Term Information

Effective Term	Summer 2015

General Information

Course Bulletin Listing/Subject Area	Earth Sciences
Fiscal Unit/Academic Org	School of Earth Sciences - D0656
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	4798
Course Title	Environmental Sustainability in Costa Rica (Study Tour)
Transcript Abbreviation	EnvSustCostaRica
Course Description	Traditional lectures and a study tour explore the complex relationship between the use and conservation of natural resources and economic development in Costa Rica, especially the role of protected areas in ensuring the country's environmental sustainability.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	4 Week (May Session)
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Field Experience, Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Mansfield

Prerequisites and Exclusions

Prerequisites/Corequisites	One college-level geology, ecology, biology, or environmental sciences course; one college-level Spanish course (or excellent achievement in at least three years in high school Spanish); and permission of instructor.
Exclusions	

Cross-Listings

Cross-Listings	

Subject/CIP Code

Subject/CIP Code	40.0601
Subsidy Level	Baccalaureate Course
Intended Rank	Sophomore, Junior, Senior, Masters

Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Students will learn core concepts of the geological and natural history of Central America, and Costa Rica in particular.
- Students will learn ways in which natural resources are used to produce consumable goods and provide ecosystem services.
- Students will understand and appreciate the interconnections among economic, environmental, and social aspects of sustainability.
- Students will learn to apply sustainability concepts locally and globally by engaging in real-world experiences highlighting the conflicts between development and conservation.
- Students will understand the connections between their chosen academic field and issues of global sustainability, and develop an integrated vision for sustainability that embraces their personal lives, profession, local communities, and the world-at-

Content Topic List

- Geology and geography of Central America
- Biogeography and biomes of Central America
- Water resources, energy resources, and mineral resources of Central America
- Eco-tourism and sustainable agriculture in Central America

Attachments

- New Course Request _ES_4798(CostaRica)2015.pdf: Syllabus

(Syllabus. Owner: Krissek,Lawrence Alan)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Krissek,Lawrence Alan	11/10/2014 05:48 PM	Submitted for Approval
Approved	Krissek,Lawrence Alan	11/10/2014 05:49 PM	Unit Approval
Approved	Fink,Steven Scott	11/13/2014 01:55 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole	11/13/2014 01:55 PM	ASCCAO Approval

Earth Sciences 4798 – Global Change and Sustainability (Study Tour)

Environmental Sustainability in Costa Rica

May Session 2015 (May 11-June 4)

Instructor:

Dr. Ozeas Costa: costa.47@osu.edu
Office location: 395 Ovalwood Hall (OV) Mansfield Campus
Office Hours: by appointment.
Office Telephone: 419-755-4128

Format of instruction: Lectures (on-campus and in-country) and in-country structured educational experiences as part of a study tour

Meeting dates/times:

- In the US (lectures): May 11, 13, 15, 18, 20, 22 (from 1-4 pm) – 18 hours of classroom instruction
- In Costa Rica (in-country lectures and study tour): May 25 to June 4

Contact hours:

A total of 3 credit hours will be offered, which includes the following:

- 1,080 minutes of **on-campus formalized instruction** (pre-departure lectures). More information about the content of the lectures is provided on pages 3 and 4.
- 180 minutes of **in-country formalized instruction (**on-site lectures). More information about the date, duration, and topic of lectures is provided below.
- 2,225 minutes of **in-country structured educational experiences** which includes: faculty-led guided tours, visits with local authorities/experts, organized discussions, independent assigned observations, and visits to natural and cultural landmarks. More information about these educational experiences is provided below and in the **detailed topical outline and itinerary** (which starts on page 7 of this document).

