

## SEMESTER AT SEA COURSE SYLLABUS

**Voyage: Spring 2013**

**Discipline: Biology**

**BIOL 3559: Conservation Biology**

**Division: Upper**

**Faculty Name: Frank von Hippel**

**Pre-requisites: Introductory Biology or Environmental Science**

**COURSE DESCRIPTION:** This upper-division course reviews the drivers of global environmental change (human population growth and consumption of resources), resulting environmental degradation, and tools to slow down or reverse environmental damage. The course begins with analyses of levels of biodiversity and species richness, and then covers concepts in demography, such as source and sink dynamics and population viability analysis. These concepts are then employed to understand major environmental problems, including habitat conversion and modification, climate change, eutrophication, acid rain, stratospheric ozone depletion, endocrine disruption due to contaminants, trade in threatened species, and biological invasions. Connections are explored between biodiversity and human health in a changing global environment. Interactions and synergisms between environmental problems are then illustrated via analysis of the global declines of amphibians, reptiles and primates. The final third of the course explores the conservation biology toolbox, including conservation genetics, island biogeography and the design of nature reserves, and environmental policy. Special attention is paid to conservation problems along the route of the Semester at Sea voyage.

### **COURSE OBJECTIVES:**

- To teach students how human population growth and consumption of resources drive environmental problems. The student will understand the major environmental problems the Earth now faces, such as climate change, eutrophication, acid rain, stratospheric ozone depletion, contaminants and endocrine disruption, habitat modification and conversion, biological invasions, and global declines of amphibians, reptiles, and primates. The student will understand how many of these problems interact in a synergistic fashion, and therefore the student will improve complex thinking skills.
- To teach students tools for assessing and addressing environmental degradation. Students learn these tools both in class and on field exercises. The student will understand major tools for solving environmental problems, such as legislative tools (e.g., CITES, ESA), tools in conservation genetics, island biogeography and its application to reserve design, and economic tools (e.g., debt for nature swaps, analysis of lost opportunity costs).
- To teach students to analyze conservation problems in a multidisciplinary manner with consideration of economics, law and policy alongside scientific fields such as conservation genetics, environmental chemistry and population demography.

## REQUIRED TEXTBOOKS

AUTHOR: Martha J. Groom, Gary K. Meffe, C. Ronald Carroll

TITLE: Principles of Conservation Biology

PUBLISHER: Sinauer Associates, Inc.

ISBN #: ISBN-10: 0878935975, ISBN-13: 978-0878935970

DATE/EDITION: 2005, third edition

## TOPICAL OUTLINE OF COURSE

<b>Class #</b>	<b>Topic</b>	<b>Reading</b>
1	<b>Diversity of life 1: species richness, taxonomy &amp; conservation</b>	Chapter 1
2	<b>Diversity of life 2: levels of biodiversity and species richness</b>	Chapter 2
3	<b>Environmental problems: drivers &amp; consequences</b>	Chapter 3
4	<b>Conservation values &amp; ethics</b>	Chapter 4
5	<b>Ecological economics &amp; nature conservation</b>	Chapter 5
6	<b>Habitat degradation &amp; loss</b>	Chapter 6
7	<b>Habitat fragmentation</b>	Chapter 7
8	<b>Overexploitation</b>	Chapter 8
9	<b>Biological invasions</b>	Chapter 9
10	<b>Climate change 1</b>	Chapter 10
11	<b>Climate change 2</b>	“
12	<b>Midterm Exam</b>	
13	<b>Conservation genetics 1</b>	Chapter 11
14	<b>Conservation genetics 2</b>	“
15	<b>Species &amp; landscape approaches to conservation</b>	Chapter 12
16	<b>Ecosystem approaches to conservation</b>	Chapter 13
17	<b>Island biogeography &amp; protected areas 1</b>	Chapter 14
18	<b>Island biogeography &amp; protected areas 2</b>	“
19	<b>Restoration ecology</b>	Chapter 15
20	<b>Sustainable development</b>	Chapter 16
21	<b>Conservation science &amp; policy</b>	Chapter 17
22	<b>Complex conservation challenges</b>	Chapter 18
23	<b>Biodiversity revisited</b>	

24	<b>Final Exam</b>	
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**FIELD WORK**

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

Potential field labs include:

*Urban ecology of Shanghai.* We will visit the “forest corridors” of Shanghai, where the government has initiated an urban forest restoration program. We will learn about changing forest landscapes in urban settings, including conservation implications of forest fragmentation, edge effects, reforestation and tree species diversity. We will investigate the effects of Shanghai’s program on urban environmental quality, including air and water quality. We will study effects on bird species diversity, and learn about conservation partnerships between government and non-governmental organizations. Each student will create detailed journal entries of their observations, questions and interpretations, with special attention paid to effective scientific journal notes and illustrations.

