b>Maximum Credit Units (CB06)</b>	4
<b>Total Course In-Class (Contact) Hours</b>	108
<b>Total Course Out-of-Class Hours</b>	108
<b>Total Student Learning Hours</b>	216

## Credit / Non-Credit Options

<b>Course Credit Status (CB04)</b>	<b>Course Non Credit Category (CB22)</b>	<b>Non-Credit Characteristic</b>																																								
Credit - Degree Applicable	Credit Course.	No Value																																								
<b>Course Classification Code (CB11)</b>	<b>Funding Agency Category (CB23)</b>	Cooperative Work Experience Education <input type="checkbox"/> Status (CB10)																																								
Credit Course.	Not Applicable.																																									
<input type="checkbox"/> Variable Credit Course																																										
<b>Weekly Student Hours</b> <table> <thead> <tr> <th></th> <th>In Class</th> <th>Out of Class</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Lecture Hours</td> <td>3</td> <td>6</td> <td><b>Course Duration (Weeks)</b></td> <td>18</td> </tr> <tr> <td>Laboratory Hours</td> <td>3</td> <td>0</td> <td><b>Hours per unit divisor</b></td> <td>52.5</td> </tr> <tr> <td>Activity Hours</td> <td>0</td> <td>0</td> <td><b>Course In-Class (Contact) Hours</b></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Lecture</td> <td>54</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Laboratory</td> <td>54</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Activity</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td></td> <td><b>Total</b></td> <td>108</td> </tr> </tbody> </table>				In Class	Out of Class			Lecture Hours	3	6	<b>Course Duration (Weeks)</b>	18	Laboratory Hours	3	0	<b>Hours per unit divisor</b>	52.5	Activity Hours	0	0	<b>Course In-Class (Contact) Hours</b>					Lecture	54				Laboratory	54				Activity	0				<b>Total</b>	108
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### Time Commitment Notes for Students

No value

### Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

### Prerequisites, Corequisites, and Advisories

#### Advisory

EASCI161 - Earth Science

#### Advisory

MATH30 - Elementary Algebra for STEM Majors

Or qualification by the MJC placement process.

## Requisite Skills

Requisite Skills	Description
<b>Describe the nature of Earth Science.</b>	<ul style="list-style-type: none"> <li>EASCI 161 - Describe the nature methods and importance of the Earth Sciences including geologic time dating methods and fossils.</li> </ul>
<b>Be proficient at mathematical operations such as multiplication and division as well as graph interpretation.</b>	<ul style="list-style-type: none"> <li>MATH 30 - Simplify arithmetic expressions using the correct order of operations.</li> <li>MATH 30 - Solve and graph linear inequalities in one variable.</li> </ul>

## Specifications

### Methods of Instruction

Methods of Instruction (Typical)	INSTRUCTIONAL METHODS
MOI	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. Use of audio and visual materials</li> <li>3. Demonstrations</li> <li>4. Instructor-led discussion</li> <li>5. Possible field trips</li> </ol>

### Assignments (Typical)

#### Evidence of Workload for Course Units (Quantity)

1. current event article summary/analysis (weekly)
2. textbook readings (weekly)
3. question sets (weekly)
4. pre-lab activity (weekly)
5. study and prepare for lecture exams (three/semester)
6. study and prepare for lab exams (three/semester)
7. all day field trip (one/semester)

#### Evidence of Critical Thinking (Quality)

1. Typical Assignment
  1. 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.
2. Lecture Exam Question
  1. "Describe the formation of biogenous sediment in pelagic settings."
3. Lab Exam Problem
  1. Use a bathymetric map with isochrons to measure and calculate average spreading rates of a specified segment of oceanic ridge.
4. Field Trip Problem
  1. 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.