Credit allocation rationale for the in-country experience:

- **In-country formalized instruction** (lecture time: 180 minutes total):
  - May 26 – Lecture by Dr. Costa at the Parque Nacional Volcan Poas (30 minutes)
    - Lecture topic: Volcanoes of Costa Rica
  - May 27 – Lecture by Dr. Costa at the Sangregado Dam in Lake Arenal (30 minutes)
    - Lecture topic: Renewable Energy Resources of Costa Rica
  - May 28 – Lecture by Dr. Costa at the Caño Negro Wildlife Refuge (30 minutes)
    - Lecture topic: Biodiversity of Costa Rica
  - May 29 – Lecture by Dr. Costa at the Parque Nacional Volcan Tenorio (30 minutes)
    - Lecture topic: Water Resources of Costa Rica
  - May 31 – Lecture by Dr. Costa at the Santa Elena Reserve (30 minutes)
    - Lecture topic: Cloud Forests of Costa Rica
  - Jun 02 – Lecture by Dr. Costa at the Parque Nacional Manuel Antonio (30 minutes)
    - Lecture topic: Forest Fragmentation and Reforestation Projects in Costa Rica

- **In-country structured educational experiences** (2,225 minutes total):
  - May 25 – Guided tour of the Teatro Nacional de Costa Rica in San Jose, built in the 19th century from taxes on coffee plantations (45 minutes)

- May 26 – Orientation video and lecture at the INBIOparque (25 minutes)
- May 26 – Guided tour of the INBIOparque research station from the Costa Rica National Institute of Biodiversity (100 minutes)
- May 26 – Guided tour of the Parque Nacional Volcan Poas in Alajuela and its 1-mile wide active crater; including a visit to Lake Botos, which occupies an extinct crater of Poas Volcano (120 minutes)
- May 26 – Organized discussion – Topic: What is sustainability? (30 minutes)

- May 27 – Guided tour of the Sangregado Dam (Lake Arenal) which produces 12% of the electricity in Costa Rica (60 minutes)
- May 27 – Group hike to the base of La Fortuna Waterfall (60 minutes)
- May 27 – Lecture by Mr. Matias Zeledon, president of "Down to Earth Coffee" at the Coffee Shop in La Fortuna (30 minutes) - Lecture topic: Sustainable Coffee
- May 27 – Visit to natural hot springs produced by the Arenal Volcano (90 minutes)
- May 27 – Organized discussion – Topic: Renewable Energy (30 minutes)

- May 28 – Boat tour of the wetlands of Caño Negro Wildlife Refuge (180 minutes)
- May 28 – Organized discussion – Topics: Threats to Biodiversity (30 minutes)

- May 29 – Visit to Parque Nacional Volcan Tenorio, including: geyser basin and thermal springs (240 minutes)

- May 30 – Guided tour of the 6.4 megawatt Aeroenergia Wind Farm (60 minutes)
- May 30 – Visit to Monteverde Biological Reserve (60 minutes)
- May 30 – Organized discussion – Topic: Ecosystem Services (30 minutes)

- May 31 – Orientation video and lecture at the Santa Elena Institute (40 minutes)
- May 31 – Guided tour of the Santa Elena Cloud Forest (80 minutes)
- May 31 – Tree-planting at the Capulin Reforestation Project (60 minutes)
- May 31 – Canopy tour at Monteverde Biological Reserve (120 minutes)
- May 31 – Visit to the Escuela La Cruz (Elementary and Middle School) and interact with students, parents, teachers and school administrators (90 minutes)
- May 31 – Night walk (guided tour) for observation of wildlife at the Hidden Valley Trail (60 minutes)

- June 1 – Lecture by Roberta Ward from La Reserva Forest Foundation about reforestation projects in Tilarán (45 minutes)

- June 2 – Excursion to Parque Nacional Manuel Antonio (180 minutes)
- June 2 – Organized discussion – Topic: Forest Fragmentation and Biodiversity Loss (30 minutes)

- June 3 – Guided Tour and Crocodile Safari at the Tarcoles River (90 minutes)
- June 3 – Visit to the cultural center of Sarchi and guided tour of craft shops and oxcart factory (120 minutes)
- June 3 – Coffee Tour at Britt plantation and roastery (90 minutes)
- June 3 – Organized discussion – Topic: Environmental Sustainability – Is It Possible? (30 minutes)

Course Description:

