

SEMESTER AT SEA COURSE SYLLABUS  
University of Virginia, Academic Sponsor

**Voyage: Spring 2016**  
**Discipline: Biology**  
**BIOL 3559-101: Conservation Biology**  
**Division: Upper**  
**Faculty Name: Dr. Catherine Pringle**  
**Credit Hours: 3; Contact Hours: 38**

**Pre-requisites:**

Introductory Biology

**COURSE DESCRIPTION**

This upper-level undergraduate course will review the drivers of global environmental change (human population growth and consumption of resources), resulting environmental degradation, and tools to slow down or address environmental damage. The course begins with analyses of current and historic changes in biodiversity, habitat conversion and fragmentation, and exotic species. Species, landscape, and ecosystem approaches to conservation are reviewed, including important tools such as management of source-sink dynamics, conservation genetics, population viability analysis, elements of nature reserve design, restoration, and environmental policy. Lectures toward the end of the course focus on the conservation challenges of disease, climate change, and toxic chemicals. The course uses case studies from the instructor's own experiences in conservation research and management. Connections are explored between biodiversity and human health in a changing global environment. Special attention is paid to current conservation issues in countries and regions along the route of the voyage.

**COURSE OBJECTIVES**

General Goal: To provide students with a fundamental understanding of the ecological and evolutionary dimensions of conservation biology, along with science-based management and policy solutions. The course will combine lectures, readings, in-class presentations and exercises with a special emphasis on critical thinking, problem solving, and global understanding.

Specifics: By the end of this course students should be able to:

- understand ecological and evolutionary principles that underlie biological diversity;
- explain threats to biodiversity and consequences of biodiversity loss and to identify linkages among conservation challenges across different biological scales (genes to landscapes) and geographical scales (local to global);
- demonstrate how ecological and evolutionary principles are applied to solving conservation challenges;

- articulate our responsibility, as humans, to serve as global land stewards;
- apply critical reasoning skills to assessment, analysis, and synthesis of conservation problems and solutions; and
- demonstrate a greater understanding of: conservation issues in countries both outside and within the US; cultural differences in perceptions of problems; and effective solutions.

## REQUIRED TEXTBOOKS

AUTHOR: Richard B. Primack  
 TITLE: Essentials of Conservation Biology  
 PUBLISHER: Sinauer Associates, Inc.  
 ISBN #: 978-1-60535-293-3  
 DATE/EDITION: 2014/ Sixth Edition

## TOPICAL OUTLINE OF COURSE

Depart Ensenada- January 5:

### **A1- January 7: Introductions; *What is Conservation Biology and Sustainable Development?***

- Required Readings:
1. Primack Chapter 1
  2. Clark, W.C. (2007) *Sustainability Science: A room of its own* PNAS 104 (6): 1737-38.
  3. Ackerman, D. (2014). *Is nature natural anymore?* pp 111-127. In: *The human age: The world shaped by us.* W.H. Norton and Company.

**Writing Assignment #1:** (5% grade; due Jan 9<sup>th</sup>): Students will write a short essay (not more than two double-spaced pages) based on the Ackerman book chapter (indicated above). Guiding thought-provoking questions will be provided in class to help direct these essays.

### **A2- January 9: *Global Biodiversity and Why it is Important: Historic and Contemporary losses and patterns***

- Required Readings:
1. Primack (course text): Chapters 2, 3, 7, 8
  2. Dirzo, R. et al. (2014) *Defaunation in the Anthropocene.* Science 345 (6195): 401-406.
- Recommended:
1. Kolbert (The Sixth Extinction): Chapters 1-5
  2. Pimm, S. L. et al. (2014) *The biodiversity of species and their rates of extinction, distribution, and protection.* Science 344:

### **A3- January 11: *Current Threats to Biodiversity (55 min); Preview of conservation issues in Hawaii (20 min)***

- Required Readings:
1. Primack (course text) Chapters 7, 8
  2. Foley et al (2005) *Global consequences of land use.*

Honolulu: January 12

**A4- January 15: *Conservation Ethics and Environmental Justice in the Age of Globalization;***

- Required Readings: 1. Primack Chapters 6, 20, 22  
2. Carbon trade-watch fact Sheets (2009) #1 and #2  
(two pages each)

Required DVD documentary: (40 min) The carbon connection 2007

Recommended/of interest: The Pope's (Papal) Encyclical (2015)

