Course title: Costa Rican Natural History
Course code: BIOL 3002 MTVE
Programs offering course: Sustainability and the Environment
Language of instruction: English
U.S. semester credits: 2.00
Contact hours: 30.00
Term: Spring 2021

Course Description

Costa Rican Natural History is a field-based course that provides students an opportunity to observe, investigate, and understand the structure and function of tropical ecosystems (cloud forests, lowland rainforests, dry forests, wetlands, rivers and streams, and mangroves) and their most characteristic biotic and abiotic components. Biotic components will include key taxa or functional groups (plants, birds, arthropods, mammals, reptiles, amphibians; plant growth forms, herbivores, carnivores, etc.) that play critical roles determining community structure (e.g., richness, diversity, and composition) and ecological function (e.g., energy, nutrient, and water cycles) of each ecosystem. Abiotic components will include factors such as temperature, precipitation, seasonality, soil properties, geomorphology, salinity, and discharge, etc., as relevant to each ecosystem. Lectures and readings will supply a modern evolutionary-ecological framework for understanding each ecosystem, which will be then enhanced and extended through extensive firsthand experiences in the field. Field activities teach students how to observe and interpret natural history, i.e., the behavior of organisms in their natural context, understand species interactions such as pollination, seed dispersal, herbivory, and predation, apply concepts such as evolution through natural selection, and gain insight into ecosystem services such as water purification, atmospheric regulation, and erosion control.

Learning Objectives

By completing this course, students will:

- Differentiate the defining abiotic features (e.g., temperature, precipitation, seasonality, geomorphology, salinity) of major Costa Rican ecosystems, such as mangroves, cloud forests, montane rivers, streams and rivers, and rain forests;
- Deconstruct forces behind seasonal variation in the characteristic abiotic parameters of ecosystems, such as precipitation, temperature, discharge;
- Make systematic, properly recorded observations on the behavior of plants, animals, and fungi in their natural context;
- Assess the adaptive (evolutionary) significance of the natural history of typical taxa that characterize the habitats under study. Natural history includes interactions within and between species, adaptations for reproduction and survival, functional role in the community, taxonomic relationships between species, and possible ecosystem services provided and conservation significance;
- Assess the role of climate and weather in shaping seasonality and ecosystem variation in the mountains of Costa Rica. This includes trade winds, weather systems of the Atlantic and Pacific Oceans, etc.;
- Integrate knowledge of natural history, ecosystem processes, and natural cycles with the concept of ecosystem services to articulate the specific ecosystem services provided by the different habitats and taxa under study;
- Propose a rationale for the appreciation of Costa Rican ecosystems, and articulate a personal investment in their protection, both at home and abroad.

Course Prerequisites

Previous college-level coursework or other significant prepartation in the physical or natural sciences or related fields, as assessed by CIEE.

Methods of Instruction

The Learning Objectives will be introduced through PowerPoint lectures and documentaries, and reinforced and further developed through field excursions and activities, as well as readings and oral reports prepared and presented by peers (“Species Reports”; see details below).
Assessment and Final Grade

1. Species Reports (5 total) 40%
2. Quizzes (5 total) 25%
3. Final Exam 25%
4. Participation 10%
TOTAL 100%

Course Requirements

Species Reports (5 total)

Students will individually investigate published reports on a species’ natural history information from hard copy sources or online sources (e.g., Encyclopedia of Life, National Institute of Biodiversity, and the Tree of Life Web Project), then paraphrase the information in a set of written notes. When the species is observed in the field, the student will present the information to peers. In total, five Species Reports are presented. A grading rubric will be supplied before the assignment.

Quizzes (5 total)

Students will supply short, written answers (a few words-short paragraph) to a series of questions related to lectures, orientation hikes or outdoor activities, readings, or documentaries, and will include at least one question from the species reports. In total, five quizzes will be prepared. The quizzes will also serve as study guides for the tests.

Final Exam

This consists of short-answer-questions (100 points) related to lectures, orientation hikes or outdoor activities, readings, or documentaries.

Participation

Attendance is noted for each lecture, discussion session, and field activity. As the semester proceeds, students earn points for thoughtful commentary, questions, and participation in discussions.

Attendance

Regular class attendance is required throughout the program, and all absences will result in a lower participation grade for any affected CIEE course. Due to the intensive schedules for Open Campus and Short Term programs, absences that constitute more than 10% of the total course will result in a written warning.

Students who transfer from one CIEE class to another during the add/drop period will not be considered absent from the first session(s) of their new class, provided they were marked present for the first session(s) of their original class. Otherwise, the absence(s) from the original class carry over to the new class and count against the grade in that class.

For CIEE classes, excessively tardy (over 15 minutes late) students must be marked absent.

Attendance policies also apply to any required co-curricular class excursion or event, as well as to any required field placement. Students may not miss placement/work hours at an internship or service learning site unless approved in advance by the Academic Director and placement supervisor. All students must complete all of the requisite 100 minimum work hours on site at the internship or service learning placement to be eligible for academic credit.