Costa Rica is known worldwide for its conservation efforts, which have attracted millions of tourists to the country's parks and reserves. However, the ongoing transition from an agriculture-based to a service economy and the accelerated infrastructural development threaten Costa Rica's biodiversity and society. As rural areas give way to urban development, already scarce resources, including fresh water and energy resources, are stretched to their limit. This situation is further compounded by the synergistic effects of global climate change. In this integrated, multidisciplinary program (which include lectures in the US and in Costa Rica, group discussions, and in-country educational and cultural experiences), we will explore the complex relationship between the use and conservation of natural resources and economic development in Costa Rica, in particular the role of protected areas in ensuring the country's environmental sustainability. Visits to a number of in-country locations will provide hands-on knowledge to assess different conservation practices and establish the effectiveness of protected areas in promoting environmental sustainability in face of accelerated development. This will include interviews with farmers, park managers, business owners and community stakeholders, as well as visits to a coffee plantation in the outskirts of San Jose, the Costa Rican capital; the biomes and research station at the Institute of Biodiversity's INBioparque; active volcanism in the national parks of Volcan Poas, Volcan Tenorio, and Volcan Arenal, including a geyser basin and geothermal springs; the wetlands of Caño Negro Wildlife Refuge and the estuary of the Tarcoles River; the coastal ecosystems at Manuel Antonio National Park; and the Santa Elena Cloud Forest, with opportunities for guided tours, a night walk in the forest, visits to renewable energy facilities (wind, geothermal, and hydropower), and tree-planting at a reforestation project.

Course components:

(1) **Pre-departure lectures** in the US covering the following topics: (a) the geological evolution of the Central America Volcanic Arc, (b) Costa Rica's natural history, tropical ecosystems and biodiversity, and (c) natural resource availability and use in Costa Rica;
(2) **In-country lectures** by OSU instructor and exchanges with local authorities/experts at multiple locations in Costa Rica;
(3) **In-country structured educational experiences** that includes visits and guided tours to wetlands, cloud forests, dry forests, volcanoes, lowland forests, energy facilities, farms and plantations to examine how these natural resources are being used for tourism, agriculture, conservation, and urban/economic development.

Content of pre-departure lectures:

- Tectonic evolution of the Central America convergent margin (*introduction to plate tectonics theory; plate motion and plate boundaries; evolution and paleogeography of the Caribbean plate; formation of the Central American Volcanic Arc*)
- Geomorphology and physiographic provinces (*geomorphic diversity in Central America; the role of tectonism, lithology, and climate in shaping landforms in Central America; major physiographic provinces*)

- Volcanism and volcanic landforms (*relationship between magma composition, the type of eruption, and volcanic landforms; volcanic hazards in Central America; eruptive history and characteristics of major volcanoes in Costa Rica*)
- Late Quaternary sedimentation and stratigraphic units (*weathering processes and formation of sediments; effects of Pleistocene glaciation in the high-altitude páramo; depositional environments; distribution of major rock units and quaternary sediments in Central America*)
- Biogeographic regions and biomes (*Central America climatic and ecological zones; relationship between vegetation and climate; characteristics of forests in mountainous regions and lowland basins; biogeographic differences between Atlantic and Pacific coasts*)
- Conservation units and protected areas (*the SINAC – Sistema Nacional de Areas de Conservacion; protected areas in Costa Rica – history, challenges, and success stories*)
- Hydrogeology and groundwater resources (*classification of Central American aquifers; water resource management in Central America; the CARA Network; use and management of groundwater resources in Costa Rica*)
- Geothermal resources – availability and use (*the current energy mix in Costa Rica; electric power generation and resource assessment; evaluation of geothermal potential; the Miravalles and Pailas geothermal fields*)
- Mineral and energy resources (*mineral production and current needs – metallic and non-metallic; major mineral imports and exports; exploration and production of hydrocarbons; hydroelectricity and other non-renewable energy resources*)
- Eco-tourism and sustainable agriculture (*Costa Rica economic profile; the ecotourism industry; ICT and sustainable tourism in Costa Rica; industrial agriculture (plantations) in Costa Rica; the development of permaculture (sustainable farming) in Costa Rica*).

