Costa Rican Biodiversity Studies and Research
HON: BIOL 285
Winter 2024 Semester

Dr. Martin Stone, Rm. 239 EST, Phone: 270-438-6923 (call or text)
Martin.Stone@wku.edu

Course Description and Goals: Students will gain a broad understanding and exposure to Neotropical biodiversity as well as conservation issues in Costa Rica. We will visit and study several of the major ecosystems including tropical seasonally dry forest, mangroves, estuaries and tidal pools, cloud forest, and lowland wet forest. Students will be directly involved in the monitoring of an important leatherback sea turtle nesting site at Las Baulas National Marine Park. Data will be collected on adults, nest size, egg nest temperatures, and survivorship. We will also spend one week in a cloud forest preserve conducting research projects on biodiversity. The last part of the trip will be a visit to the lowland habitats found in Cocorvado National Park as well as the reefs found in Isla del Caño National Park.

Required textbook: None

Strongly suggested books (follow your interests): *= available Kindle Stone**

1. **Costa Rican Natural History, D.H. Jansen, Editor (1983)**
2. ***Breakfast of Diversity, 2013, Vandermeer and Perfecto**
3. ***Tropical Plant Families Identification Handbook, 2014, Kew Gardens**
4. ***Field Guide to Plants of Costa Rica, Gardiullo, Magnuson, and Kimball, 2008, Oxford Press**
5. ***Arboles Maderables de la Peninsula de Osa: Madera y Corteza, Rodriguez and Olivares, 2014**
6. ***Trees of Costa Rica Vol. IV, 2011, Villalobos, Madrigal, Alvarez, Quesada**
7. ***Butterflies, Moths, and Other Invertebrates of Costa Rica: A Field Guide, 2010, Henderson**
8. ***Trees and Panama and Costa Rica, 2011, Condit, Perez, and DaGuerre**
9. **Tropical Nature. Forsyth and Miyata (1984)**
10. **Tropical Plants of Costa Rica 2007 by Zuchowski**
11. **A Neotropical Companion. Kricher (1997)**
12. Peterson Field Guide: Insects (1970)
13. Mammals of Belize, Fiona Reid (2001)
14. **The Birds of Costa Rica - Garrigues, Richard/ Dean, Robert (2007) or equivalent.**
15. **Neotropical Rainforest Mammals, A Field Guide L.H. Emmons (1997**)
16. Costa Rican Fruit Chaffers (2004) by Angel Solis.
17. Sealife (1996) by Waller, Dando, and Burchett, ISBN# 1560986336
18. An Introduction to the Biology of Marine Life (1996) by Sumich, ISBN# 0697159906
19. Reef Fish (1980) by Thresher, ISBN# 0915096099
20. Coral Reef Fishes (2002) by Sale, ISBN# 0126151857
21. Reef Life: Natural History and Behaviors of Marine Fishes and Invertebrates (2001) by Tackett and Tackett, ISBN# 1890087564
22. Marine Invertebrates and Plants of the Living Reef (1990) by Colin, ISBN#0866228756
23. Mammals, Amphibians, and Reptiles of Costa Rica: A Field Guide Carrol L. Henderson (2010)
24. Field Guide to the mammals of Central America and Southeast Mexico
25. **The Mammals of Costa Rica A Natural History and Field Guide (2007), by Wainwright**
26. Tropical Rain Forest Ecology, Diversity, and Conservation (2010) by Jaboury Ghazoul and Douglas Sheil, ISBN13: 978-0-19-928588-4ISBN10: 0-19-928588-8

List of Required Equipment:
Field boots/hiking shoes broken in
Relaxation shoes like tennis shoes
Headlamp and flashlight
Insect repellent
Sunscreen
Hat (full brim is best)
Cheap poncho or raingear

Spending Money- extra spending money will be needed for meals not provided through the program cost. Additional money may be needed for souvenirs and other activities.

