SEMESTER AT SEA COURSE SYLLABUS

Colorado State University, Academic Partner

Voyage:	Spring 2019
Discipline:	Natural Resources
Course Number and Title:	NR 150 Oceanography (Section 2)
Division:	Lower
Faculty Name:	Laurie A. McConnico
Semester Credit Hours:	3

Prerequisites: None
Teaching Day: A days, 0800-0920 in Kino

COURSE DESCRIPTION

What better way to study the oceans than directly from a vessel transiting three of the four principle ocean basins? This unique shipboard classroom allows students to discover the interconnected nature of the world's ocean using their own daily observations. First-hand lab and field experiences, and classroom discussions will be employed to explore the interdisciplinary nature of oceanography. The physical (waves, tides, currents), chemical (salinity, ocean acidification, nutrients), geological (sediments, bathymetry, plate tectonics) and biological components (habitats, organisms) of the ocean realm will be investigated, as well as human impacts to the marine environment. Understanding oceanographic principles is essential to deciphering the ocean's role in climate regulation, pollution impacts to the marine system, species declines and invasions, sustainable fisheries, resource protection and more. Students will hone critical thinking skills and apply knowledge acquired on the MV World Odyssey to the coastal countries they visit, which are dependent on a healthy marine ecosystem.

LEARNING OBJECTIVES

The goal is for students to:

- Explore the interdisciplinary nature of oceanography, including the biological, geological, chemical and physical components of the sea.
- Describe oceanographic processes and evaluate the ocean's role in climate regulation.
- Examine natural and anthropogenic threats to marine environments and organisms.
- Distinguish among equipment types and techniques used in oceanographic research.
- Apply oceanographic fundamentals to the surrounding world and observations made at sea.

REQUIRED TEXTBOOKS

AUTHOR: Tom Garrison
TITLE: Oceanography: An Invitation to Marine Science
PUBLISHER: Cengage Learning
ISBN #: 13: 978-1305105164

DATE/EDITION: 2015/ 9th

Additional readings will be made available on the ship or handed out in class.

See ADDITIONAL RESOURCES at end of syllabus for additional required supplies.

TOPICAL OUTLINE OF COURSE

Corresponding readings from the course text are noted in parentheses. Additional supplemental readings will accompany the course text.

Depart Ensenada, Mexico — January 5

A1—January 7: Course introduction, syllabus, projects and logistics. (Chapter 1)
How can we link oceanographic fundamentals to life at sea and while in port?

A2—January 9: Plate tectonics and Ocean Bathymetry (Chapters 3 & 4)
What does the bottom of the ocean look like and how did all of those Hawaiian Islands form?

A3—January 11: Sea water properties and conditions for coral growth (Chapters 7 & 15)
How salty (acidic, cold, or nutrient rich) are the oceans?
Preparation for Hawaii field class

Honolulu, Hawaii — January 12

A4—January 14: Debriefing Hawaii. Sea water continued (Chapter 6)
Does the ocean have layers and who cares?

January 16—International Date Line crossing (Lost Day)

A5—January 17: Great Pacific Garbage Patch- an intersection among gyres, people and marine life. (Chapters 9 & 18 and additional readings TBA)
Where did all of those plastics originate, and can anything be done?

Study Day (No Class) — January 19

A6—January 20: Ocean Bathymetry and Sediments continued (Chapters 4 & 5)
What's the big deal about the Mariana's Trench and are all sediments just dirt?

A7—January 22: Exam 1
Prepare for Japan

Kobe, Japan — January 24-28

A8—January 29: Debrief Japan and prepare for China. Oceanographic History and Connections to the Sea. (Chapter 2)

Shanghai, China — January 31 - February 1
In-Transit — February 2-3

Hong Kong, SAR — February 4-5

A9—February 6: Debrief China. Coasts, coastal processes and a bit about mangroves: preparing for Vietnam. (Chapter 12)
What are the links between erosion and habitat degradation?

Ho Chi Minh City, Vietnam — February 8-13

A10—February 14: Debrief Vietnam. Intro to Atmospheric Circulation and Climate (Chapters 8 & 18)

Community Programming (No Class) — February 16

A11—February 17: Atmospheric Circulation continued. Prepare for Myanmar (Chapter 8)
What is the difference between a monsoon and a typhoon?

