

SEMESTER AT SEA COURSE SYLLABUS
University of Virginia, Academic Sponsor

Voyage: Spring 2016
Discipline: Biology
BIOL 1559-501&502: Marine Biology
Division: Lower
Faculty Name: Stephanie Green
Credit Hours: 3

Pre-requisites: None.

COURSE DESCRIPTION

This course provides an introduction to the amazing diversity of life that awaits you just off shore. Throughout the semester, we will take advantage of our opportunity to visit the majority of the world's oceans to learn about seascapes as habitats, and the characteristics and adaptations of species found within them—from algae to whales, and beaches to deep sea trenches. We will explore how the interaction of species with their environment and with one another affect their distributions and populations. By tracking oceanographic patterns of temperature, pressure, light, and salinity across our global voyage, we will discover how these basic physical forces shape marine communities found from pole to pole (e.g. kelp forests, coral reefs, mangroves, deep sea hydrothermal vents, sea ice, open ocean). We will also explore the importance of marine organisms and their habitats to human cultures, and the effects our civilizations have on marine biodiversity. Throughout the semester, we will use the investigative tools and concepts of marine conservation biology to study and compare marine ecosystems found along our route.

COURSE OBJECTIVES

1. Review and integrate biological, chemical, and physical science principles through an exploration of marine ecosystems.
2. Discover the great diversity of marine organisms and how they have evolved to meet the challenges of the ocean environments in which they live.
3. Apply the scientific method as an objective mode of inquiry to classify, measure, and observe marine habitats and organisms.
4. Employ taxonomic and morphological classification to survey plant and animal life in the ocean, spanning microscopic organisms to megafauna.
5. Investigate the relationships between organisms across major marine ecosystems and understand the potential for cross-ecosystem exchange of organisms and nutrients.
6. Examine the relationship between humans and the oceans, including the types of resources our societies extract from the sea.

7. Understand the main sources of human-induced degradation to oceans, and the ways in which marine conservation and restoration can prevent and offset impacts.

REQUIRED TEXTBOOKS

AUTHOR: Castro, P. and Huber M.E.

TITLE: Marine Biology 9e

PUBLISHER: McGraw Hill

ISBN #: 978-0-07-352420-7

DATE/EDITION: 2013/ 9th Edition

TOPICAL OUTLINE OF COURSE

**Chapters refer to reading assignments from Castro and Huber*

Date	Topic/Activity	Readings/Videos
January 5:	Depart Ensanada	
A1- January 7:	Course overview; syllabus review & introductions Scientific methods for ocean exploration <i>In-class assignment: course goals and interests</i>	Chapter 1*
A2- January 9:	Geography of ocean basins and the sea floor Methods for scientific observation I	Chapter 2
A3- January 11:	Chemical & physical features of marine environments Methods for scientific observation II	Chapter 3
January 12:	Honolulu	
A4- January 14:	Fundamentals of life in the ocean Evolutionary patterns of marine life	Chapter 4 Hydrothermal vents
A5- January 17:	Marine plankton and microbes	Chapter 5 Stromberg 2013
January 19:	Study day	
A6- January 20:	Marine multicellular plants & algae <i>Quiz #1</i>	Chapter 6 DNA and the sea

A7- January 22: Marine invertebrates I Chapter 7
Climate change & kelp forests in Japan Verges (2014)

January 24-25: Yokohama
January 26: In-transit
January 27-28: Kobe

A8- January 29: Marine invertebrates II Chapter 7
Sustaining seafood in China [Integrated farming](#)
[Fin soup](#)

Jan 31-Feb 1: Shanghai
February 2-3: In-transit
February 4-5: Hong Kong

A9- February 6: Biology and ecology of marine fishes I Chapter 8
[Protecting](#)
[Vietnam's coastline](#)

February 8-12: Ho Chi Minh City

A10- February 13: Biology and ecology of marine fishes II Chapter 8

February 15: Study day

A11- February 16: Marine reptiles & birds Chapter 9 *through*
p. 189
Rasmussen et al.
(2011)

Feb 18-22: Yangon

A12- February 23: Marine mammals Chapter 9 *p. 189*
onward
[Dipani Sutaria](#)
[interview](#)

A13- February 25: Introduction to ecology and species introductions Chapter 10
[Quiz #2](#)

