

## SEMESTER AT SEA COURSE SYLLABUS

Discipline: Biological Science  
Semester and Year: Fall 2006  
Course # and Title: **World Ecosystems**  
Faculty Name: Dr. Timothy Kittel

### Suggested Pre-requisites:

Introductory course in ecology, biology, physical geography, or other environmental sciences.

### COURSE DESCRIPTION

An examination of a world vegetation map reveals a repeating pattern of evergreen rain forests, dry deciduous woodlands, hot deserts, and more. A closer look shows that there are great similarities among, for example, tropical forests on one continent to those on another, and yet these areas are also distinct. This course surveys the major ecological regions of the world, with an emphasis on environments visited during the voyage. The course explores key physical and biological factors that determine the structure, function, and distribution of these ecosystems, including climate, topography, soil, and biotic interactions. We will discuss how morphological, physiological, and behavioral adaptations allow plants and animals to survive in particular environments. In addition, we will follow how human use is connected to regional ecology. We will use in-country field practica and onboard student presentations to explore these ecosystems and to build a comparative analysis as we go. Suggested equipment: Binoculars are highly recommended for use on field practica.

### COURSE OBJECTIVES

Course objectives are to foster a global perspective of the ecosystems in which peoples of the countries we visit live, to develop an understanding of the complexity of processes that shape these landscapes, and to impart an appreciation of the threats that face ecosystems worldwide. To this end, we will explore **four themes**:

- (1) **Underlying processes** – What are the key factors controlling the distribution, structure, and function of ecosystems?
- (2) **Continental comparison** – What are the similarities and distinctions of ecosystems representing the same biome on different continents?
- (3) **Ecosystems and society** – What is the ecological context for different cultures? And what ‘services’ do ecosystems provide to society?
- (4) **Global environmental change** – What global and cumulative regional changes are currently occurring? And what might the future hold for these environments?

## TOPICAL OUTLINE OF COURSE

#	Date depending on A or B schedule	Topic / Activity (lecture and class discussion topics in <b>bold</b> , student presentations <u>underlined</u> , quizzes in <i>Italics</i> )	Readings Chapters: §=Sections in <i>Breckle</i>	Voyage location
1		<i>Course intro –</i> <b>Global Themes in the Biogeography of Ecosystems</b>	<b>Introduction</b>	Ensenada to Honolulu
2		<b>Global Climate Dynamics – Climate and Vegetation – A Tour of Terrestrial &amp; Marine Biomes</b>	<b>Fundamentals:</b> §1-9 <b>Ecosystems:</b> §1-4, §14	to Honolulu
				<b>Honolulu</b>
3		<b>Polar and Boreal Ecosystems</b> (Biomes VIII & IX, <i>numerals correspond to those in Breckle</i> ) – <b>Tundra and Forests of Siberia</b>	<b>Ch VIII, Ch IX</b>	to Japan
4		<u>Student Presentations 1 (Biomes VIII &amp; IX)</u> <b>Cold and Warm Temperate Forests</b> (Biomes V & VI) – <b>Ecosystems of Japan</b>	<b>Ch V</b> <b>Ch VI:</b> §1-3, §5	to Japan
5		<u>Student Presentations 2 (Biomes V &amp; VI)</u> <b>Soil and Vegetation</b>	<b>Fundamentals:</b> §11, <b>Ecosystems:</b> §6	to Japan
6		<i>Quiz 1</i> <b>Temperate Grasslands and Deserts</b> (Biome VII) – <b>Steppes and Deserts of China &amp; Central Asia</b>	<b>Ch VII</b>	to Japan
		<i>In port</i>		<b>Japan</b>
7		<i>Field Reports:</i> Japan <u>Student Presentations 3 (Biome VII)</u> <b>Subtropical and Tropical Rain Forests</b> (Biome I) – <b>Forests of SE Asia</b>	<b>Ch I:</b> §1-4, §6-8	to China
		<i>In port</i>		<b>China/Hong Kong</b>
8		<i>Field Reports:</i> China & Hong Kong <u>Student Presentations 4 (Biome I)</u> <b>Mangroves</b>	<b>Ch II:</b> §7-9	to Vietnam
		<i>In port</i>		<b>Vietnam</b>
9		<i>Field Reports:</i> Vietnam <b>Tropical Moist Seasonal Forests</b> (Biome I/II) – <b>Monsoon Forests of the Indian Subcontinent – Topography and Vegetation – Tropical Orbiomes (mountain ecosystems)</b>	<b>Ch I:</b> §9, <b>Ch II:</b> §1-2 <b>Ecosystems:</b> §5, <b>Ch I:</b> §5, <b>Ch II:</b> §10	to Myanmar
10		<u>Student Presentations 5 (Biome I/II)</u> <i>Quiz 2</i>		to Myanmar
A11		<b>Time and Vegetation – The Role of Disturbance/Fire – Global Climate Change and Vegetation</b> [if B schedule, see B13]	<b>Ecosystems:</b> §13	to Myanmar
		<i>In port</i>		<b>Myanmar</b>
B11/ A12		<i>Field Reports:</i> Myanmar <b>Tropical Dry Deciduous Woodlands and Savanas</b> (Biome II) – <b>Dry Vegetation of the Indian Subcontinent</b>	<b>Ch II:</b> §3-6, §12	to India

TOPICAL OUTLINE OF COURSE (*continued*)

