Instructor
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Required Texts
• One of the Following

Required Equipment (Ask the professor if you are in doubt of the quality.)
• Good Quality Binoculars. Rentals are available from the Biological Sciences Department for $25.
• Good Quality Snorkeling Gear.

Course Description
This course will survey and investigate biological processes at the the levels of organism, population, community, and biosphere, emphasizing the relationship of these processes to the tropical latitudes. This course will guide students through a comparative study of major tropical plants, animals and biomes, and examine the essential principles of tropical ecology and conservation biology.

Course Objectives
The primary objective of this course is to introduce you to some key Neotropical ecoregions and to walk with you as you discover the awe and wonder of tropical nature. To do this we will engage in a variety of activities which will introduce you to the basic principles of rainforest ecology. Emphasis will be on the structure, function and conservation of the rainforest ecosystems and the species that comprise those systems.
To accomplish this task, we will:
1. Spend most of our time together in the field.
2. Examine the component parts making up an ecosytem.
3. Consider the energy flow and biogeochemical cycles that drive the ecosystem.
4. Look at the interaction of species including the topics of predation, competition, pollination, fruit distribution, and antipredation strategies in both plants and animals.
5. Evaluate rainforest plants as biochemical resource for human society.
6. Examine the sustainability of various societies within the tropical rainforests.
7. Experience first hand the species (our nonhuman neighbors) that surround us. As we learn their names we will consider their place within the ecological system.
8. Involve you in individual field exercises where you will seek answers to a number of significant ecological questions.
Likewise as a cross-cultural course this academic experience will meet the following objectives:

1. appreciate cultural traditions significantly different from their own.
2. articulate how people from different cultures perceive the world, interpret reality, and make meaning.
3. understand the paradoxes, tensions, and contradictions as well as the consistencies and values in a society significantly different from their own.
4. develop an appropriate sense of cultural relativism and reduce ethnocentrism.
5. reflect on their own culture and society from the perspective of another culture.
6. gain skill and experience living and working in a culture different from their own.

**COURSE DELIVERY**

- **Lectures and Course Modules**
  Lectures will seek to impart information from various angles: the tropics as a whole, the habitats that comprise the tropics, and the denizens that define the tropical communities. Sometimes, days will consist of lecture modules that engage the student in discussions, lectures, lecture walks, investigation, and journaling. More often than not, lectures will be followed with field time through small investigations. Field time will involve both theoretical lecture/discussions, group opportunity for first hand examination of these principles, and time for individual investigative study. This will help you develop your analytic and critical thinking skills.

- **Research Projects and Presentations**
  Students will conduct a mini-investigations related to course lectures, as well as a research project representing the Experiential Learning Initiative assignment. These will be done in pre-assigned groups. Each student group will report back to the class on the results of their group’s research project using PowerPoint and analytical applications (i.e., Excel) for our travel symposiums. Each student is expected to record the details of these investigations in their Field Notebook.

- **Course Contribution**
  **Discussion** - Students will be given time at the beginning of each module to share interesting tropical forest experiences with the class. What creatures amazed you? What surprised you? How does the experience in the field meet or differ from your expectations? This is the time for each student to report back to the group on the results of your individual and group investigations and will record the details of these investigations in your Field Notebook. Participation is expected.

  **Collaboration** - Certain attitudes are critically important to successful scholarly collaboration, as well as Christian unity. Is the person courteous in all intellectual exchange? Is the person willing to be corrected, or is s/he always right? Is s/he willing to firmly correct error, or does s/he timidly defer to mere personality rather than logic or fact? Is the person willing to confront and express grievances in person, or does s/he let it generate ill feeling or criticism behind the back of another. Do the person carry his/her weight on research projects?

- **Textbook Exams**
  There will be two exams over the material covered in the course (lectures, text, and field work). The first is over your reading of *Tropical Nature* (Forsyth & Miyata) prior to departure to Central America. The second exam will emphasize terms, concepts, principles and integrative relationships covered in lectures and readings from *Tropical Ecology* (Kricher). They will be primarily short-answer and essay questions in written format.

- **Birding, Lizarding and Night Walks**
  Each student will be assigned three mornings to be ready at 5:45 am to do small group birding and lizards. Each student will be assigned three nights to walk as a small group to look for nocturnal creatures: bats, snakes, frogs and mammals. Species lists for each experience will be made in the Field Notebook.
• **Devotions**
  Students will be assigned a date and group to deliver breakfast devotions to the class. Devotions should seek to focus on how/what God speaks to us through Creation.