Feb 27-March 3:	Cochin	
A14- March 4:	Estuaries and estuarine ecosystems	Chapter 12
March 6:	Study day	
A15- March 7:	Coral reefs Marine protection and the Chagos Archipelago	Chapter 14 Koldewey et al. (2010)
March 9:	Port Louis	
A16- March 10:	Intertidal communities	Chapter 11
March 12:	Study Day	
A17- March 13:	Subtital communities Nutrient subsidies to rocky shores in South Africa	Chapter 13 Bustamante et al. (1995)
March 15-20:	Cape Town	
A18- March 21:	Life in the open ocean	Chapter 15
A19- march 23:	Life in the deep sea <i>Quiz #3</i>	Chapter 16 Deep Sea Light
A20- March 25:	Humans and the sea: ocean resources	Chapters 17, 19 Sawfish in West Africa
March 27-28 March 29-31	Takoradi Tema	
A21- April 1:	Humans and the sea: anthropogenic degradation Group projects check-in	Chapter 10 (pp. 231-241) The Earth's Life Support System
A22- April 3:	Human and the sea: marine conservation and restoration	Chapter 18

A23- April 5: Humans and the sea: synthesis

[Lennhardt 2013.pdf](#)
[PEW 2010.pdf](#)

Class discussion and debate: strategies for ocean biodiversity conservation

April 7-11: Casablanca

April 12: Study Day

A24- April 13: *Final project presentations*

April 16: Disembarkation Day

FIELD WORK

Experiential course work on Semester at Sea is comprised of the required field lab led by your instructor and additional field assignments that span multiple ports.

Field Labs

Field lab 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 lab.

BIOL 1559-501 (Section 1)

Field Lab Location: Honolulu, HI

Field Lab Date: January 12

BIOL 1559-502 (Section 2)

Field Lab Location: Port Louis, Mauritius

Field Lab Date: March 9

Mangrove and coral reef biodiversity exploration

The islands of Oahu (Honolulu) and Mauritius offer excellent opportunities to access and observe marine organisms across a gradient of environmental conditions, from shoreline to the subtidal. Because of their small size, Oahu and Mauritius also allow us to observe the influence of human development on the marine environment, and contrast these effects with relatively undisturbed landscapes nearby. Our trip will focus on identifying, describing, and comparing marine species in two habitats: tidal mangroves and subtidal coral reefs. We will also have the opportunity to learn about human-made threat to these habitats and conservation and restoration initiatives from local marine research and conservation experts. Field labs in both locations will involve snorkeling in mangrove and coral reef environments, as well as visiting local marine research facilities.

Objectives:

1. Observe and compare the biodiversity found in coral reef and mangrove ecosystems, and the adaptations of organisms to living in each environment.
2. Meet tropical marine researchers and gain experience in field data collection.
3. Develop an appreciation for the relationship between marine science and conservation of ocean species.

METHODS OF EVALUATION

Field Lab Assignment (20%)

You will be evaluated on two products:

- 1) Production of an 'identification guide' including: taxonomic identifications and morphological descriptions (with sketches and/or pictures) of at least 10 species observed in the two habitats, details on the environment in which the species were found, and notes on their adaptations to the environment. Prior to the field trip, you will be provided with a species list and information about organisms found in the area.
- 2) A journal entry comparing and contrasting observations of the environment as we travel across the island throughout the day and talk with local marine research and conservation experts. Specific questions to be addressed will be distributed before the field trip.

Observation Journal (25%)

Observation is a key method used by scientists to compare and contrast ocean environments and organisms, identify patterns, and generate questions for further study. Throughout the voyage, you will conduct and record observations of the marine environment and marine-related activities, including information on weather conditions, habitat type, the influence of human activities, and the identity, abundance and behavior of marine species sighted.

Observation periods should be at least 30 minutes each, conducted from the ship during at least 7 different 'in-transit' segments of the voyage, and while you are off the ship at a minimum of 5 ports-of-call. To gain a comparative perspective, at least 1 shipboard and 1 port-of-call observation should be conducted on each of four legs of the voyage: 1) Ensanada-Kobe, 2) Kobe-Yangon, 3) Yangon-Cape Town, 4) Cape Town-Southampton. Please see me to discuss opportunities for observation at ports-of-call, based on your final itinerary.

Please consider these numbers as a minimum! The more you observe, the more you will see for yourself how marine life, and the interaction between humans and the ocean, vary across the globe.

You will receive additional detail on journal format during the first week of class. Journals will be collected regularly across the voyage to provide feedback and ensure that you are on track with making entries. In the final week of the voyage, you are expected to produce a brief journal entry that synthesizes patterns and offer contrasts between your observations across the voyage.

Group Project (25%)

Throughout the semester, you will encounter a great diversity of marine species and habitats, and witness many sources of human-mediated stress and disturbance to the marine environment. In groups of 3-4, you will choose a focal group of marine organisms or habitat type, and one source of human-mediated degradation. Your mission: uncover the biological and ecological effects of the stressor on your organisms/habitat, and identify conservation or restoration actions that can be taken to alleviate or prevent impacts.