Yangon, Myanmar — February 19-23

A12—February 24: Debrief Myanmar. Waves (Chapter 10)
How do waves form and is there more than one type?

A13— February 26: Tsunamis. Prepare for India (Chapters 10)
What caused the 2004 Tsunami in the Indian Ocean and what were the impacts?

Cochin, India — February 28 – March 5

A14—March 6: Debrief India. Tides and Sea Level Rise (Chapters 11 & 12)
Why are sea levels rising so fast in the Indian Ocean and what are the impacts to India?

Community Programming (No Class) — March 7

A15—March 9: Exam 2
Prepare for Mauritius (Coasts, Reefs and Mangroves, Extinction) (Chapter 12)

Port Louis, Mauritius — March 11

A16—March 12: Debrief Mauritius. Coral and Mangrove Communities (Chapters 12 & 16)
What are some significant challenges to marine conservation and management?

A17—March 14: Ocean Circulation (Chapter 9)
How important are ocean currents?

A18—March 16: Productivity, Plankton and Food Webs. Preparation for Cape Town (Chapters 13 & 14) How can micro-organisms be so important to ocean health and function?

Cape Town, South Africa — March 18-23 (March 18: Mandatory Field Class)

A19—March 24: Debrief South Africa. Life in the Ocean & Marine Animals (Chapters 13 & 15)
Who are the big drifters and nekton, and what is their role in the marine environment?

A20—March 26: Marine Communities- Pelagic. (Chapters 15 & 16)

What defines a community and how are pelagic communities distinct?

A21—March 28: Marine Communities- Benthic. Prepare for Ghana. (**Chapter 16**)
What makes the kelp forests, intertidal and deep sea unique?
Field Class Assignments Due

Takoradi, Ghana — March 30 - April 1
Tema, Ghana — April 2-3

A22—April 4: Debrief Ghana. Resources from the Sea and Project Prep (**Chapter 17**)
From fish to sand, what do we take from the sea?

A23—April 6: Student Presentations. Human Uses and Impacts (**Chapter 18**)
What uses become abuses and how can we be better stewards of the sea?

Study Day (No Class) — April 8

A24— April 9: Student Presentations. Human Uses and Impacts. Prepare for Morocco (**Chapter 18**)
What uses become abuses and how can we be better stewards of the sea?

Casablanca, Morocco — April 11-15

Study Day (No Class) — April 16

A25—April 17: Final Exam and Debrief Morocco.

Arrive Amsterdam, The Netherlands — April 21

FIELD WORK

Semester at Sea field experiences allow for an unparalleled opportunity to compare, contrast, and synthesize the different cultures and countries encountered over the course of the voyage. In addition to the one field class, students will complete independent field assignments that span multiple countries.

Field Class & Assignment

The field class for this course is on **Tuesday, 18 March 2019 in Cape Town, South Africa.**

Field Class attendance is mandatory for all students enrolled in this course. Do not book individual travel plans or a Semester at Sea sponsored trip on the day of your field class. Field Classes constitute at least 20% of the contact hours for each course, and are developed and led by the instructor.

Field Class Title: Two Oceans Aquarium and Outdoor Exploration in Table Bay
Students will visit the Two Oceans Aquarium to examine organisms and oceanographic conditions associated with the Atlantic and Indian Oceans bordering South Africa. Students will take a behind the scenes tour and hear from Aquarium Staff/ Researchers regarding local conservation efforts. If possible, the field class will also include an outdoor excursion to explore the wildlife and ecology of Table Bay.

Objectives:
1. Compare the oceanographic conditions and organisms associated with the Indian and Atlantic Ocean.
2. Observe species unique to South Africa and investigate conservation efforts.
3. Gain an understanding marine biodiversity in South Africa.