Methods of Evaluation (Typical)	Rationale
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FORMATIVE EVALUATION	1. Article Summary/Analysis 2. Lab Activities 3. Midterm Exams 4. Question Sets 5. Lab Midterms			
SUMMATIVE EVALUATION	1. Final Exam 2. Lab Final			
<b>Equipment</b>				
No Value				
<b>Textbooks</b>				
Author	Title	Publisher	Date	ISBN
Trujillo and Thurman	Essentials of Oceanography (12th Ed.)	Prentice Hall	2017	0134073541
<b>Other Instructional Materials</b>				
No Value				

## Learning Outcomes and Objectives

### Course Objectives

Describe the role of the ocean in the earth system including its formation during the evolution of the layered earth.

Describe plate tectonics and explain how tectonic processes have produced the features of the ocean basins.

Relate the features and processes of the various marine provinces.

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

Relate the unique chemical properties of seawater to oceanic processes.

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

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

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.

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

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

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

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

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

#### Lab Objectives

Use an appropriate GIS-type mapping tool (like GeoMapApp) to navigate and explore the ocean basins.

Use latitude and longitude to describe the location of a place on earth's surface.

Create and export digital maps of specific areas of the ocean basins.

Identify major physiographic regions of the global ocean.

Use appropriate digital mapping tools to create bathymetric profiles with appropriate vertical exaggeration.

Use appropriate digital mapping tool to locate examples of seafloor features associated with various types of tectonic boundaries.

Use appropriate digital mapping tool to create maps of various types of tectonic boundaries and label the relevant features of each.

Use appropriate digital mapping tool to locate examples of each major type of marine province and label the relevant features of each.

Calculate rates of seafloor spreading across segments of oceanic ridge, using appropriate map layers of seafloor age.

Create a physical model of a coastal sedimentary system and evaluate its effectiveness with respect to erosion, deposition, and sediment sorting.

Use sediment core databases to relate sediment types to various marine provinces and latitudes.

Perform a grain size analysis of a sample of marine sediment, create a histogram to interpret it's likely setting.

Create physical models to test the effects of changing temperatures and salinities on water.

Given temperature and salinity information, use a T-S diagram to determine the density of the seawater.

Relate satellite-derived rainfall maps to maps of sea surface salinity.

Relate patterns of incoming and outgoing radiation at various latitudes to global surface temperature patterns.

Create a simplified physical model of earth's atmospheric circulation pattern.

Identify features of the global atmospheric circulation pattern by examining satellite-derived maps of global precipitation.

Use maps of forecast hurricane paths to identify locations at greatest risk of storm surge.

Use maps of prevailing wind patterns to predict locations of upwelling.

Use data about coastal upwelling to identify times of greatest upwelling and relate it to commercial fishing activities.

Use maps of sea surface temperatures for the equatorial Pacific ocean to assess the state of the El Nino Southern Oscillation.

Use buoy data to calculate the speed, period, and wavelength of ocean waves.

Use compare model analysis maps (WW3 output) to identify locations of maximum swell and relate them to wind patterns.

Use a daily tide chart to determine high tide, low tide, flood tide, ebb tide, tidal period, and tidal range for any given coastal location.

Use a monthly tide chart to identify spring and neap tides and relate these to specific phases of the moon.

Use appropriate models and imagery to identify various shoreline features and relate them to erosional or depositional processes.

Use appropriate models and imagery to classify shorelines as either emergent or submergent.

#### Recommended Objectives

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

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

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

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

#### CSLOs

**Describe, and explain the causes and consequences of, the processes that control the evolution of ocean basins and the sediments that accumulate within them.** Expected SLO Performance: 0.0