**A5- January 17: *Ecosystem Services and the Economics of Conservation***

Required Readings: Primack (course text) Chapters 4, 5

Study Day: January 19

**A6- January 20: *Habitat Fragmentation***

Required Readings: Primack (course text), Chapter 9

Recommended Readings: Crooks and Sanjayan, (Connectivity Conservation)  
Chapter 10

**A7- January 22: *Overexploitation with emphasis on "Fishing Down Marine Foodwebs (55 min); Preview of Conservation Issues in Japan (20 min)***

- Required Readings: 1. Primack (course text), Chapter 10  
2. Sohns and Crowder (2013) Chapter 6: *Sustainable Fisheries and Seas: Preventing Ecological Collapse. In: State of the World 2013: Is Sustainability Still Possible.* Island Press  
3. Baum, J.K. and B. Worm. 2009. *Cascading top-down effects of changing oceanic predator abundances.* Journal of Animal Ecology

Recommended Readings: 1. Estes et al. 2011. *Trophic downgrading of planet earth.* Science 333: 301-306  
2. Lochbaum et al. and the Union of Concerned Scientists 2014. *Fukushima: The story of a nuclear disaster.* The New Press, NY. Chapters 1, 12 and Appendix

**Writing Assignment #2** (5 % grade; due Jan 22nd): Students will write an essay (~2 pages, double spaced) based on: (1) the 2007 video, *The carbon connection* (conservation ethics of carbon trading on two different regions of the world affected by the global market); (2) two *carbon trade-watch fact sheets* (indicated above) and (3) independent, curiosity-driven research (internet and library).

Yokohama: January 24-2

In-Transit: January 26  
Kobe: January 27-28

**A8- January 29: Student Presentations/Discussion – Reflections on Japan (55 min); *Preview of Conservation Issues in China* (20 min)**

Recommended Books: 1. Economy, E. 2010. *The River Runs Black: The environmental challenge to China's future*, Chapters 1,2, and 8  
2. Shapiro, J. 2012. *China's environmental challenges*  
Chapters 1, 2, 3, and 7.

Shanghai: January 31-February 1

In-Transit: February 2-3

Hong Kong: 4-5

**A9- February 6: Student Presentations/Discussion – Reflections on China and cross-country comparisons (55 min): *Preview of Conservation Issues in Viet Nam* (20 min)**

Ho Chi Minh: February 8-12

**A10- February 13: Student Presentations/Discussion – Reflections on Viet Nam and cross-country comparisons (55 min): *Preview of Conservation Issues in Myanmar* (20 min)**

**A11-February 15: *Exotic Species in the Age of the Homogocene: Burmese pythons in Florida and North American invasives in Asia*; show u-tube NY Times Retro Report (2015) *The snake that's eating Florida* (12 min)**

Required Readings: 1. Primack (course text) Chapter 10  
2. Schmidt, C. 2012. *As isolation ends, Myanmar faces new ecological risks*. *Science* 137: 796-797.

Yangon: February 17-21

**A12- February 22: *Conservation at population and species levels* (55 min); *Preview of conservation issues in India* (20 min)**

Required Readings: 1. Primack (course text) Chapter 11, 12, 13, 14

**A13- February 24: Midterm Exam**

Cochin: February 26-March 2

**A14- March 3: Student Presentations/Discussion – Reflections on India and cross-country comparisons**

Study Day: March 5

**A15- March 6: *Ecosystem-level management of protected areas* (55 min); *Preview of conservation issues in Mauritius* (20 min)**

Required Readings: 1. Primack (course text) Chapters 15, 16,

2. Pringle, C. M. 2001. *Hydrologic connectivity and the management of biological reserves: A global perspective*. Ecological Applications 11: 981-998.
3. Pringle, C. M. 2000. *Threats to U.S. public lands from cumulative hydrologic alterations outside of their boundaries*. Ecological Applications 10:971-989.

Port Louis: March 12

**A16- March 9: *When Protected Areas Become “Population Sinks”: Examples from the U.S., Viet Nam, India and Africa***

Study Day: March 11

**A17- March 12: *Park Management Case study: Kruger National Park, South Africa* (55 min); *Preview of conservation issues in South Africa* (20 min)**

- Required Readings:
1. Primack (course text): Chapters 17, 18;
  2. Licht, et al.. 2008. Out of Africa: Lessons from Park Management in South Africa. The George Wright Forum: 25(1): 20-29.

Recommended Readings: 1.