<u>Expected learning outcomes</u>:

- Students will learn core concepts of the geological and natural history of Central America, and Costa Rica in particular;
- Students will be able to identify the major tropical ecosystems of Costa Rica;
- Students will learn ways in which natural resources are used to produce consumable goods and provide ecosystem services;
- Students will understand and appreciate the interconnections among economic, environmental, and social aspects of sustainability;
- Students will be able to explain how sustainability relates to their lives and how their actions impact sustainability;
- Students will learn to think holistically about sustainability using perspectives from across multiple disciplines;
- Students will learn to apply sustainability concepts locally and globally by engaging in real-world experiences highlighting the conflicts between development and conservation;
- Students will understand the connections between their chosen academic field and issues of global sustainability, and develop an integrated vision for sustainability that embraces their personal lives, profession, local communities, and the world-at-large.

<u>List and availability of course materials</u>:

- Required (free) textbook: ‘Sustainability: A comprehensive Foundation’ by Tom Theis and Jonathan Tomkin (editors), Connexions (Rice University Press), 2012 edition. This book is available for free through the Open Source Textbook Initiative (a pdf copy will be available to students on Carmen).

- Selected chapters (available on Carmen) from the textbook 'Visualizing Geology' by Barbara Murck & Brian Skinner, Wiley, ISBN 978-1-118-12986-9.
- Online links and resources specific to each lecture (more info available at the **detailed topical outline and itinerary**, which starts on page 7 of this document).
- Additional reading materials will be provided from the following texts (available on reserve at the Geology Library; titles marked with an * are also available at the OSU main library):
    - Costa Rica – National Parks and Preserves, by Joseph Franke, The Mountaineers Books, 2009, 272 pages, ISBN 978-1-59485-035-6.
    - *Central America – A Natural and Cultural History, by Anthony Coats (Ed.), Yale University Press, 1997, 277 pages, ISBN 0-300-08065-4.
    - *A Brief History of Central America, by Hector Perez-Brignoli, University of California Press, 1989, 223 pages, ISBN 978-0-520-06832-2.
    - *The Green Republic – A conservation History of Costa Rica, by Sterling Evans, University of Texas Press, 1999, 317 pages, ISBN 978-0-292-72101-2.
    - Earth Transformed, by William Ruddiman, W.H. Freeman & company, 2014, 375 pages, ISBN 978-1-4641-0776-4.
    - The Human Impact on the Natural Environment, by Andrew Goudie, Blackwell Publishing, 2006, 357 pages, ISBN 1-4051-2704-X.

Evaluation:

- **Reading quizzes** (30% of final grade): a total of five quizzes will be offered through Carmen (due before the departure to Costa Rica) and will cover the content from the pre-departure lectures and associated readings. Quizzes will be available online through Carmen. The randomization option will be used so that each student – when they click to start their quiz – will be assigned a different set of questions (taken from a "Question Library", a pool of questions from which random questions are selected). To ensure that students stay on track and follow the planned course/topic progression, the Carmen 'release conditions' feature will be used (students are required to take a quiz before they can access the next content module or they need to complete other required tasks - such as completing homework assignment or receiving a minimum grade on a previous quiz - before taking a new quiz). More details about the quizzes available at the **detailed topical outline and itinerary** (which starts on page 7 of this document).

- **Homework assignments** (30% of final grade): at the end of every lecture there will be a homework assignment specific to that lecture (6 in total) which students will need to submit online (Carmen dropbox) in order to unlock a quiz or access the next content module.
    - **Homework 1**: students will evaluate a series of different maps representing the paleogeography of the Caribbean plate and select the one that corresponds to their assigned tectonic event.
    - **Homework 2**: students will correctly describe the lithology and climate associated with their assigned Central American physiographic province.
    - **Homework 3**: using Google Earth, students will create a placemark with information about each of their assigned Costa Rican volcanoes and save these placemarks in a KMZ file to be uploaded to the homework dropbox on Carmen.
    - **Homework 4**: students will identify the relationship between relief, vegetation, and climate in their assigned Central American biogeographic zone.

- **Homework 5**: students will identify on a map the locations of major water, geothermal, energy and mineral resources in Costa Rica.
- **Homework 6**: using Google Earth, students will create a placemark with information about each of their assigned Costa Rican conservation units (parks/reserves) and save these placemarks in a KMZ file to be uploaded to the homework dropbox on Carmen.