		<b><i>In port</i></b>		<b>India</b>
B12/ A13		<i>Field Reports: India</i> <u>Student Presentations 6 (Biome II)</u> <b>Organisms and Vegetation I: Symbiotic Relationships</b>	Reserve reading	to Egypt
B13		[=A schedule A11] <b>Time and Vegetation – The Role of Disturbance/Fire – Global Climate Change and Vegetation</b>	<b>Ecosystems: §13</b>	to Egypt
14		<b>Subtropical Deserts (Biome III) – Deserts of the Middle East and North Africa</b>	<b>Ch III</b>	to Egypt
15		<u>Student Presentations 7 (Biome III)</u> <b>Quiz 3</b>		to Egypt
16		<b>Mediterranean Biomes (Biome IV) – Vegetation of the Mediterranean Basin</b>	<b>Ch IV</b>	to Egypt
		<b><i>In port</i></b>		<b>Egypt</b>
17		<i>Field Reports: Egypt</i> <u>Student Presentations 8 (Biome IV)</u> <b>Organisms and Vegetation II: Herbivory – Desertification</b>	Reserve reading	to Turkey
		<b><i>In port</i></b>		<b>Turkey</b>
18		<i>Field Reports: Turkey</i> <b>Temperate Orobionomes &amp; Their Winter Ecology – Vegetation of Non-Mediterranean Europe</b>	<b>Ch VI: §4, §6</b>	to Croatia
		<b><i>In port</i></b>		<b>Croatia</b>
19		<i>Field Reports: Croatia</i> <b>Voyage Synthesis – Working Groups convene:</b> <b>Theme 1 – Underlying ecological processes</b> <b>Theme 2 – Continental comparative analysis</b>		to Spain
20		<i>Working Group Reports: Synthetic Themes 1 &amp; 2</i>		to Spain
		<b><i>In port –</i></b>		<b>Spain</b>
21		<i>Field Reports: Spain</i> <b>Voyage Synthesis – Working Groups convene:</b> <b>Theme 3 – Ecosystem-society interconnections</b> <b>Theme 4 – Global environmental change</b>		to Florida
22		<i>Working Group Reports: Synthetic Themes 3 &amp; 4</i>		to Florida
23		<b>Final Exam</b>		to Florida
		<b><i>In port – Home</i></b>		<b>Florida</b>

### FIELD COMPONENT:

Students will be expected to take part in field practica in at least 3 ports of call that will take them to natural areas and provide opportunities to experience and learn about these ecosystems. The 3 sites should be selected to sample each of the major regions visited: E/SE Asia, S Asia, and the Mediterranean. Students will (1) keep a field journal of observations and of what they learned from guides, experts, and other on-site resources, (2) report on these activities back to the class once underway, and (3), for each site, submit a 3-page written summary of field and follow-up research. The summary should interpret observations and other findings, placing them in regional and global contexts. For the course field component, a student can choose to work on an independent field project that involves individualized activities in several ports – such projects must be approved beforehand, devised and undertaken in consultation with the instructor, and presented back to the class during the field reports.

### METHODS OF EVALUATION

- 25% *Exams* – There will be 3 quizzes (5% each) and a final exam (10%) covering material from lectures, readings, student presentations, and in-class discussion. The final will be cumulative.
- 20% *Pre-port Presentations* – Prior to arrival in each port, groups of 3-4 students will give short (15-20 min) presentations on global comparative ecology of a selected biome found in the region of that port. As part of this presentation, each student will be expected to choose one ecological aspect on which to focus their comparisons, following that topic through occurrences of the biome on other continents. Grades will be based on oral presentation and a one-page annotated outline prepared by the group for the class. Each student will have the opportunity to present such analyses twice during the voyage (2 presentations @10%).
- 20% *Field Reports* – Following each port-of-call, students will lead a debriefing consisting of (1) individuals or groups orally presenting reports from related practica and (2) general discussion of their field experiences and insights. Each student is expected to contribute substantively to these discussions and to report on their field findings (per Field Component, above) (15%). In addition, students are to keep a field journal of observations and of what they learned from guides, experts, and other resources (5%)
- 15% *Papers* – 3-page written summaries of field and follow-up research for each of 3 sites (see Field Component, above) (5% each).
- 20% *Synthesis Working Groups* – In the final weeks of the course, students will participate in two synthesis working groups, each focused on one of the course's four themes (see page 1). The voyage synthesis will be conducted as a professional workshop. Each student is expected to participate in the group's discussion, presentation, and summary write-up (2 themes @10%).

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REQUIRED TEXTBOOKS

AUTHOR: Breckle, Siegmund-Walter  
TITLE: *Walter's Vegetation of the Earth*  
PUBLISHER: Springer  
ISBN #: 3-540-43315-5  
DATE/EDITION: 2002, 4<sup>th</sup> edition  
COST: \$79.95

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RESERVE LIBRARY LIST

AUTHOR: S. Rivas-Martinez, A. Penas, M.A. Luengo & S.Rivas-Saenz; H. Lieth (ed).  
TITLE: Worldwide Bioclimatic Classification System. (CD-Series: Climate and Biosphere II)  
PUBLISHER: Backhuys Publ. – see *Note (1)* for US outlet  
ISBN #: 90-5782-139-7  
DATE/ED: 2003, CD-ROM  
COST: \$96 + 6 shipping from US outlet, price as of 11/21/05 – see *Note (2)*

Instructor Notes:

1) This CD is available in the US from:

Balogh International, Inc.

1911 North Duncan Road, Champaign IL 61822 USA

+1 217 355 9331; fax: +1 217 355 9413

<http://www.balogh.com/>

[balogh@balogh.com](mailto:balogh@balogh.com)

The CD is listed on-line at <<http://www.balogh.com/backhuys/spb-eco.html>>

2) US price not fixed – based on price in Euros (€ 60)

3) This item is also requested as a Reserve item for the course BioSci 0800: *The Earth's Climate System*