Cape Town: March 14-19

**A18- March 20: *Student Presentations/Discussion – Reflections on South Africa and Cross-Country Comparisons***

**A19- March 22: *Ecological Restoration and Conservation at local, national and international levels***

- Required Readings:
1. Primack (course text) Chapter 19, 20, 21
  2. Butchart et al. (2010). *Global biodiversity: Indicators of recent declines*. Science 328: 1164-1168.
  3. Walpole et al. (2009) *Tracking progress toward the 2010 biodiversity target and beyond*. Science 325: 1503-1504

- Recommended Readings:
1. Chapter 5: *Conservation (in South Asia): the role of local communities*. In: Bawa et al. (2004) Conservation Biology: A primer for South Asia. Sinauer Associates
  2. Chapter 6: *Law, policies and institutions for conservation in South Asia*. In: Bawa et al. (2004) Conservation Biology: A primer for South Asia. Sinauer Associates

**A20- March 24: *Conservation Challenge I: Dealing with Emerging Infectious Diseases* (55 min); *Preview of conservation issues in Ghana* (20 min)**

- Required Readings:
1. Primack (course text): Chapter 10 (pp 241- 246)
  2. Machalaba, C.C. et al. (2015). Emerging diseases from

animals, pp. 105-116. In: State of the World 2015: Confronting hidden threats to sustainability. Island Press. .

Tema: March 26-28

Takoradi: March 29-30

**A21- March 31: Student Presentations/Discussion – Reflections on Ghana and Cross-Country Comparisons**

**A22- April 2: *Conservation Challenge II: Controlling Synthetic Chemicals in the Environment***

Required Readings: Colburn et al. (199x) Chapters x, x, x

Required DVD: *Homo toxicus*

**A23- April 4: *Conservation Challenge III: Mitigating effects of Global Climate Change* (55 min) and *Preview of Conservation Issues in Morocco* (20 min)**

Required Readings: Primack (course text): Chapter 9 (pp 205-212)

Recommended Readings: The Lancet Commission. 2015. Health and climate change: Policy responses to protect public health. pp. 1-12; 31-34.

**Writing Assignment #3:** (10% grade; due April 5th): In this longer (5-10 pages, double-spaced) writing assignment, students will pick a conservation theme from the class and write a paper comparing 3-5 countries (visited during the voyage) based on this conservation theme. The final report will involve internet and library research. A list of conservation themes will be provided to students to choose from.

Casablanca: April 6-10

Study Day: April 11

**A24- A Day Finals, April 12**

April 15: 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 LAB** (At least 20 percent of the contact hours for each course, to be led by the instructor.)

Country: Honoulu, Hawaii

Coconut Island is a tropical marine research facility belonging to the University of Hawai'i at Manoa's Institute of Marine Biology. It is surrounded by 64 acres of coral reef and it supports

research in many disciplines of tropical science such as coral ecology, biogeochemistry, and evolutionary genetics. Students will travel on the station's research vessel, deploying a plankton net along the way. Upon reaching Coconut Island they will encounter sharks and other research animals, then do two hands-on labs, one analyzing the plankton from the research cruise and the other sorting through invasive seaweeds to separate out and recover small creatures from the bay. The lab will provide first-hand exposure to the endangered coral ecosystem, and an appreciation of the role that scientific research plays in their conservation.

### Objectives:

1. Understand the structure and biodiversity of coral reef ecosystems, and discuss the threats to their survival.
2. Tour a tropical marine research facility; speak with scientists engaged in marine research; and gain hands-on experience in data collection.
3. Develop an appreciation of the linkages between basic scientific research and applied conservation strategies.

### **FIELD ASSIGNMENT**

- Students will write a two-page response (following the Field Lab) to specific questions posed by the instructor. Questions will require students to interpret and evaluate what they see, not just summarize.

### **WRITING ASSIGNMENTS**

**Writing Assignment #1:** (5% grade; due Jan 9<sup>th</sup>): Students will write a short essay (not more than two double-spaced pages) based on the Ackerman book chapter (indicated above). Guiding thought-provoking questions will be provided in class to help direct these essays.

**Writing Assignment #2** (5 % grade; due Jan 22<sup>nd</sup>): Students will write an essay (~2 pages, double spaced) based on: (1) the 2007 video, *The carbon connection* (conservation ethics of carbon trading on two different regions of the world affected by the global market); (2) two *carbon trade-watch fact sheets* (indicated above) and (3) independent, curiosity-driven research (internet and library).

**Writing Assignment #3:** (10% grade; due April 5<sup>th</sup>): In this longer (5-10 pages, double-spaced) writing assignment, students will pick a conservation theme from the class and write a paper comparing 3-5 countries (visited during the voyage) based on this conservation theme. The final report will involve internet and library research. A list of conservation themes will be provided to students to choose from.