- **Field notes** (30% of final grade): students will maintain and submit – at the end of the course – a detailed field notebook including itinerary sketches and maps of sites visited with descriptions and independent assigned observations.

- **Participation** (10% of final grade): students will participate fully in activities and discussions on lectures, site visits, and at base camp during organized discussions.

Course Assignments and Grading Scale:

As indicated in the previous page, the following are the course assignments and their contribution to the final grade:

1. Reading quizzes (4) = 30% of final grade
2. Homework assignments (6) = 30% of the final grade
3. Field notes = 30% of the final grade
4. Participation = 10% of final grade

The course final grade will be determined by the following equation:
(RQ*30) + (HW*30) + (FN*30) + (P*10) / 100

Where, RQ is the average grade from the reading quizzes (each graded 0-100),
HW is the average grade from the homework assignments (each graded 0-100),
FN is the grade from the field notes (between 0-100),
P is the grade from participation in course activities (between 0-100)

The following grading scale will be used to submit grades to the Registrar.

93 or above	⇨	A
90 – 92	⇨	A-
87 – 89	⇨	B+
83 – 86	⇨	B
80 – 82	⇨	B-
77 – 79	⇨	C+
73 – 76	⇨	C
70 – 72	⇨	C-
67 – 69	⇨	D+
60 – 66	⇨	D
0 – 59	⇨	E

Detailed topical outline and study tour itinerary:

Pre-departure lectures and course activities:

- Readings in preparation for lecture #1:
  - Read the online edition of "This Dynamic Earth – The Story of Plate Tectonics" – available at http://pubs.usgs.gov/gip/dynamic/dynamic.html)
  - Read chapter 4 of Visualizing Geology (Plate Tectonics) – available on Carmen.
  - Read the notes from lecture 1 PowerPoint slides – available on Carmen.
- Pre-departure lecture #1 - Monday (May 11) from 1-4 pm. Topic: Tectonic evolution of the Central America convergent margin (*introduction to plate tectonics theory; plate motion and plate boundaries; evolution and paleogeography of the Caribbean plate; formation of the Central American Volcanic Arc*).
- Homework #1 (due Wednesday, May 13, at 12:30 pm): each student will be assigned a different event in the tectonic evolution of the Caribbean plate; they will then have to select – among a series of available paleogeographic maps – which one corresponds to their assigned event. The paleogeography of the Caribbean plate will have been discussed during the lecture so students should be able to identify which paleogeographic maps corresponds to their event by reviewing the lecture notes. I expect that completion of this homework will take about 30-45 minutes.
- Reading Quiz #1 (due Wednesday, May 13, at 12:30 pm): Quiz questions will be based on: (1) readings from chapter 1 of 'Sustainability: A comprehensive Foundation' (available on Carmen), and (2) readings in preparation for lecture #1 (listed above). The quiz will be available online through Carmen (as described on page 5).

- Readings in preparation for lecture #2:
  - Read chapter 3 of 'Central America: Geology, Resources and Hazards' about the geomorphology and physiographic provinces of Central America – available on Carmen.
  - Read the notes from lecture 2 PowerPoint slides – available on Carmen.
- Pre-departure lecture #2 - Wednesday (May 13) from 1-4 pm. Topic: Geomorphology and physiographic provinces (*geomorphic diversity in Central America; the role of tectonism, lithology, and climate in shaping landforms in Central America; major physiographic provinces*).
- Homework #2 (due Friday, May 15, at 12:30 pm): students will correctly describe the lithology and climate associated with their assigned Central American physiographic province. I expect that completion of this homework will take about 30-45 minutes.
- Reading Quiz #2 (due Friday, May 15, at 12:30 pm): Quiz questions will be based on: (1) readings from chapter 3 and 4 of 'Sustainability: A comprehensive Foundation' (available on Carmen), and (2) readings in preparation for lecture #2 (listed above). The quiz will be available online through Carmen (as described on page 5).