Strongly Suggested Equipment:
Sunglasses
Swim shirt/Swim suit
Camera/cell phone with waterproof case (?)
Cap and Sweater (cashmere) for sleeping at Cloudbridge

For Clothing: try Goodwill for synthetic t-shirts and other items

COURSE LOCALITIES AND ACTIVITIES:

Goldring Marine Biological Station:
http://www.goldringmarinestation.org/Goldring-Gund/Home.html

Goldring-Gund Marine Biology Station is located in Guanacaste Province. The station has been an influential center for research on the exceptional local biodiversity since it was founded in 2004. Primarily this has focused on the turtle population found in **Las Baulas National Marine Park** (Parque Nacional Marino Las Baulas), which hosts the highest nesting density of the critically endangered leatherback turtle in the eastern Pacific. Over the past 20 years these populations have declined by over 95% and this severe decrease is jointly attributed to both the poaching of eggs and the impacts of fisheries by-catch. In collaboration with EarthWatch, on-site scientists and international volunteers have strived to conserve this species before it is driven to extinction.

Our activity here will mainly be patrolling Playa Grande looking for nesting turtles during the evening and overnight hours. Research (current and past) includes studies on turtles, crocodiles, vegetation, and billfish in the region.

Guest lecture: Dr. Frank Paladino, Station Director, and Jack Schrey, Indiana University-Purdue University
Side Day Trips: **Tidal pools, Estuary tour, and possibly Santa Rosa National Park or Palo Verde National Park.**

Cloudbridge Nature Reserve:
http://vimeo.com/34552818 and http://www.cloudbridge.org/

Goals of the Preserve:

1. To **preserve** a precious part of the tropical world forever.
2. To help **reforest** those areas which had been converted to cattle pasture.
3. To **protect the biodiversity** for which the neotropical forests, and those in Costa Rica in particular, are so famous.

Cloudbridge is composed of cloud forest- this is a rain forest without the deluges. It is a highland forest characterized by nearly 100% humidity throughout the year. The land is a mix of reforested and pristine cloud forest so plant and general diversity is varied. Clouds are constantly drifting through the valleys and treetops. The large tree canopies harbor a wide diversity of epiphytes. Some, like "old man's beard" (the lichen *Usnea*) draped on branches and vines, act as a huge net to capture moisture. Tree trunks are almost always covered with mosses, bromeliads, ferns, and other plants. Intact cloud forests play an extremely important role in the hydrology of certain regions of the planet; they capture, store, and filter water that feeds into local communities and large rivers hundreds of miles away.

Adjacent to Cloudbridge is Chirripó National Park. This park spans the most biologically diverse area in Costa Rica and, together with its neighbor La Amistad NP, comprises the largest unspoiled forest in the country. An astonishing number of habitats — produced by the differences in altitude, soil, climate and topography — can be found, including paramos, marshlands, oak forests, madrono forests, fern groves and mixed forests. Chirripó peak is the highest mountain in the country.

Cloudbridge Nature Reserve is just beyond San Gerardo de Rivas in the mountains of Costa Rica's southeastern interior. At Cloudbridge, activities will center on daily research activities. Some afternoons will be filled with further discussions and observations on this diverse ecosystem. Students will be assigned to research teams that will study projects in the cloud forest ecosystem of the Cloudbridge Nature Reserve, adjacent to the Chirripo National Park. Research projects will be from the following choices:

- Plant diversity in various habitats
- Tree diversity, carbon sequestration, and climate change

- Large mammal photo capture study and bird forest habitat specialization
- Endosymbionts of *Gunnera* plants

After dinner we will meet during the evening for a few student paper presentations and discussions. E**vening walks** (each student must participate on one) will occur on several nights. The last full day we will hold the **7th Annual Gatton Academy Research Symposium at Cloudbridge**. Each team will make a 10-15 minute powerpoint presentation of their research to all attendees.

Corcovado National Park:

Corcovado National Park (*Parque Nacional Corcovado*) is located on the Osa Peninsula in southwestern Costa Rica. It encompasses an area of 425 km² (263 mi²). It is widely considered the crown jewel in the extensive system of national parks and biological reserves spread across the country. The ecological variety is quite stunning. National Geographic has called it "the most biologically intense place on Earth in terms of biodiversity."