Assessment tools:
1. Field notebook (10%)
2. Report (10%)
The Field Class Assignments are due by: March 28, 2019

Independent Field Assignments

A log from the decks of the MV World Odyssey: Students will keep a log of ocean conditions and observations of marine life while out at sea. The log must include details on ship location (which ocean, coordinates, shelf/ or middle of ocean basin), sea state and color, ocean depth, wave height, weather conditions, wind speed, marine life, etc. Students will also note any evidence of anthropogenic impacts to the marine environment and other vessels. Care will be taken to make observations at the same time of day. The final log will be due towards the end of the journey, but it will be collected or reviewed during the voyage to ensure students are keeping up with observations and completing the assignment correctly. A complete set of guidelines will be available on the 1st day of class.

Ports-of-Call Report: Students will work in groups to contrast two ports-of-call visited during the expedition. While in port students will observe the coastal environment, people's relationship to the marine environment and make connections between their observations and concepts relevant to oceanography and related course themes. Photo documentation of the ports of call (where appropriate/legal) will be necessary in addition to taking detailed field notes. At the end of the expedition, students will present their ports of call in a PowerPoint presentation (PPT). They will also submit a brochure/ pamphlet that summarizes the PPT and the major findings. A complete set of guidelines will be available on the 1st day of class.

METHODS OF EVALUATION

Exams (2): 20%
Final: 10%
In class and pre/post class assignments: 10%
Group project/ presentation: 20%
Expedition Log: 10%
Field Class: 20%
Participation and attendance: 10%

GRADING SCALE

The following Grading Scale is utilized for student evaluation. Pass/Fail is not an option for Semester at Sea coursework. Note that C-, D+ and D- grades are also not assigned on Semester at Sea in accordance with the grading system at Colorado State University (the SAS partner institution).

Pluses and minuses are awarded as follows on a 100% scale:

Excellent	Good	Satisfactory/Poor	Failing
97-100%: A+	87-89%: B+	77-79%: C+	Less than 60%: F
93-96%: A	83-86%: B	70-76%: C	
90-92%: A-	80-82%: B-	60-69%: D	

ATTENDANCE/ENGAGEMENT IN THE ACADEMIC PROGRAM

Attendance in all Semester at Sea classes, including the Field Class, is mandatory. Students must inform their instructors prior to any unanticipated absence and take the initiative to make up missed work in a timely fashion. Instructors must make reasonable efforts to enable students to make up work which must be accomplished under the instructor's supervision (e.g., examinations, laboratories). In the event of a conflict in regard to this policy, individuals may appeal using established CSU procedures.

LEARNING ACCOMMODATIONS

Semester at Sea provides academic accommodations for students with diagnosed learning disabilities, in accordance with ADA guidelines. Students who will need accommodations in a class, should contact ISE to discuss their individual needs. Any accommodation must be discussed in a timely manner prior to implementation.

A letter from the student's home institution verifying the accommodations received on their home campus (dated within the last three years) is required before any accommodation is provided on the ship. Students must submit this verification of accommodations to academic@isevoyages.org as soon as possible, but no later than two months prior to the voyage.

STUDENT CONDUCT CODE

The foundation of a university is truth and knowledge, each of which relies in a fundamental manner upon academic integrity and is diminished significantly by academic misconduct. Academic integrity is conceptualized as doing and taking credit for one's own work. A pervasive attitude promoting academic integrity enhances the sense of community and adds value to the educational process. All within the University are affected by the cooperative commitment to academic integrity. All Semester at Sea courses adhere to this Academic Integrity Policy and Student Conduct Code.

Depending on the nature of the assignment or exam, the faculty member may require a written declaration of the following honor pledge: "I have not given, received, or used any unauthorized assistance on this exam/assignment."

RESERVE BOOKS FOR THE LIBRARY

AUTHOR: Rachel Carson
TITLE: The Sea Around Us

PUBLISHER: New York: Oxford University Press
ISBN #: 0195147014
DATE/EDITION: 2003

AUTHOR: Mark W. Denny
TITLE: How the ocean works: an introduction to oceanography
PUBLISHER: Princeton: Princeton University Press
ISBN #: 0691126461
DATE/EDITION: 2008

AUTHOR: Herb McCormick and David Thoreson
TITLE: One island, one ocean: Ocean Watch and the epic journey around the Americas
PUBLISHER: San Francisco, CA: Weldon Owen
ISBN #: 978161628171
DATE/EDITION: 2011