- Readings in preparation for lecture #3:
  - Read chapters 6 and 8 of Visualizing Geology – available on Carmen.
  - Read the notes from lecture 3 PowerPoint slides – available on Carmen.
- Pre-departure lecture #3 - Friday (May 15) from 1-4 pm. Topics: Volcanism and volcanic landforms (*relationship between magma composition, the type of eruption, and volcanic landforms; volcanic hazards in Central America; eruptive history and characteristics of major volcanoes in Costa Rica*) and Late Quaternary sedimentation and stratigraphic units (*weathering processes and formation of sediments; effects of Pleistocene glaciation in the high-altitude páramo; depositional environments; distribution of major rock units and quaternary sediments in Central America*)

- Homework #3 (due Monday, May 18, at 12:30 pm): using Google Earth, students will create a placemark with information about each of their assigned Costa Rican volcanoes and save these placemarks in a KMZ file to be uploaded to the homework dropbox on Carmen. A brief tutorial on the use of Google Earth will be provided during the lecture. A KMZ template will also be provided to students so they can add the information about their assigned volcanoes. Completion time of this homework will vary depending on student's familiarity with Google Earth. Those that have previously used it may complete the assignment in about 30 minutes.
- Reading Quiz #3 (due Monday, May 18, at 12:30 pm): Quiz questions will be based on: (1) readings from chapter 5 and 6 of 'Sustainability: A comprehensive Foundation' (available on Carmen), and (2) readings in preparation for lecture #3 (listed above). The quiz will be available online through Carmen (as described on page 5).

- Readings in preparation for lecture #4:
  - Read chapter 3 of 'Central America – A Natural and Cultural History' and part 1 of 'The Green Republic' – copies will be provided to students.
  - Read the notes from lecture 4 PowerPoint slides – available on Carmen.
- Pre-departure lecture #4 - Monday (May 18) from 1-4 pm. Topic: Biogeographic regions and biomes (*Central America climatic and ecological zones; relationship between vegetation and climate; characteristics of forests in mountainous regions and lowland basins; biogeographic differences between Atlantic and Pacific coasts*) and Conservation units and protected areas (*the SINAC – Sistema Nacional de Areas de Conservacion; protected areas in Costa Rica – history, challenges, and success stories*).
- Homework #4 (due Wednesday, May 20, at 12:30 pm): students will identify the relationship between relief, vegetation, and climate in their assigned Central American biogeographic zone. The biogeographic zones will have been discussed during the lecture so, using the information from the readings and their lecture notes students should be able to complete this homework in about 30-45 minutes.
- Reading Quiz #4 (due Wednesday, May 20, at 12:30 pm): Quiz questions will be based on: (1) readings from chapter 8 of 'Sustainability: A comprehensive Foundation' (available on Carmen), and (2) readings in preparation for lecture #4 (listed above). The quiz will be available online through Carmen (as described on page 5).

- Readings in preparation for lecture #5:
  - Read chapter 24 of 'Dynamic Earth' (Earth's Resources) – available on Carmen.
  - Read the notes from lecture 5 PowerPoint slides – available on Carmen.
- Pre-departure lecture #5 - Wednesday (May 20) from 1-4 pm. Topic: Hydrogeology and groundwater resources (*classification of Central American aquifers; water resource management in Central America; the CARA Network; use and management of groundwater resources in Costa Rica*) and Geothermal resources – availability and use (*the current energy mix in Costa Rica; electric power generation and resource assessment; evaluation of geothermal potential; the Miravalles and Pailas geothermal fields*).
- Homework #5 (due Friday, May 22, at 12:30 pm): students will identify on a map the locations of major water, geothermal, energy and mineral resources in Costa Rica. Sources of information (all available on Carmen) include: (1) the lecture notes, (2) the Central American Energy Resources Project (http://www.worldwatch.org/system/files/CA_report_highres_english_2013.pdf), and (3) the USGS Minerals Yearbook report 'Mineral Industries of Central America' (http://minerals.usgs.gov/minerals/pubs/country/2004/camermyb04.pdf). I expect that completion of this homework assignment will take about 45-60 minutes.

- Reading Quiz #5 (due Friday, May 22, at 12:30 pm): Quiz questions will be based on: (1) readings from chapter 9 of 'Sustainability: A comprehensive Foundation' (available on Carmen), and (2) readings in preparation for lecture #5 (listed above). The quiz will be available online through Carmen (as described on page 5).