The park conserves the largest primary forest on the American Pacific coastline and one of the few remaining sizeable areas of lowland tropical rainforests in the world. Corcovado is home to a sizable population of the endangered Baird's Tapir and even a small population of the very rare Harpy Eagle. All four Costa Rican monkey species can be seen within the park, including the endangered Central American Squirrel Monkey, White-faced Capuchin, Mantled Howler, and Geoffroy's Spider Monkey. Other mammals present include Two-toed and Three-toed Sloth, Collared Peccary, Northern Tamandua and Silky Anteater.

The abundance in animal diversity can in part be explained by the variety of vegetation types, at least 13, including montane forest (more than half the park), cloud forest, jolillo forest (palm swamp), prairie forest, alluvial plains forest, swamp forest, freshwater herbaceous swamp and mangrove, together holding over 500 tree species, including purple heart (tree), poponjoche, nargusta, banak (tree), cow tree, espave and crabwood (tree). Another reason for the diversity (as with all of Costa Rica) is that it lies on a north-south corridor for flora and fauna; part of the "land bridge" and wildlife corridor that links the large continents of North America and South America.

We will stay near the park at Poor Man's Paradise, located on the Amaya homestead along the magnificient Pacific Coast of the Peninsula de Osa, the last frontier of Costa Rica. Due to the lack of roads, this magical corner of the world has maintained its natural beauty. We will arrange park entry here to **Sirena Station** and will explore trails to observe wildlife.

Isla del Caño National Park:

Isla del Caño is where students can study coral reef ecosystems over deeper water. Students will depart for Caño Island from a river town and travel downriver to the ocean, travelling through Central America's largest mangrove swamp. Out at sea, Humpback Whales and other cetaceans may be spotted. At Caño Island, students will snorkel (and possibly scuba if certified) to explore the reef life that includes white tip reef sharks, rays, moray eels, sea turtles, and numerous other types of fish and invertebrates.

STUDENT INTRODUCTORY PAPER:

I request that you write no more than one page (and probably less) about you. Tell me what you would like me to know about you, your interests, hometown, travel, hobbies, family, potential career goals, pets, and other details. I want to know a little about you before we travel so please email this to me before we depart.

STUDENT RESEARCH PAPERS:

Before the trip, students are required to familiarize themselves with one Neotropical organism found in country and one based on another broader aspect of Costa Rican biodiversity, biogeography, geology, volcanism, tidal effects on reefs, trophic interactions, conservation, political landscape, culture, state of education, or similar topics as approved by instructor, via two-1,000 word papers.

The papers on organisms should include a literature cited section (with at least two references from a scientific journal). Cite these references within your paper.

You will be asked to present both of your research topics during informal class meetings, usually after the evening meal but not always.

Identify one aspect of the topic or organism that is controversial and include both sides in your discussion to receive full credit.

You MAY NOT use Wikipedia as the only source for your information.

NOTE: STUDENT RESEARCH PAPER TOPICS REQUIRE INSTRUCTOR APPROVAL.

DUE DATE: These must be completed by December 28 and emailed to me at martin.stone@wku.edu and brought with you to Costa Rica to be used for informal presentations to the group.

ATTENDANCE POLICY:

All students are required to participate in all scheduled activities. A penalty will be imposed for failing to attend any event. In addition to the trip, we will meet twice on campus for pre-trip orientation.

EVALUATIONS:

Students will be evaluated in the following manner:	(% of overall course grade):
Daily journal entries describing species encountered, behaviors observed, environmental conditions experienced, reflections on the day's happenings, etc.	**20%**
Test(s)	**20%**
Research project including pp presentation at Cloudbridge	**30%**
Background Papers: BEFORE WE LEAVE	**20%**
Participation on trip and Introductory Paper before departure	**10%**

Grading:

90-100	**A**
80-89	**B**
70-79	**C**
60-69	**D**
< 60	**F**