Students who miss class for personal travel, including unforeseen delays that arise as a result of personal travel, will be marked as absent. No make-up or re-sit opportunity will be provided.

Attendance policies also apply to any required class excursion, with the exception that some class excursions cannot accommodate any tardiness, and students risk being marked as absent if they fail to be present at the appointed time.

Absences for classes will lead to the following penalties:
Weekly Schedule

Week 1
Class:  1.1  Mangrove Ecosystems

Lecture:  Mangrove Ecology.

Characteristics of, “mangrove swamps”; geographic distribution of mangroves; typical taxa for Costa Rican mangroves; eco-physiological adaptations to living in a brackish, hypoxic environment; adaptations for seed dispersal for mangrove trees; critical ecosystem services supplied by mangrove ecosystem; history of specific taxa of Costa Rican mangrove ecosystems

Readings:

Class:  1.2  Activity

Orientation boat tour and hike through mangrove ecosystems

Assessments:
Species Report 1

Week 2
Class:  No Classes

Week 3
Class:  3.1  Cloud Forest Ecosystems

Lecture:  Cloud Forest Ecosystems.

Characteristics of tropical montane cloud; geographic distribution of tropical montane cloud forests; identify important cloud forest plant growth forms and cloud forest pollinators/dispersers/seed predator; eco-physiological adaptations of epiphytes and hemi-epiphytes to living in the canopy of cloud forests; adaptations for pollination by common cloud forest pollinators; adaptations for seed dispersal by common cloud forest dispersers; concept of keystone species; concept of coevolution; terms such as epiphyte, hemi-epiphyte, mycorrhizae, velamen, succulence, pseudobulbs, trichomes, aerial roots, anther, stigma, style, seed, fruit, flower, frugivorous, terrestrial, arboreal, scansorial.

Percentage of Total Course Hours Missed  |  Minimum Penalty
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Up to 10%  |  Participation graded as per class requirements
10 – 20%  |  Participation graded as per class requirements; 3% grade penalty & written warning
More than 20%  |  Automatic course failure, and possible expulsion

N.B. Course schedule is subject to change due to study tours, excursions, or local holidays. Final schedules will be included in the final syllabus provided to students on site.
Readings:

Class: 3.2 Activity

Hike in cloud forest and carry out an interactive exercise on pollination and dispersal. Students deliver Species Reports.

Assessments:
Species Report 2;
Quiz 1 – Mangrove Ecosystems Quiz

Week 5
Class: 5.1 Tropical Dry Forests

Lecture: Ecology and Conservation of Tropical Landscapes

Pacific Dry Forests; Geographic distribution; characteristic abiotic features: temperature, rainfall, and wind on seasonal basis. Characteristic ecological features and adaptations of vegetation: deciduousness; tree stature; tree growth patterns; growth forms; fruiting, flowering, pollination, and dispersal; fruits and seeds; interconnectivity of tropical ecosystems; organism migrations; conservation and threats.

Class: 5.2 Activity

Hike through Tropical Dry Forest. Students deliver Species Reports of ecosystem representative species. Short introduction to marine ecosystems of the Pacific Northwest of Costa Rica.

Assessments:
Species Report 3;
Quiz 2 – Cloud Forest Ecosystems quiz

Week 7
Class: No Classes

Week 8
Class: Assessment

Quiz (no lecture)

Assessments:
Quiz 3 – Tropical Dry Forest Ecosystems quiz

Readings:
Frankie, Mata, & Vinson (2004). Chapter 15

Week 9
Class: No Classes

Weeks 9-10

Week 11
Class: 11.1 Lowland Rainforest

Lecture: Ecology of Caribbean Lowland Wet and Moist Forests

Geographic distribution; characteristic abiotic features: temperature, rainfall; characteristic ecological features; basics of the ecology, natural history; geographic distribution; types of species interactions (competition, predation, amensalism, neutralism, commensalism, mutualism);
extinction or co-existence through speciation; obligate or facultative niche partitioning. Terms such as chemical defense, aposematism, Batesian mimicry, Müllerian mimicry, cryptic coloration.

Class: 11.2 Activity

Hike through Caribbean Lowland Wet and Moist Forests

**Readings:**

Kricher (1997). Chapter 3, and Chapter 11 (pg. 245-250)

Species Report 4

Quiz 4: Caribbean lowland rainforest ecology

**Week 12**

Class: 12.1 Marine Ecosystems

**Lecture:** Marine Ecology – Caribbean Coral Reef Ecology.

Definition and basic components of marine and coral reef ecosystem; distribution and physical features; coral reef ecosystem services; floral and faunal ecology of coral reef ecosystems; patterns of biodiversity; climate change and coral reef conservation.

Class: 12.2 Activity

Boat tour and snorkeling the coral reefs of Bocas del Toro archipelago in the Caribbean coast of Panama.

**Assessment:**

Species Report 5;

Quiz 5: Marine ecosystems

**Week 13**

Class: Review for Final Exam

**Week 14**

Class: Final Exam

**Course Materials**

**Readings**


Other required and recommended readings will be made available online.

**Online Resources**