- Readings in preparation for lecture #6:
    - Read part 2 of 'The Green Republic' – copy will be provided to students.
    - Read the notes from lecture 6 PowerPoint slides – available on Carmen.
- Pre-departure lecture #6 - Friday (May 22) from 1-4 pm. Topic: Mineral and energy resources (*mineral production and current needs – metallic and non-metallic; major mineral imports and exports; exploration and production of hydrocarbons; hydroelectricity and other non-renewable energy resources*) and Eco-tourism and sustainable agriculture (*Costa Rica economic profile; the ecotourism industry; ICT and sustainable tourism in Costa Rica; industrial agriculture (plantations) in Costa Rica; the development of permaculture (sustainable farming) in Costa Rica*).
- Homework #6 (due Saturday, May 23, at 11:59 pm): using Google Earth, students will create a placemark with information about each of their assigned Costa Rican conservation units (parks/reserves) and save these placemarks in a KMZ file to be uploaded to the homework dropbox on Carmen. A brief tutorial on the use of Google Earth will be provided during the lecture. A KMZ template will also be provided to students so they can add the information about their assigned conservation units. Completion time of this homework will vary depending on student's familiarity with Google Earth. Those that have previously used it may complete the assignment in about 30 minutes.

<u>Study tour activities</u>:

- May 25 (Monday) – Arrival in San Jose, Costa Rica
    - Visit to downtown San Jose (Costa Rica capital city)
    - Guided tour of the Teatro Nacional de Costa Rica (45 minutes)
    - Dinner and free time
- May 26 (Tuesday) – Transfer to Arenal via INBIOparque and Parque Nacional Volcan Poas
    - Orientation video and lecture at the INBIOparque (25 minutes)
    - Guided tour of the INBIOparque biomes and research station (100 minutes)
    - Transfer to Parque Nacional Volcan Poas
    - Lecture by Dr. Costa at the visitor center – Topic: Volcanoes of Costa Rica (30 minutes)
    - Guided tour of the park with hikes to the active crater and to Lake Botos (120 minutes)

    - Transfer to La Fortuna
    - After dinner: Organized discussion. Topic: What is sustainability? (30 minutes)
- May 27 (Wednesday) – Arenal region (La Fortuna)
    - Transfer to Lake Arenal
    - Guided tour of the Sangregado Dam (60 minutes)
    - Lecture by Dr. Costa at the Dam – Topic: Renewable Energy Resources (30 minutes)
    - Group hike to the base of La Fortuna Waterfall (60 minutes)
    - Return to La Fortuna
    - Lecture by Mr. Matias Zeledon, president of "Down to Earth Coffee" at the Coffee Shop in La Fortuna (30 minutes) - Lecture topic: Sustainable Coffee
    - Visit to natural hot springs produced by the Arenal Volcano (90 minutes)
    - After dinner: Organized discussion. Topic: Renewable Energy (30 minutes)
- May 28 (Thursday) – Caño Negro Wildlife Refuge (Los Chiles)
    - Transfer to Los Chiles
    - Guided tour (by boat) of the wetlands of Caño Negro Wildlife Refuge (180 minutes)
    - Lecture by Dr. Costa at Caño Negro – Topic: Biodiversity of Costa Rica (30 minutes)
    - Return to La Fortuna
    - After dinner: Organized discussion. Topic: Threats to Biodiversity (30 minutes)
- May 29 (Friday) – Parque Nacional Volcan Tenorio (Guanacaste)
    - Lecture by Dr. Costa at the park – Topic: Water Resources of Costa Rica (30 minutes)
    - Guided tour of Parque Nacional Volcan Tenorio, including the geyser basin and thermal springs (240 minutes)
    - Return to La Fortuna
- May 30 (Saturday) – Transfer to Monteverde via Aeroenergia Wind Farm
    - Guided tour of Aeroenergia, a 6.4 megawatt wind farm active since 1998 (60 minutes)
    - Transfer to Monteverde
    - Visit to Monteverde Biological Reserve (60 minutes)
    - After dinner: Organized discussion. Topic: Ecosystem Services (30 minutes)
- May 31 (Sunday) – Santa Elena Reserve and Monteverde
    - Orientation video and lecture at the Santa Elena Institute (40 minutes)
    - Guided tour of the Santa Elena Cloud Forest (80 minutes)
    - Lecture by Dr. Costa at the institute – Topic: Cloud Forests of Costa Rica (30 minutes)
    - Tree-planting at the Capulin Reforestation Project (60 minutes)
    - Canopy tour at Monteverde Biological Reserve (120 minutes)
    - Visit to the Escuela La Cruz (Elementary and Middle School) and interact with students, parents, teachers and school administrators (90 minutes)
    - Night walk (guided tour) for observation of wildlife at the Hidden Valley Trail (60 minutes)
- June 1 (Monday) – Transfer to Central Pacific Coast via Tilarán
    - Lecture by Roberta Ward from La Reserva Forest Foundation about reforestation projects in Tilarán (45 minutes)
- June 2 (Tuesday) – Parque Nacional Manuel Antonio
    - Lecture by Dr. Costa at the park – Topic: Forest Fragmentation and Reforestation Projects in Costa Rica (30 minutes)
    - Guided tour and excursion of the Parque Nacional Manuel Antonio (180 minutes)
    - After dinner: Organized discussion. Topic: Forest Fragmentation and Biodiversity Loss (30 minutes)