• **Preparatory Reading**
  Students should read Forsyth and Miyata’s *Tropical Nature* prior to the arrival to campus. This material will provide the background for our lectures, discussion, and field work.

**GRADING**

Your work in the above areas will be evaluated by your mastery comprehension of fundamental concepts and underlying principles. Letter grades are as follows. Final grades will **NOT** be rounded up, and may not be raised by doing additional assignments or revising previous assignments after the course has ended.*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93.0 - 100</td>
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<tr>
<td>A-</td>
<td>90.0 - 92.99</td>
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<tr>
<td>B+</td>
<td>87.0 - 89.99</td>
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<tr>
<td>B</td>
<td>83.0 - 86.99</td>
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<tr>
<td>B-</td>
<td>80.0 - 82.99</td>
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<tr>
<td>C+</td>
<td>77.0 - 79.99</td>
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<tr>
<td>C</td>
<td>73.0 - 76.99</td>
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<tr>
<td>C-</td>
<td>70.0 - 72.99</td>
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<tr>
<td>D+</td>
<td>67.0 - 69.99</td>
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<tr>
<td>D</td>
<td>63.0 - 65.99</td>
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<tr>
<td>D-</td>
<td>60.0 - 62.99</td>
</tr>
<tr>
<td>F</td>
<td>0.0 - 59.99</td>
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*an average below 60 is not a passing grade

**Composition**

Your grade will be determined by your performance in each of the following areas.

- 20% Exam 1 - Textbook Exam
- 20% Exam 2 – Lecture Exam
- 30% Field Notebook/Journal
- 15% Mini-investigations
- 15% Research/Presentations
- 10% Contributions/Participation**

**Total 100**

**This is expected, so if there are failures to be present and active for lecture discussions, night walks, birding/lizarding, and research projects, then point deductions up to 10% will be made from the final grade.**

**Evaluation Requirement**

Students must complete an online course evaluation following their return from the course trip. Failure to submit the evaluation will result in a course grade of incomplete.

**ACADEMIC INTEGRITY**

This class operates on the honor system. That means you are trusted to be more committed to God's values than the desire (yours or your friends') to earn high(er) grades. Academic dishonesty will result in failing the course, such dishonesty includes:

1. Cheating on exams
2. Plagiarism: submitting the work of another as your own.
3. Falsification: giving false information in regard to any academic undertaking (e.g. doctored research results, false or altered quotes, phony excuses or forged signatures, etc.)

**FIELD BEHAVIOR**

1. Treat all wildlife in the field with respect.
2. Responsibly care for and use scientific instrumentation.
3. Fully participate in all field activities: This includes bringing appropriate materials (field books, binoculars, and field notebook); keeping necessary written records; staying with the group; paying attention to and heeding field instructions, often given **orally, just once**. It only takes one negligent worker to ruin an entire day's data for a whole group, or even the whole class!
4. Support group collaboration: Field work is often a group process. We need to work together.
INVESTIGATIVE PROTOCOL

This is a biological field course, which means a good deal more than we are likely to spend lots of time outside. We want not only to illustrate, but actually to derive, and enable you to derive, many of the principles we discuss in lecture from observations of nature. The goal is to equip you to see things in the natural world you’ve never seen before, by enabling you not only to identify components but, even more importantly, to recognize processes and perceive questions you have not conceived before. That’s a big goal. Our job will be to provide you with the appropriate information and selective exposure to and interpretation of habitats. Your job will be to give it your best, submitting to a variety of field protocols. Specific details will be explained in class, but two general categories will be described up front.

FIELD NOTEBOOKS

General Overview
You should commit to spending at least 30 minutes per class day on your Field Notebook, which ought to result in 1-3 pages per entry, but length is not your sole goal. Some entries may be fairly short, with no more than a few paragraphs. At other times you may find yourselves writing many more pages. It must be readable! Please use pen. Bring your journals/field notebooks to every class session and field trip.

Fifteen percent of your grade will come from a field notebook/journal, which should have three distinct and clearly marked sections. ONE, notes from lecture discussion sessions; TWO, field observational records on the species and communities we observe and study; THREE, a more personal one which might be called a naturalist’s/culture learner’s notebook or intellectual journal. The third section is described in below.