AUTHOR: Charles Moore and Cassandra Phillips
TITLE: Plastic ocean: how a sea captain's chance discovery launched a quest to save the oceans
PUBLISHER: Avery
ISBN #: 978158333501
DATE/EDITION: 2012

FILM REQUEST

Title of Film: Blue Earth (2009)
Distributor: National Geographic

Title of Film: The Blue Planet. Seas of Life (2007)
Distributor: British Broadcasting Corporation (BBC)

Title of Film: Deep Sea (2006)
Distributor: Warner Home Video

Title of Film: Drain the Ocean (2009)
Distributor: National Geographic

Title of Film: The End of the Line (2010)
Distributor: New Video Group

Title of Film: The Jacques Cousteau odyssey the complete series (2005)
Distributor: Warner Home Video

Title of Film: Japans Killer Quake (2011)
Distributor: PBS (NOVA)

Title of Film: Sand Wars (2014)
Distributor: PBS

Title of Film: Tsunami: The Wave that Shook the World (2005)

Distributor: PBS (NOVA)

ELECTRONIC COURSE MATERIALS

Articles

Lebreton et al. 2018. Evidence that the Great Pacific Garbage Patch is rapidly accumulating plastic. https://www.nature.com/articles/s41598-018-22939-w.pdf

Murray CC., Maximenko N., Lippiatt S. 2018. The influx of marine debris from the Great Japan Tsunami of 2011 to North American shorelines. Marine Pollution Bulletin. https://doi.org/10.1016/j.marpolbul.2018.01.004

YouTube:

Coral Gardening | South Pacific | BBC Earth
https://www.youtube.com/watch?v=0UlnRnHWFqU

Coral Reefs 101 | National Geographic
https://www.youtube.com/watch?v=ZiULxLLP32s

El Niño 101 | National Geographic
https://www.youtube.com/watch?v=d6s0T0m3F8s

Hurricanes 101 | National Geographic
https://www.youtube.com/watch?v=lEtxRd9y1c4

Monsoons; Wet, Dry, Repeat...
https://www.youtube.com/watch?v=CR7KL6KSlx4

Ocean Drifters
https://www.youtube.com/watch?v=ziGtmjiUlJQ

Oceans of Contrast
https://www.youtube.com/watch?v=Juw0JijaTrQ&t=1911s

Penguin Crime Spree | South Africa
https://www.youtube.com/watch?v=vYHWbI46Q5I

Rare Video: Japan Tsunami | National Geographic
https://www.youtube.com/watch?v=oWzdgBNfhQU

This Incredible Animation Shows How Deep The Ocean Really Is
https://www.youtube.com/watch?v=UwVNkfCov1k

Tsunami 101 | National Geographic
https://www.youtube.com/watch?v=_oPb_9gOdn4

What is Coral Bleaching | Time
https://www.youtube.com/watch?v=fA6mpexcyN4

Webpages
Hawaii Institute of Marine Biology
http://www.himb.hawaii.edu/

NOAA
https://www.noaa.gov/

The Two Oceans Aquarium
https://www.aquarium.co.za/

ADDITIONAL RESOURCES (some are required items)

1. A **water proof field notebook is required** for the field class. Students must choose one similar to the 'Rite in the Rain' models No. 351 or 373 (4 5/8" x 7"). For example: https://www.amazon.com/dp/B009F1E28G/ref=twister_B07864WN67?_encoding=UTF8&th=1
2. A **standard composition notebook is required** for the ship log. Students should choose one with lines and at least 9.5" x 6" or 8.5" x 11" page dimensions.
3. For field classes students must pack closed toe shoes suitable for getting wet (no flip flops), swimming gear and a rash guard or light weight long sleeve t-shirt.
4. Students might consider purchasing a clip-on microscope for a tablet/ smart phone or a pocket microscope. These will be used to identify marine organisms living in the water column. Available on Amazon for $10-20: Carson MicroBrite Plus 60x-120x, Kingmas 60x clip on microscope.
5. Students will need access to binoculars. A small portable pair is recommended.
6. Students will need access to shipboard charts, oceanographic, and weather data.