- June 3 (Wednesday) – Transfer to San Jose via Tarcoles River and Sarchi
    - Guided Tour and Crocodile Safari at the Tarcoles River (90 minutes)
    - Visit to the cultural center of Sarchi; tour of craft shops and oxcart factory (120 minutes)
    - Coffee Tour at Britt plantation and roastery (90 minutes)
    - After dinner: Organized discussion. Topic: Environmental Sustainability – Is It Possible? (30 minutes)
- June 4 (Thursday) – Return to USA
    - Transfer to airport and return flight to the US

Prerequisites:

Prerequisites include one college-level geology, ecology, biology, or environmental sciences course and one college-level Spanish course (or excellent achievement in at least three years in high school Spanish). Permission of instructor required for registration.

For the study tour portion, high humidity should be expected; participants must be in good physical condition and be willing to hike for many hours each day, often over difficult, irregular terrain in hot tropical weather. The elevation gradient spans from Pacific beaches and mangroves, to lowland rainforest, to tropical humid forest, and montane (cloud) forest in a volcanic setting. Because we will be spending all day outdoors sometimes at remote field sites, you must be prepared to deal with the presence of bugs, snakes, and the many other organisms that make the tropics unique. Each day's excursions will be long and full of adventure and everyone on the course must be willing to work hard, support each other, and enjoy the experience to the fullest. Participants will sign a memo of understanding regarding limitations and acceptance of restrictions of activities at the field stations.

A current passport, good for more than 6 months beyond the date of travel is required. Apply now if you think you are serious about taking the course.

Travel:

International return flights are not included in the program fee. In-country land transportation by chartered bus (and boat while on the wetlands of Caño Negro Wildlife Refuge and on the Tarcoles River) are included in the program fee (see program costs below).

Program costs:

OSU tuition for registration in ES 4798 during May session 2014, for 3 credit hours (students who are enrolled full time during spring semester 2015 can take up to three credit hours during May session 2015 without paying tuition costs).

Program fee (for the study tour portion) in the amount of $1,998 are payable directly to OIA (the Office of International Affairs). Included in this program fee are: all land and water transportation while in Costa Rica (return flights not included), all accommodation (lodging in hotel rooms with private bathrooms in San Jose, La Fortuna, Monteverde, and Jaco), all meals (up to 3 per day), and all the tours and tickets to facilities/locations visited during the trip.

OSU supplemental travel insurance in the amount of $37 is payable directly to OIA up to 45 days prior to departure.

Other costs that are not covered by the program fee include: meals and snacks en route, passport-issuing expenses, extra meals and tips, souvenirs, additional tours and activities not included as part of the trip.

Statement on academic misconduct:

"It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/."

Statement about disability services:

"Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/."