*Mangrove forest and riverine restoration in Ho Chi Minh City.* We will visit the Vam Sat Marshlands, a formerly degraded ecosystem due to exposure to toxic chemicals from war. The marshlands have been the focus of intensive restoration, and are home to saltwater crocodiles, river otters, pythons, monkeys, wildcats and flying foxes. We will learn about how the ecosystem was degraded, what was done to restore ecological functions and wildlife populations, and what more could be done to improve the habitat. We will learn about the natural ecology of mangrove forests and how that ecology is disrupted by contaminants. We will learn about the ecology and conservation of resident wildlife. Each student will create detailed journal entries of their observations, questions and interpretations, with special attention paid to effective scientific journal notes and illustrations.

*Mangrove forest and orangutan conservation in Malaysia.* We will visit a small island with a family of orangutans to learn about orangutan ecology and conservation. We will then visit the Taiping Lake Gardens and the Matang Mangrove Forest Reserve to learn about mangrove forest ecology, conservation and management. We will also see how local people use mangrove wood to produce charcoal. Each student will create detailed journal entries of their observations, questions and interpretations, with special attention paid to effective scientific journal notes and illustrations.

**FIELD ASSIGNMENTS**

In addition to the field lab assignment described above, each student will complete a journal entry for 6 of the 13 ports that we visit (the student chooses the ports to include). Each journal entry will address a question from the course that has relevance to the chosen port. The journal entry will be a descriptive analysis of the question, and may include species lists, list of rank-ordered threats, analysis of conservation actions, illustrations, interviews, habitat inventories, and the like. Journal

entries will be due on the second day at sea following the port visit. Journal entries will be evaluated based on clarity, content, quality of writing, depth of analysis, and effectiveness of illustration. Feedback will be given for each entry in order for the student to improve future entries.

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

Field lab assignment = 20%

Journal entry for each port = 5% x 6 ports = 30%

Midterm exam = 25%

Final exam = 25%

### **RESERVE LIBRARY LIST**

AUTHOR: Theo Colborn, Dianne Dumanoski and John Peter Meyers

TITLE: Our Stolen Future

PUBLISHER: Plume

ISBN #: ISBN-10: 0452274141, ISBN-13: 978-0452274143

DATE/EDITION: 1997

AUTHOR: Rachel Carson

TITLE: Silent Spring

PUBLISHER: Houghton Mifflin Company

ISBN #: ISBN-10: 0618249060, ISBN-13: 978-0618249060

DATE/EDITION: 2002 (other editions are also fine, originally published in 1962)

AUTHOR: Kathryn Phillips

TITLE: Tracking the Vanishing Frogs

PUBLISHER: Penguin

ISBN #: ISBN-10: 0140246460, ISBN-13: 978-0140246469

DATE/EDITION: 1995

### **ELECTRONIC COURSE MATERIALS**

n/a

### **ADDITIONAL RESOURCES**

Each student must also have a rite-in-the-rain bound notebook for their journal entries. I prefer the Rite in the Rain Fabrikoid Cover Bound Book, "blank bound book", available from Ben Meadows (benmeadows.com) as item number 197290 for \$18.00.

Each student must have a good supply of pencils.

### **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]."

Ethical Principles of Conservation Biology. - diversity of species and ecosystems should be preserved - ultimate extinctions of populations and species should be prevented - ecological complexity should be maintained - evolution should continue - biodiversity has intrinsic value. Biophilia. genetic disposition to like biodiversity. Biodiversity. complete range of species and biological communities, genetic variation within species and ecosystem processes. preservationist ethic. Buy Principles of Conservation Biology on Amazon.com "FREE SHIPPING on qualified orders." He is senior author of Ecosystem Management: Adaptive, Community-Based Conservation, coauthor of Conserving Biodiversity on Military Lands: A Handbook for Natural Resources Managers, and coeditor of Ecology and Evolution of Livebearing Fishes. Since 1997 he has served as Editor of the international journal Conservation Biology. C. Ronald Carroll is the former Director of the Institute of Ecology at the University of Georgia and currently the Director for Science in the River Basin Science and Policy Center at the University of Georgia. He is the series editor for the newly initiated Southern E Principles of Conservation Biology, Third Edition, features a wholly revised organization, emphasizing analyses of different categories of threat and approaches to conservation. Coverage has been expanded to incorporate both terrestrial and marine conservation issues, and efforts in the U.S. and across the globe. The book's eighteen chapters introduce the major themes and concepts of this diverse and dynamic field. The biological and social underpinnings of conservation problems and potential solutions are interwoven throughout the text, which is divided into three sections: foundations o