The Ohio State University
First-Year Seminar Program
Course Proposal

Course Information

1. Attach a syllabus that includes the following (sample syllabi can be found at http://firstyearseminars.osu.edu):

   - the course goals
   - a brief description of the content
   - the distribution of meeting times
   - a weekly topical outline
   - a listing of assignments
   - grade assessment information (A-E or S/U)
   - required textbooks and/or reading list
   - the academic misconduct and disability services statements (sample statements can be found at http://asccas.osu.edu/curriculum/asc-syllabus-elements)

Instructor Information

2. Attach a brief biographical paragraph that includes the current research interests, teaching awards and honors, and undergraduate courses taught by the participating instructor(s). The paragraph will be included in materials for first-year students.

Dr. Ozeas S. Costa, Jr, School of Earth Sciences
Proposer's Name and Primary Academic Unit (please print)

Associate Professor
Proposer's Title

costa.47@osu.edu
Proposer's e-mail Address

March 1, 2019
Submission Date

Dr. Matthew Saltzman, School of Earth Sciences
Approval of Department Chair of Academic Unit (please print)

Please return this form and any attachments to First-Year Seminar Program, 100 Denney Hall, 164 Annie & John Glenn Avenue, ATTN: Todd Bitters or e-mailed to bitters.4@osu.edu.

MONEY CAN GROW ON TREES: SUSTAINABLE DEVELOPMENT IN COSTA RICA
Arts and Sciences 1137.**, First-Year Seminar
1 Semester-hour Credit
Autumn Semester 2019 – Fridays, 11:35 am to 12:30 pm

Instructor Name: Ozeas Costa, PhD
e-mail: costa.47@osu.edu
Department: School of Earth Sciences
Office Hours: by appointment

Course Description

Costa Rica, the "Green Republic", is known worldwide for its conservation efforts, which every year attracts millions of tourists to the country's parks and reserves. Currently, 27% of the country's land surface is located within protected areas and conservation units, housing about 5% of the global biodiversity. After a long history of deforestation resulting from the expansion of export-related agricultural commodities between 1830 and 1980, the country experienced a remarkable transformation, moving from only 20% forest cover in 1990 to almost 60% forest cover today. This all happened while the country – which was once considered "the poorest Spanish colony" – became the most prosperous and stable democracy in Central America. Over the last 25 years, the country has tripled its GDP, reached a 98% literacy rate, established a high-quality universal health care system, achieved life expectancy rates higher than the United States, and almost 100% of the country's energy currently comes from clean, renewable energy sources. In this course, we will explore how this tiny Central American country managed to undergo this unprecedented change. We will discuss the social, cultural, economic, and environmental drivers of this transformation, and explore how the country navigates the complex relationship between conservation of natural resources and economic development, in particular the role played by protected areas in ensuring Costa Rica's environmental sustainability.

Texts

Required text: *The Green Republic: A Conservation History of Costa Rica*, by Sterling Evans, University of Texas Press, ISBN 9780292721012.

Additional texts and articles used in the course (these will be provided on Carmen):

- *An Introduction to Sustainability*, by Martin Mulligan, Routledge, ISBN 9780415706445.
- *Central America: A Natural and Cultural History*, by Anthony Coates, Yale University Press, ISBN 9780300080650.
- *The Geomorphology and Physiographic Provinces of Central America*, by Jeffrey Marshall, In: Central America: Geology, Resources and Hazards, Jochen Bundschuh & Guillermo Alvarado (eds), Chapter 3.
- Conservation in Action: Past, Present, and Future of the National Park System of Costa Rica, by Mario Boza, *Conservation Biology*, Volume 7, No. 2, pp 239-247.
- Payments for environmental services in Costa Rica, by Stefano Pagiola, *Ecological Economics*, Volume 65, pp 712-724.
- *Geology-related tourism for sustainable development*, by Jochen Bundschuh et al., Ch 34.
- Uses of solar energy in Costa Rica, by Shyam Nandwani, *Renewable Energy*, Vol 31, 689-701.
- The renewable energy consumption-growth nexus in Central America, by Nicholas Apergis & James Payne, *Applied Energy*, Volume 88, pp 343-347.