Lecture Notes
You should include notes taken in the field and classroom lectures to study from for Exam #2.

Field Notes
1. Give the date and location and time of day at the top of each page.
2. Briefly describe the habitat and location where the observations were made. The location should be given in sufficient detail should you return to the same location for subsequent study.
3. Record your observations. Include data if you are doing research. Make sketches.
4. Include a comprehensive species list of all the plants and animals we specifically discuss or observe, plus notes on the natural history of particular species or communities.

Travel Journal
Scientists, students, explorers, missionaries, political leaders, and naturalists keep travel journals. A journal is more than an historical or even a personal introspective diary (although it should include elements of that). It is a record of your intellectual development during the voyage you take in the discovery of ideas and perceptions of the world. It should be a chronicle of your thoughts, observations, feelings, insights, connections, analyses, and conclusions related to certain ideas; but it should also contain your unanswered questions, sources of confusion and possible plans for resolving them. As a naturalist and culture learner, it should also be rife with descriptions, perceptions, and observations about the world around you. It is not just a diary, if by that term is meant the mere record of daily life or ones emotional response to it. Good intellectual work never disregards emotion or personal experience.

A major portion of your journal should be devoted to the considering the concepts, ideas, propositions, observations. from readings, lectures, discussions, or field exercises that strike you as interesting or significant in this course. You may occasionally go beyond the course to reflect on such things as faith/learning, field or Christian education, camp life, or other aspects of your current experience. Some of what you write in your journal will be determined by class assignment. But other entries will be up to you. Possibilities include:
1. Reflections on the beauty or mechanics of the natural world.
2. Brief essays on topics suggested by readings, lectures or discussions.
3. Reflections on this course’s structure & methodology; or education in general at a Christian college or field station. Thoughts on the group dynamics of this class or the station.
4. Short notes or memos to yourself about insights, questions, ideas for further reading, thought or prayer.
5. Dialogues with your own conscience: promises, goals, dreams, questions, resolutions, convictions. Think of what would be illuminating to rediscover or recall 10 years from now about yourself during this period of life.
6. Observations and reflections on the daily appearance of and changes in the forest, weather, insect fauna, or other aspects of the local environment whose pulse you can become sensitive to by persistent description. Education should enable you to cultivate the ability to observe subtlety, to see something previously unseen.

**You should have one significant journal entry per day.** I may ask at any time to check your journal to check progress.

**EXPERIENTIAL LEARNING INITIATIVE (ELI) REFLECTION AND DELIVERABLE**

Students will design learning objectives at the beginning of the ELI experience that are driven by the overarching ELI objectives of meaningful career development and community engagement. Students will answer the common ELI reflection questions. Faculty may build this segment into the reflection component of the course through journals, ePortfolio or other methods.

To ensure that the ELI leads to the stated outcomes of career development and community engagement, students will be required to translate the learning from their reflection into a “deliverable” that is contextualized for an external audience relevant to the students’ future goals (employer, graduate school, etc.). Faculty will determine the format of the deliverable (i.e. ePortfolio, blog, digital storytelling, cumulative reflective essay, etc.).

Note: Faculty will score student responses to reflection questions and deliverable according to the ELI assessment rubric and submit the results to the Off-Campus Programs Advisory Committee for ELI.

*Common Objectives and Outcome Reflection Questions*

- **Objectives**: At the outset of the course, students will personalize specific objectives in all of the following categories, in light of their unique situation and goals:

**PERSONAL**

How do you expect to grow personally (e.g. in your self-awareness, your spirituality, and how you relate to others) through this experience?

**PROFESSIONAL**

Regardless of whether or not your ELI relates explicitly to your career goals, what specific skills do you plan to develop/enhance that would be transferable to your professional goals?

**ACADEMIC**

In what specific ways do you hope to grow as a student? How do you hope your ELI will connect to your major and classroom experiences?

**COMMUNITY ENGAGEMENT**

What do you hope to learn about the "bigger picture" of community (local or global) from your ELI?