**Team Presentation:** (10 % grade): Student "Presentations/Discussions" are included in class meetings that immediately follow return to the ship after a country visit. At the beginning of the

term, groups of 3-4 students will each be assigned a country that will be visited during the voyage (e.g., “Japan Group,” “India Group”). Immediately following the visit to their assigned country, the students will create a PowerPoint presentation (using images they collected during the country visit) and a written *team summary* that summarize and illustrate conservation themes relevant to that country. They will use this presentation to stimulate a class discussion of the country visited.

## **METHODS OF EVALUATION / GRADING RUBRIC**

The final grade in the course will be computed as follows:

- 25% midterm examination
- 25% final examination
- 20% three writing assignments
- 20% field lab
- 10% team presentation

## **RESERVE BOOKS AND FILMS FOR THE LIBRARY**

1. AUTHOR: Meffe, Groom and Carroll

TITLE: Principles of Conservation Biology 3<sup>rd</sup> Edition

PUBLISHER: Sinauer Associates

ISBN #: 978-0-87893-597-0

DATE/EDITION: 2006/3<sup>rd</sup> Edition

2. AUTHOR: Elizabeth Kolbert

TITLE: The Sixth Extinction: An unnatural history

PUBLISHER: Henry Holt and Company

ISBN #: 978-0-8050-9299-8

3. AUTHOR: Theodore Colburn, Dianne Dumanoski, John Peterson Myers

TITLE: Our Stolen Future

PUBLISHER: Dutton Publishers

ISBN #: 0-452-27414-1

DATE/EDITION: 1997

4. AUTHOR: Reuben P. Keller

TITLE: Invasive species in a globalized world

PUBLISHER: University of Chicago Press

ISBN #: 13-978-0-226-16618-6

DATE/EDITION: 2015

5. AUTHOR: Reuben P. Keller

TITLE: Invasive species in a globalized world

PUBLISHER: University of Chicago Press



ISBN #: 13-978-0-226-16618-6

DATE/EDITION: 2015

6. AUTHOR: Paul. Krausman and Bruce Leopold  
TITLE: Essential Readings in Wildlife Management and Conservation  
PUBLISHER: John Hopkins University Press  
DATE/EDITION: 2013

7. AUTHOR: K. Crooks and M. Sanjayan  
TITLE: Connectivity Conservation  
PUBLISHER: Cambridge University Press  
DATE/EDITION: 2006

8. DVD: Homo Toxicus

9. AUTHOR: Diane Ackerman  
TITLE: The Human Age: The world shaped by us  
PUBLISHER: W. W. Norton  
ISBN: 978-0-393-2407-0  
DATE/EDITION: 2014

10. AUTHOR: The Worldwatch Institute  
TITLE: State of the World 2015: Confronting hidden threats to sustainability  
PUBLISHER: Island Press  
ISBN: 978-1-61091-610-3  
DATE/EDITION: 2015

11. DVD: *The Carbon Connection* 2011.

12. U-TUBE: NY Times Retro Report (2015): *The snake that's eating Florida* (12 min)

13. AUTHORS by [Kamaljit Bawa](#) (Author), [S. Primack](#) (Author), [Richard B. Oommen](#) (Author), [Meera Anna](#) (Author)  
TITLE: Conservation Biology: A primer for South Asia  
Paperback: 604 pages  
PUBLISHER: Sinauer Associates

14. AUTHOR: Economy, Elizabeth (2010)  
TITLE: *The River Runs Black: The environmental challenge to China's future*  
*available in paperback*

15. AUTHOR Shapiro, J. 2012.  
TITLE: *China's environmental challenges*  
*available in paperback*

16. AUTHOR Union of Concerned Scientists (Lochbaum et al. 2014)

TITLE: Fukushima: The story of a nuclear disaster  
PUBLISHER: The New Press, NY  
ISBN: 978-1-59558-908-8 paperback

**ELECTRONIC COURSE MATERIALS - See required and recommended readings listed above**

**ADDITIONAL RESOURCES**

Students will be asked to locate some information on the Internet.

**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]."

Conservation biology is the management of nature and of Earth's biodiversity with the aim of protecting species, their habitats, and ecosystems from excessive rates of extinction and the erosion of biotic interactions. It is an interdisciplinary subject drawing on natural and social sciences, and the practice of natural resource management.:478. The conservation ethic is based on the findings of conservation biology.