Expected learning outcomes

- Students will understand and appreciate the interconnections among economic, environmental, and social aspects of sustainability, and learn to think holistically about sustainability using perspectives from across multiple disciplines;
- Students will learn core concepts of the geological and natural history of Costa Rica, and how they influenced the social, cultural, and economical make-up of the country;
- Students will identify and describe the 12 ecological zones of Costa Rica and the factors that affect and define these zones;
- Students will investigate the history of deforestation in Costa Rica, and its connections with the economic and social changes the country has experienced since 1830;
- Students will describe the SINAC – *Sistema Nacional de Areas de Conservacion* – and its role on the conservation of natural resources and the economic development of Costa Rica;
- Students will investigate ways in which natural resources are used to produce consumable goods and provide ecosystem services, including renewable energy;
- Students will learn about the market tools used by Costa Rica to protect its natural resources and guide its economic development;
- Students will apply sustainability concepts to address some of the current challenges resulting from conflicts between development and conservation.

Course Policies

- This class will meet once a week (50-minute class period) throughout the fifteen-week semester. Every week there will be several reading assignments that need to be completed before the weekly meeting. These include readings from the course text plus focused research articles. An online quiz on Carmen will test students' understanding of the reading material. This quiz – which is a component of the students' final grade – is also due before the weekly meeting. This will ensure that students are fully prepared to engage in class discussions.
- Class meetings will be divided into two parts: an open discussion about the topics for the week, including current research, and a group activity designed to engage students with some of the key factors constraining the Costa Rican experience with sustainability and sustainable development. Participation of every student in class discussions and activities is critical and will account for 20% of the final grade.
- Since participation in discussions and group activities during class are essential components of the course, attendance at the weekly class meeting is required. Absences for acceptable reasons (such as illnesses, religious observance, or family emergencies) will need to be discussed with the instructor, preferably prior to missing a class.
- Missing a class for an acceptable reason will not excuse you from completing the readings and assignments for the missed class (which include pre-class quizzes and in-class activities). As such, it is your responsibility to obtain notes from a classmate and contact the instructor in order to complete all the assignments by their original or extended deadlines.

Grading

This course will use a Letter grade. Weekly **reading quizzes** constitute 25% of the final grade. In-class **group activities** constitute 25% of the final grade. **Participation** in class discussion and course activities constitute 20% of your final grade. The remaining 30% of your course grade will come from the **end-of-semester presentation**. For this presentation, students will prepare a **research poster** on one of the topics discussed in the course. Every effort will be made to match each student topic to his/her intended major. Some of the topics include (but are not limited to): *the economic and ecological impacts of national parks and preserves*; *the role of alternative energy sources in the country's energy mix*; *mapping land use and land cover changes since 1970*; *natural hazards assessments*; *tropical species distribution*; *access to health and education*.

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

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

Course Schedule and Assignments

Class	Topics	Assignments
Week 1	• Course introduction • What is sustainability? What is sustainable development?	• Reading: *The Green Republic* (Chapter 1); Global emergency of the sustainability concept (from *An Introduction to sustainability*); The Circular Economy: A new sustainability paradigm? (article from *Journal of Cleaner Production*). • Group activity: The Sustainability Card Game (using the Disruptive Design Method)
Week 2	• Costa Rica export economy from 1830-1980 • Causes and consequences of deforestation	• Reading: *The Green Republic* (Chapter 2); Consumption and Consumerism (from *An Introduction to sustainability*); Land cover dynamics following a deforestation ban in northern Costa Rica (article from *Environmental Research Letters*). • Group activity: Exploring Deforestation in Central America
Week 3	• Drivers of social change in Costa Rica from colonization to independence	• Reading: *The Green Republic* (Chapter 3); Social dimensions of sustainability (from *An Introduction to sustainability*); The practices of collective action: Practice theory, sustainability transitions and social change (article from *Journal for the Theory of Social Behaviour*). • Group activity: Population, Environment, and Sustainability