Educator-advisors will provide feedback on student learning objectives, and then touch base with students minimally at the beginning, mid-point and end to monitor their progress. At the end of the experience, students will reflect on their learning outcomes:

- **Outcome Reflection Questions**: Near the end of the course, students will be asked: Please reflect on the experiences you’ve had, lessons you’ve learned, and ways in which you’ve grown. There is a lot to ponder, so we’ve provided a few questions we’d like you to answer to help you reflect. As often as possible, try to think of specific examples, stories, situations, or problems you faced during your ELI experience to help answer the questions.”

As a result of your experience in the ELI...
1. Discuss a significant moment during this experience that left a lasting impact on you. Why was this experience significant for you?

2. What did you learn about your strengths or weaknesses? What did you discover about yourself as a person...
   a. Professionally? ______________________
   b. Intellectually? ______________________
   c. Personally? _________________________

3. How has this experience impacted or shaped your ideas about who you are called to be in a more long-term way?

4. How did this experience influence your specific career goals?

5. Please provide specific examples of two transferable skills (i.e. skills that you will be able to use beyond your ELI) that you gained or enhanced during your ELI.
   a. Transferable Skill 1: ______________________
   b. Transferable Skill 2: ______________________

6. Please provide one example of something that you had learned in a course at Messiah (e.g. a theory, concept, strategy, etc.) that you were able to apply during your ELI.

7. How did your ELI experience deepen your understanding of your major and your broader educational experience (inside or outside of the classroom) at Messiah? How does your ELI experience apply to your major and/or future courses?

8. As a result of your experience in the ELI, what is one specific way you foresee your future self...
   a. Contributing to your community over the long-term?
   b. Having purposeful influence in church and society?
   c. Pursuing the work of reconciling individuals with God, each other, and/or creation?
   d. Demonstrating the love of God in service to others?
### ELI Assessment Rubric

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>CWEO</th>
<th>DIMENSION (Mapped to final reflection question numbers)</th>
<th>DEFINITION (Proficient Level)</th>
<th>NO ATTEMPT</th>
<th>NEEDS IMPROVEMENT</th>
<th>PROFICIENT</th>
<th>EXEMPLARY</th>
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<tbody>
<tr>
<td><strong>Meaningful Careers</strong></td>
<td>5.d - interests, abilities, and limitations</td>
<td>Identifying Personal Strengths/Abilities (Questions 1, 2, and 5)</td>
<td>Student clearly and accurately connects their intellectual, professional and personal strengths and abilities to their ELI experience</td>
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<td></td>
<td>5.c. - sense of vocation/career that transcend career choice</td>
<td>Sense of Vocation (Questions 3 and 4)</td>
<td>Student clearly articulates how their experience enhances or informs their vocation (sense of purpose for their interests and abilities)</td>
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<tr>
<td><strong>Academic integration</strong></td>
<td>4 – major 1-3, 5-7 – QuEST</td>
<td>Academic Integration (Questions 6 and 7)</td>
<td>Student identifies specific ways in which academic learning informs ELI experience and/or ELI experience informs classroom learning</td>
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<td><strong>Community Calling</strong></td>
<td>5.e. - role in community</td>
<td>Role in Community (Question 8a)</td>
<td>Student develops and specifically demonstrates awareness of his/her role, both personally and professionally, in society</td>
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<td></td>
<td>7.b. Leadership - civic responsibility</td>
<td>Leadership (Question 8b)</td>
<td>“Student identifies specific ways in which (s)he does or could have purposeful influence in the broader church and society” (definition of leadership from</td>
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<tr>
<td>Community Engagement</td>
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<td>MC Leadership Model</td>
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<td>7.c. – Reconciliation</td>
<td>Reconciliation</td>
<td>Student identifies specific ways in which (s)he does or could seek to pursue the work of reconciling individuals with God, with each other, and with all of creation in the broader church and society” (definition of reconciliation from MC foundational values document)</td>
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<tr>
<td>acting responsively and redemptively</td>
<td>(Question 8c)</td>
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<td>7.f. - Service - decisions based on ethic of service</td>
<td>Service</td>
<td>“Student identifies specific ways in which (s)he does or could seek to demonstrate the love of God in service to others” (service phrasing from MC foundational values document)</td>
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<td>(Question 8d)</td>
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<td>Completion of Deliverable</td>
<td></td>
<td>Student has completed deliverable project in the format appropriate to bucket area and in a way that clearly summarizes ELI outcomes and reflections to an external audience</td>
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*In order for students to successfully fulfill the ELI Requirement, they must obtain at least eight (8) points on this rubric*