<i>ISLOs</i> GELO	Demonstrate proficiency in NATURAL SCIENCE by doing the following: Explaining how the scientific method is used to solve problems and describing how scientific discoveries and theories affect human activities
<i>Earth Science</i> UNIVERSITY PREPARATION, EMPHASIS IN EARTH SCIENCES, AS	Identify, describe, and explain the causes and consequences of the various chemical processes that control the transformation of matter within the earth system.  Identify, describe, and explain the causes and consequences of the various interactions between the biosphere and the physical components of the earth system.  Identify, describe, and explain the causes and consequences of the various physical processes that transfer energy into, within, and out of the earth system.
<i>ISLOs</i> Core ISLOs	Students will develop skills that aid in lifelong personal growth and success in the workplace. Students will be able to: Identify and assess individual values, knowledge, skills, and abilities in order to set and achieve lifelong personal, educational, and professional goals. Practice decision-making that builds self-awareness, fosters self-reliance, and nourishes physical, mental, and social health. Apply skills of cooperation, collaboration, negotiation, and group decision-making. Exhibit quality judgment, dependability, and accountability while maintaining flexibility in an ever-changing world.  Students will develop skills to effectively search for, critically evaluate, and utilize relevant information while demonstrating technological literacy. Students will be able to: Effectively access information and critically evaluate sources of information. Analyze, synthesize and apply information practically and ethically within personal, professional and academic contexts. Identify, utilize and evaluate the value of a variety of technologies relevant to academic and workplace settings.

**Describe, and explain the causes and consequences of, the processes that affect coastlines and the sustainability of human populations that occupy them.**

Expected SLO Performance: 0.0

<i>ISLOs</i> GELO	Demonstrate proficiency in NATURAL SCIENCE by doing the following: Explaining how the scientific method is used to solve problems and describing how scientific discoveries and theories affect human activities
<i>Earth Science</i> UNIVERSITY PREPARATION, EMPHASIS IN EARTH SCIENCES, AS	Identify, describe, and explain the causes and consequences of the various interactions between the biosphere and the physical components of the earth system.
	Identify, describe, and explain the causes and consequences of the various physical processes that transfer energy into, within, and out of the earth system.
<i>ISLOs</i> Core ISLOs	<p>Students will develop skills that aid in lifelong personal growth and success in the workplace. Students will be able to: Identify and assess individual values, knowledge, skills, and abilities in order to set and achieve lifelong personal, educational, and professional goals. Practice decision-making that builds self-awareness, fosters self-reliance, and nourishes physical, mental, and social health. Apply skills of cooperation, collaboration, negotiation, and group decision-making. Exhibit quality judgment, dependability, and accountability while maintaining flexibility in an ever-changing world.</p> <p>Students will develop skills to effectively search for, critically evaluate, and utilize relevant information while demonstrating technological literacy. Students will be able to: Effectively access information and critically evaluate sources of information. Analyze, synthesize and apply information practically and ethically within personal, professional and academic contexts. Identify, utilize and evaluate the value of a variety of technologies relevant to academic and workplace settings.</p>

**Describe, and explain the causes and consequences of, the various types of air-sea interactions and their effect on climate.**

Expected SLO Performance: 0.0

<i>ISLOs</i> GELO	Demonstrate proficiency in NATURAL SCIENCE by doing the following: Explaining how the scientific method is used to solve problems and describing how scientific discoveries and theories affect human activities
<i>Earth Science</i> UNIVERSITY PREPARATION, EMPHASIS IN EARTH SCIENCES, AS	Identify, describe, and explain the causes and consequences of the various chemical processes that control the transformation of matter within the earth system.
	Identify, describe, and explain the causes and consequences of the various physical processes that transfer energy into, within, and out of the earth system.
<i>ISLOs</i> Core ISLOs	<p>Students will develop skills that aid in lifelong personal growth and success in the workplace. Students will be able to: Identify and assess individual values, knowledge, skills, and abilities in order to set and achieve lifelong personal, educational, and professional goals. Practice decision-making that builds self-awareness, fosters self-reliance, and nourishes physical, mental, and social health. Apply skills of cooperation, collaboration, negotiation, and group decision-making. Exhibit quality judgment, dependability, and accountability while maintaining flexibility in an ever-changing world.</p> <p>Students will develop skills to effectively search for, critically evaluate, and utilize relevant information while demonstrating technological literacy. Students will be able to: Effectively access information and critically evaluate sources of information. Analyze, synthesize and apply information practically and ethically within personal, professional and academic contexts. Identify, utilize and evaluate the value of a variety of technologies relevant to academic and workplace settings.</p>