Week 4	• Conservation units and protected areas: history, challenges & success stories	• Reading: *The Green Republic* (Chapter 4); Conservation in Action: Past, Present, and Future of the National Park System of Costa Rica (article from *Conservation Biology*); Protected area tourism: Progress, innovation and sustainability (article from *Tourism & Hospitality Research*). • Group activity: The State of Global Biodiversity (The Living Planet Index)
Week 5	• The source of Costa Rica geomorphic diversity: tectonic evolution	• Reading: *The Green Republic* (Chapter 5); Geology, Tectonics, and geomorphology of Costa Rica: A Natural History Approach (Chapter 3 of *Costa Rican Ecosystems*). • Group activity: The Origin of Continents and Oceans
Week 6	• Geomorphology and physiographic provinces: the role of lithology and climate	• Reading: *The Green Republic* (Chapter 6); The Geomorphology and Physiographic Provinces of Central America (Chapter 3 of *Central America: Geology, Resources and Hazards*). • Group activity: Physiographic Provinces of Costa Rica
Week 7	• Biogeographic regions, biomes, and ecological zones in Costa Rica	• Reading: *The Green Republic* (Chapter 7); *Costa Rican Ecosystems* (Chapters 1 and 21). • Group activity: Central America Biogeographic Zones
Week 8	• Ecosystem services and ecosystem valuation methods: environmental economics in Costa Rica	• Reading: *The Green Republic* (Chapter 8); The Case for the Valuation of Ecosystem Services (Chapter 1 of *An introductory guide to valuing ecosystem services*); The Valuation of Ecosystem Services (Chapter 18 of *Biodiversity, Ecosystem Functioning, and Human Wellbeing: An Ecological and Economic Perspective*). • Group activity: Mapping Ecosystem Services
Week 9	• The design and implementation of PES (payment for environmental services) in Costa Rica	• Reading: *The Green Republic* (Chapter 9); Costa Rica's Payment for Environmental Services Program: Intention, Implementation, and Impact (article from *Conservation Biology*); Payments for environmental services in Costa Rica (article from *Ecological Economics*). • Group activity: The Value of Ecosystem Services
Week 10	• Ecological tourism: the Costa Rican experience	• Reading: *The Green Republic* (Chapter 10); Conservation Strategies, Protected Areas, and Ecotourism in Costa Rica (article from *Journal of Park and Recreation Administration*); The importance of Ecotourism as a Development and Conservation Tool in the Osa Peninsula, Costa Rica (report from *CREST*). • Group activity: Ecotourism Design Challenge

Week 11	• Sustainable agriculture and permaculture practices	• Reading: *The Green Republic* (Chapter 11); Towards Sustainable Agricultural Stewardship: Evolution and Future Directions of the Permaculture Concept (article from *Environmental Values*); Permaculture for agroecology: design, movement, practice, and worldview (article from *Agronomy for Sustainable Development*). • Group activity: Agriculture, Soil, and Sustainability
Week 12	• The energy-environment nexus: renewable energy in Costa Rica	• Reading: *The Green Republic* (Chapter 12); The renewable energy consumption-growth nexus in Central America (article from *Applied Energy*); Uses of solar energy in Costa Rica (article from *Renewable Energy*). • Group activity: Analyzing Fuel Carbon Footprints
Week 13	• Measuring genuine progress: GDP, GPI, HPI	• Reading: *The Green Republic* (Conclusion); Beyond GDP: The Need for New Measures of Progress (*The Pardee Papers*, no. 4); Beyond GDP: Measuring and achieving global genuine progress (article from *Ecological Economics*). • Group activity: How to Measure Human Welfare
Week 14	• The Costa Rica model: Current and future challenges	• Reading: On Achieving Sustainable Development: The Costa Rican Model (article from *Thunderbird International Business Review*); Carbon Neutral by 2021: The Past and Present of Costa Rica's Unusual Political Tradition (article from *Sustainability*). • Group activity: The Game Changer Game
Week 15	• End-of-semester presentations	• Poster session

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/**.

Students with Disabilities

Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, **slds@osu.edu**; **slds.osu.edu**.

Biographical Statement

The course instructor is Dr. Ozeas Costa, an Associate Professor in the OSU School of Earth Sciences. He has a Ph.D. in aqueous geochemistry (2002) from the University of Plymouth (U.K.), where he studied changes in the benthic community structure of Brazilian coral reefs in response to coastal eutrophication. Dr. Costa also has a Master of Science in coastal geology (1998) from the Federal University of Bahia (Brazil), where he studied the impacts of coastal development on the geochemistry of nearshore ecosystems. His current research seeks to understand the processes (both natural and anthropogenic) that drive and influence the biogeochemical cycles of nutrients (particularly nitrogen and phosphorus) in inland aquatic systems such as streams, lakes, and wetlands. Dr. Costa has conducted nutrient research in Brazil, the United Kingdom, Canada, Panama, Costa Rica, Qatar and the United States. He has travelled to Costa Rica regularly since 2014, as part of his Study Abroad program titled "Environmental Sustainability in Costa Rica". At Ohio State, he also teaches introductory courses in physical geology (EARTHSCI 1100 – Planet Earth: How it Works; EARTHSCI 1105 – Geology of the National Parks; EARTHSCI 1121 – The Dynamic Earth) and environmental science (ENR 2100 – Introduction to Environmental Science).