

BIO-2020: TROPICAL BIOLOGY

Cuyahoga Community College

Viewing: BIO-2020 : Tropical Biology

Board of Trustees:

2018-05-24

Academic Term:

Fall 2019

Subject Code

BIO - Biology

Course Number:

2020

Title:

Tropical Biology

Catalog Description:

Introduction to biology of the tropics. Topics include major tropical biomes, biodiversity, conservation, sustainability, and consequences of human impact on the tropics. Studies include identification of flora and fauna and adaptations of tropical organisms. In addition to on-campus lecture/lab during an academic term, students are required to participate and travel to a tropical location for a real-world experience. A portion of the laboratory hours will be completed during the mandatory field trip to a tropical ecosystem. Field trip requires additional costs.

Credit Hour(s):

4

Lecture Hour(s):

3

Lab Hour(s):

3

Requisites

Prerequisite and Corequisite

Departmental approval and any 1000 level science course.

Outcomes

Course Outcome(s):

Investigate the biological, geographical, ecological, and physical components of tropical biology in both the classroom and the field.

Objective(s):

1. Discuss the effects of geography, sun, wind and water on tropical climates and weather patterns.
2. Demonstrate, in the field, the ability to use binoculars and guides to investigate and identify tropical flora and fauna.
3. Identify, on a map, geographical features that determine the boundaries of the tropics and the location of tropical biomes.
4. Identify and implement safety measures as they apply to travel in the tropics.

Course Outcome(s):

Identify and analyze different tropical ecosystems.

Objective(s):

1. Compare different ecosystems including tropical rainforests, dry forest, savannah, montane, cloud forest, mangroves, and coastal ecosystems and recognize organisms unique to each area.
 2. Describe the structural complexity of a tropical ecosystem in terms of physiognomy, watersheds and soil composition.
 3. Explain functions in a tropical ecosystem in terms of productivity, succession, forest gaps and symbiotic relationships.
 4. Explain the impact of microorganisms and climate on nutrient cycling and decomposition in the tropics.
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Course Outcome(s):

Analyze biogeography, evolution, adaptation, and classification to recognize and explain biodiversity in the tropics.

Objective(s):

1. Examine the role of the tropics in animal migratory patterns.
2. Interpret co-evolutionary patterns and how different organisms influence each other and contribute to species fitness.
3. Evaluate evolutionary patterns and their significance on species diversity in the tropics.
4. Identify and classify organisms into the appropriate taxa.
5. Recognize and evaluate plant and animal adaptations to tropical environments.
6. Explain the significance of the Panamanian land bridge in the biodiversity of the Americas.

Course Outcome(s):

Explain, discuss and analyze the value of tropical regions on a global scale and the impact of humans.

Objective(s):

1. Describe environmental issues that impact tropical ecosystems such as deforestation, agricultural practices, invasive species, habitat destruction, global warming, animal exploitation, and ecotourism.
2. Research and discuss conservation efforts in the tropics as related to environmental issues.
3. Examine and evaluate sustainability practices utilized in the tropics.

Methods of Evaluation:

1. Participation
2. Exams
3. Quizzes
4. Research paper
5. Class discussions
6. Field presentations
7. Field journal
8. Species list

Course Content Outline:

1. Concepts:
 - a. Geography of tropical regions
 - b. Climate of tropical regions
 - c. Coriolis effect
 - d. Weather patterns in the tropics
 - e. Rain shadow effect
 - f. Importance of the sun in impacting climate
 - g. Effect ocean currents on climate and weather patterns
 - h. Seasonal variations in the tropics
 - i. Tropical ecosystems and biomes
 - j. Morphology of tropical plants
 - k. Adaptations of tropical plants
 - l. Epiphytes
 - m. Plant life cycles
 - n. Forest gaps
 - o. Species richness
 - p. Structural complexity: forest floor, understory, canopy
 - q. Primary productivity
 - r. Nutrient cycling
 - s. Tropical soils
 - t. Succession
 - u. Water cycle
 - v. Decomposition
 - w. Natural selection