**Describe, and explain the causes and consequences of, the processes that control dynamic ocean phenomena such as ocean circulation, waves, and tides.**

Expected SLO Performance: 0.0

<i>ISLOs</i> GELO	Demonstrate proficiency in NATURAL SCIENCE by doing the following: Explaining how the scientific method is used to solve problems and describing how scientific discoveries and theories affect human activities
<i>Earth Science</i> UNIVERSITY PREPARATION, EMPHASIS IN EARTH SCIENCES, AS	Identify, describe, and explain the causes and consequences of the various physical processes that transfer energy into, within, and out of the earth system.
<i>ISLOs</i> Core ISLOs	Students will develop skills that aid in lifelong personal growth and success in the workplace. Students will be able to: Identify and assess individual values, knowledge, skills, and abilities in order to set and achieve lifelong personal, educational, and professional goals. Practice decision-making that builds self-awareness, fosters self-reliance, and nourishes physical, mental, and social health. Apply skills of cooperation, collaboration, negotiation, and group decision-making. Exhibit quality judgment, dependability, and accountability while maintaining flexibility in an ever-changing world.

Students will develop skills to effectively search for, critically evaluate, and utilize relevant information while demonstrating technological literacy. Students will be able to: Effectively access information and critically evaluate sources of information. Analyze, synthesize and apply information practically and ethically within personal, professional and academic contexts. Identify, utilize and evaluate the value of a variety of technologies relevant to academic and workplace settings.

## Content

### Course Content

1. Earth as a 'water planet'
  1. geography of world ocean
  2. formation of earth's atmosphere and oceans
2. Ocean Basins and Plate Tectonics
  1. Plate Tectonic theory
  2. plate boundaries: features and processes
3. Marine Provinces
  1. bathymetry as a science
  2. marine provinces: features and processes
4. Marine Sediments
  1. types of marine sediment
  2. marine sedimentary processes
  3. marine sediment distribution
5. Seawater Chemistry
  1. chemical and physical properties of water
  2. chemical and physical properties of seawater
  3. temperature, salinity, and density of seawater
6. Air-Sea Interaction
  1. seasons
  2. unequal heating of earth's surface
  3. global atmospheric circulation
7. Ocean Circulation
  1. surface ocean currents
  2. upwelling and downwelling
  3. thermohaline circulation
8. Ocean Waves
  1. wave terminology
  2. wind-driven waves
  3. waves in the surf zone
  4. tsunami
9. Tides
  1. tide generation
  2. tidal cycles and tidal patterns
  3. tidal phenomena
10. Beach and Shoreline
  1. coast terminology
  2. shoreline sediment transport
  3. erosional vs depositional shores
  4. emergent vs. submergent shores and sea level change
  5. hard stabilization
11. Coastal Ocean
  1. coastal waters: types and characteristics
  2. marine pollution
  3. coastal wetlands
12. Marine Life
  1. classification of marine organisms
  2. divisions of the marine environment
  3. adaptations to physical conditions
13. Oceans and Climate Change
  1. Earth's climate system

2. recent changes in climate
3. changes in the oceans

### Lab Content

1. Maps, Charts, and Bathymetry
  1. bathymetric profiles
2. Plate Tectonics, Isostasy, and Seismicity
3. Marine Provinces
4. Marine Sediments and Sedimentary Processes
5. Marine Chemistry
  1. temperature, salinity, and density relationships
6. Coriolis Effect
7. Atmospheric Circulation
8. Ocean Currents
  1. surface currents
  2. upwelling/downwelling
  3. thermohaline circulation
9. Ocean Waves
10. Ocean Tides
11. Coastal Dynamics
12. The Marine Environment
13. Climate Change