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255-01 Tropical Ecology in Costa Rica

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Syllabus for BIOL 255 Tropical Ecology in Costa Rica

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Student learning outcomes:

- Students will be introduced to the diversity of organisms in the Neotropical ecosystems of Costa Rica and learn to recognize and identify a variety of species of plants and animals in the field.
- Students will review current primary literature addressing a research topic concerning the Neotropics. Students will present the formal hypotheses and methodologies of modern scientific investigation.
- Students will observe first-hand some of the threats to conserving tropical biodiversity in a developing country and the biological concerns of agricultural production.
- Students will develop hypotheses addressing aspects of the tropics related to their particular experiences. Students will design research projects to collect data to test specific predictions. They will summarize, analyze, and present these data and results addressing their hypotheses.

Overview of course & grades (600 total points):

**Before trip preparation** due (via email) by Dec 24th:
- Pre-trip packet on textbooks (100 points)
- Current research article summary (100 points)

**In country assessments:**
- Powerpoint presentation on research article (50 points)
- Participation in discussions and personal conduct (50 points)
- Field Identification quizzes (40 points)
- Research project conducted in Costa Rica (group project; 60 points)

**Post-trip assignments** (due early in spring semester):
- Final exam (100 points).
- Flushed-out experimental proposal (100 points).

**Before-trip Assignments:**

Students will read the *Nature of the Rainforest* book and respond to a series of questions. Students will also read a supplemental article on agricultural issues concerning chocolate production. There will be a short worksheet designed to introduce students to the identification of plants and animals we will encounter on our trip. These questions will be handed out in the December meeting.

Also before leaving for Costa Rica, students will review a recent scientific research article (published within the last 5 years) on some aspect of tropical biology. You may want to browse the following primary journals: *Journal of Tropical Ecology, Caribbean Journal of Science, Biotropica,* and *Journal of Tropical Forest Science.* Electronic versions of these journals are available through the library. You may choose any research article that interests you as long as it describes original research conducted in the Neotropics (Central or South America). Other journals can be used as well. You may want to use the Web of Science search engine through the library. However, the article must be approved by Dr. Farnsworth or Dr. Ray by Dec. 10th so that copies of
the abstract can be made available to the other students. Dr. Farnsworth or Dr. Ray can also suggest articles to you if you are having trouble finding one of interest to you.

Your written assignment is to:

1. Provide a short summary of the research described in the article. Summarize the introduction and rationale for the research (at least 2 paragraphs). Summarize the methods used in sufficient detail for someone to understand who has not read the paper (at least 2 paragraphs). Describe the results and summarize the discussion section (at least 2 paragraphs).

2. Propose a new research project that could serve to build on the work presented (at least 2 paragraphs). As potential examples, you could describe how you could perform a similar experiment with a different species that has traits in common with the species described in the article, or you may propose an idea to test an alternative hypothesis using the same research organisms as those described in the article.

During Trip:

While in Costa Rica, students will present their chosen research article with a computer-aided (e.g. Powerpoint) presentation to the class and lead a discussion. This presentation must be organized and informative and use visuals that help illustrate the methods and results of the research project (e.g. figures, graphs, and/or tables).

There will be two field practical quizzes (20 points each). Students will be expected to identify approximately 10 tropical plant families from the characteristics observed in the field. In addition, students will learn to identify a variety of animals, including representative mammals, reptiles, amphibians, birds, insects, and other invertebrates. The quizzes may include additional details about field specimens such as distinctive behaviors or human uses.

In the evenings, students will participate in discussions. In addition to presenting their own work, students are expected to be engaged in the discussions of other student’s research. There will also be presentations by local experts on current conservation issues in Costa Rica.

Students will also work in small groups to design a research project. This project must include a hypothesis that directly leads to a specific prediction. Groups will then perform a test of that prediction by collecting appropriate data and analyzing the results. Toward the end of the trip, groups will present their work to the class.

After returning from Costa Rica:

Dr. Ray will send a post-trip test consisting of a series of questions designed to synthesize our experiences in Costa Rica with the readings and discussions relating to Neotropical ecology. This will be an open-note, open-book, take-home assignment.

Each student will also write a research proposal to address a question related to a specific experience s/he had while in Costa Rica. This assignment requires an explicitly-described hypothesis. From that hypothesis, the student will make a specific testable prediction. The assignment is to describe a realistic methodology that could be used to collect data that will test that specific prediction.