You should gather as much information as you can about your topic from the locations visited on the voyage, through observations at ports-of-call, interviews with local people and experts that you encounter, in addition to electronic documents and sources on the topic. Each group will produce a brief report that summarizes their findings, and present their results to the rest of the class at the end of the semester. Your report and presentation should contain observations from at least three locations along the voyage and use visual aids, such as maps and photos, to support your findings.

Key sections to cover in both the report and presentation include: 1) Overview of the key features of your focal organisms/habitat, 2) A summary of the stressor (What causes it? How big is the problem?) 3) The main biological and ecological effects of the stressor on your organisms/habitat (including biological mechanisms of change, key locations/species under threat) and 4) Conservation or restoration options. I will work with you to select topics and identify opportunities for gathering information at ports-of-call in the first two weeks of class.

Quizzes/in-class assignments (20%)

Quizzes (January 20th, February 25th, March 23rd) will cover material from class and in the assigned readings prior to the quiz date. In-class assignments include a 1 page reflection on your motivation for taking the course and goals for the semester (1st day of class), and an in-class debate on strategies for marine biodiversity conservation (April 5th). You'll receive information on the debate format in March.

Class participation (10%)

Participation includes active listening and contributions to class discussions and activities. Please note attendance and participation is required on Semester at Sea. Absences are only excused when accompanied by a note from the clinic.

GRADING RUBRIC

Grading:	Class participation	10%
	In-class assignments/quizzes	20%
	Field lab assignment	20%
	Observation journal	25%
	Group project	25%

Grading scheme: Based on the cumulative percentage earned, your grade will be assigned as follows:

A+	90+
A	85-89
A-	80-84
B+	76-79
B	72-75
B-	68-71
C+	64-69
C	60-63
C-	55-59
D	50-54
F	0-49

RESERVE BOOKS AND FILMS FOR THE LIBRARY

AUTHOR: Mark Denny
TITLE: How the Ocean Works: An Introduction to Oceanography
PUBLISHER: Princeton University Press
ISBN # 978-0691126470
EDITION: 2008

AUTHOR: Daniel Beckman
TITLE: Marine Environmental Biology and Conservation
PUBLISHER: Jones & Bartlett Learning
ISBN # 978-0763773502
EDITION: 2012

AUTHOR: Elliott A. Norse, Larry B. Crowder
TITLE: Marine Conservation Biology: The science of Maintaining the Sea's Biodiversity
PUBLISHER: Island Press
ISBN # 978-15-596-3662-9
EDITION: 2005

AUTHOR: Terrance M. Gossliner, David W. Behrens, Gary C. Williams
TITLE: Coral Reef Animals of the Indo-Pacific: Animal Life from Africa to Hawaii Exclusive of Vertebrates
PUBLISHER: Sea Challengers
ISBN # 978-0930118211
EDITION: 1996

AUTHOR: Gerald Allen, Roger Steene, Paul Humann, Ned Deloach
TITLE: Reef Fish Identification: Tropical Pacific
PUBLISHER: New World Publications
ISBN # 978-1878348364

EDITION: 2005

AUTHOR: Paul Humann, Ned DeLoach
TITLE: Reef Creature Identification: Tropical Pacific
PUBLISHER: New World Publications
ISBN # 978-1878348449
EDITION: 2010

AUTHOR: Thomas A. Jefferson, Marc A Webber, Robert L. Pitman
TITLE: Marine Mammals of the World: A Comprehensive Guide to their Identification
PUBLISHER: Academic Press
ISBN # 978-0124095427
EDITION: 2015 (2nd)

AUTHOR: Carmelo R. Tomas
TITLE: Identifying Marine Phytoplankton
PUBLISHER: Academic Press
ISBN # 978-0126930184
EDITION: 1997

AUTHOR: John Hoover
TITLE: Hawaii's Sea Creatures: A Guide to Hawaii's Marine Invertebrates
PUBLISHER: Mutual Publishing
ISBN # 978-1566472203
EDITION: 2006

AUTHOR: John Hoover
TITLE: Hawaii's Fishes: A guide for Snorkeling and Diving
PUBLISHER: Mutual Publishing
ISBN # 978-1566470018
EDITION: 2007

ELECTRONIC COURSE MATERIALS

Other readings and videos listed are found on the ship's intranet.

ADDITIONAL RESOURCES

None.

HONOR CODE

Semester at Sea students enroll in an academic program administered by the University of Virginia, and thus bind themselves to the University's honor code. The code prohibits all acts of lying, cheating, and stealing. Please consult the Voyager's Handbook for further explanation of what constitutes an honor offense.

Each written assignment for this course must be pledged by the student as follows: “On my honor as a student, I pledge that I have neither given nor received aid on this assignment.” The pledge must be signed, or, in the case of an electronic file, signed “[signed].”