- x. Adaptations
 - y. Cryptic coloration
 - z. Warning coloration
 - aa. Adaptive radiation
 - bb. Speciation
 - cc. Panamanian land bridge
 - dd. Coevolution
 - ee. Ethnobotany
 - ff. Plant defense compounds
 - gg. Mimicry
 - hh. Tropical agriculture
 - ii. Tropical watersheds
 - jj. Mountain ecosystems
 - kk. Tropical coastal ecosystems
 - ll. Tropical rainforests
 - mm. Savannas
 - nn. Tropical dry forests
 - oo. Classification
 - pp. Migration patterns
 - qq. Diversity of tropical animals
 - rr. Adaptation of tropical animals
 - ss. Conservation
 - tt. Sustainability
 - uu. Role of national parks in tropical biology
 - vv. Binocular basics
 - ww. Tropical diseases
2. Skills:
- a. On a map, identify the equator, tropic of cancer, tropic of Capricorn, global wind patterns and global weather patterns
 - b. On a map, identify tropical biomes
 - c. Trace the path of a chemical through the biotic and abiotic components of an ecosystem
 - d. In the field, identify characteristic organisms in their tropical biomes
 - e. In the field, identify adaptations of organisms in their habitats
 - f. Using general field markings differentiate classes of animals
 - g. Use binoculars in the field
 - h. Classify organisms into appropriate taxa
 - i. In the field, identify examples of major biological concepts such as forest gaps, succession, etc.
 - j. Identify key plants used in ethnobotany
 - k. Demonstrate appropriate behavior in the field
 - l. Use field guides
3. Issues:
- a. Deforestation
 - b. Variations in agricultural practices
 - c. Invasive species
 - d. Sustainability
 - e. Impact of Chytrid fungus on decline of amphibians
 - f. Global warming
 - g. Exploitation of animals
 - h. Land use
 - i. Ecotourism
 - j. Safety in the field

Resources

Kricher, John. *A Neotropical Companion*. 2nd ed. Princeton: Princeton University Press, 1999.

Forsythe, Adrian and Ken Miyata. *Tropical Nature*. New York: Simon and Schuster, 1984.

Stiles, F. Gary and Alexander Skutch. *A Guide to the Birds of Costa Rica*. Ithaca, NY: Cornell University Press, 1989.

Janzen, Daniel. *Natural History of Costa Rica*. Chicago: University of Chicago Press, 1983.

Henderson, Carroll L. *Field Guide to the Wildlife of Costa Rica*. Austin: University of Texas Press, 2002.

Leenders, Twan. *A Guide to the Amphibians and Reptiles of Costa Rica*. Miami: Zona Tropical, 2001.

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Wainright, Mark. *The Mammals of Costa Rica*. Ithaca: Cornell University Press, 2007.

LaVal Richard and Bernal Rodrigues-H. *Costa Rica Bats*. Santa Domingo de Heredia, Costa Rica: National Institute of Biodiversity, 2002.

Mata, Milagro. *Costa Rica Mushrooms: Volume I*. Santa Domingo de Heredia, Costa Rica: National Institute of Biodiversity, 2003.

Mata, Milagro, Roy Halling and Gregory Mueller. *Costa Rica Mushrooms: Volume II*. Santa Domingo de Heredia, Costa Rica: National Institute of Biodiversity, 2003.

Bernhardt, Ed. *Medicinal Plants of Costa Rica*. Distribuidores de la Zona Tropical, S.A., 2008.

Zuchowski, Willow and Turid Forsyth. *Tropical Trees of Costa Rica*. Distribuidores de la Zona Tropical, S.A., 2008.

Raven, Peter, George Johnson, Jonathan Losos, Kenneth Mason and Susan Singer. *Biology*. 11th ed. New York: McGraw-Hill, 2016.

Urry, Lisa A., Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky and Jane B. Reece. *Campbell: Biology in Focus*. 2nd ed. New York: Pearson, 2017.

Osborne, Patrick L. *Tropical Ecosystems and Ecological Concepts*. 2nd ed. Cambridge Press, 2012.

Kricher, John. *Tropical Ecology*. Princeton: Princeton University Press, 2011.
