Western Connecticut State University

Department of Biological and Environmental Sciences

Scientific Inquiry in the Field Spring 2020

Course Number: Bio 107 for non-Majors; Bio 202 for Majors

Course Name: Scientific Inquiry in the Field

**Semester Hours:** 4 (45 hours lecture and 45 hours lab)

**Professor**: Theodora Pinou, PhD

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**Office Hours**: TBA

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Course Room: SB 240 – Pre-travel Classes

 Playa Grande, Costa Rica - Lab

Course Time: Lecture Tuesday, January 28th, February 4nd, 11, 18, 25, March 10st and 24th at 5:25 – 7:25PM.

 Field Lab during March 15th – March 23rd.

General Education Competency Designation – Scientific Inquiry

Science is a way of knowing based on empirical observation and verification. Scientific inquiry involves asking appropriate questions, designing and implementing strategies to answer those questions, and interpreting and explaining the results within a disciplinary/theoretical context.

**WCSU Information and School Cancellations**: Check WCSU’s homepage (www.wcsu.edu). Sign up for the Emergency notification system: <http://www.wcsu.edu/ens/>.

**I. Course Description**

*Scientific Inquiry in the Field* teaches appropriate field biology techniques, to record observations, and build hypotheses through inductive and deductive processes. This course immerses students in an outdoor laboratory setting and focuses on natural history, discovery through observation, and/or the conservation and management of biodiversity. Students use the outdoors as a laboratory from which to observe, record, and test natural phenomenon. Through the activities of this course students will participate in established conservation or field management programs. Students will be required to keep an accurate and detailed field journal that will include records of lab activities, species descriptions and drawings, and habitat accounts.

**II. Required Texts and Materials:**

1. Graham, M, Parker, J, and Dayton, P. 2011. *The Essential Naturalist: Timeless Readings in Natural History*. University of Chicago Press. ISBN-13: 9780226305707.

2. Price, Daniel. 1999. *How to Make a Journal of Your Life*. Simon and Schuster, Australia. ISBN:1-58008-093-6**.**

3. Kricher, John. 1999. A Neotropical Companion. An Introduction to the Animals, Plants, & Ecosystems of the New World Tropics (2nd edition). Princeton University Press, Princeton, NJ. ISBN: 978-0-691-00974-2.

4. A working flashlight or headlamp, Field Lab Notebook (To be discussed in class) and a mechanical pencil with plenty of lead.

Optional

Binoculars and cameras recommended but not required.

The following bookstore web site contains this information by term/department/course andsection.[http://wcsu.bncollege.com/webapp/wcs/stores/servlet/TBWizardView?catalogId=10001&storeId=47055&langId=-1](https://owa2007.wcsu.edu/owa/redir.aspx?C=b850ea779198477292aa6d6c905c9b81&URL=http%3a%2f%2fwcsu.bncollege.com%2fwebapp%2fwcs%2fstores%2fservlet%2fTBWizardView%3fcatalogId%3d10001%26storeId%3d47055%26langId%3d-1)

**III. COURSE OBJECTIVE & LEARNING OUTCOMES**

 **As a result of this course students will be able to:**

1. Explain how living systems are interconnected and interacting (Departmental Programmatic Learning Outcome)
2. Test an appropriate research question through observation.
3. Interpret data within the context of biodiversity and conservation.
4. Critically evaluate the pros and cons of resource management policies.
5. Improve their communication skills through journaling and discourse.

***Scientific Inquiry Learning Outcomes***

1. Develop research questions or hypotheses through induction or deduction through observation.
2. Design a strategy to test or address the hypothesis or research question within the limits of the field experience.
3. Implement the research design strategy with faculty oversight in the field.
4. Interpret the results within the context of biodiversity and conservation disciplines.
5. The student will be able to effectively communicate and defend learning outcomes 2 - 5 *through journaling and discourse.*

**IV. Grading**

***By enrolling in this course, I affirm and agree that any of my work that is submitted for credit may be checked with Turnitin.com for detection of plagiarism*.**

Assessment:

The presentations, discussions, and activities will be provided based on the assumption that you have read any assigned readings prior to attending the associated class.Candidates are expected to complete the following:

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| **Activities and Assessment Tools** | **Percentage** |
| Warm Up Ecotourism Assignment (**100 points**) | 10% |
| Pre-field Biodiversity Exam (**100 points**) | 10% |
| Laboratory Field Journal with daily reflective notes & species pages (**500 points**) | 50% |
| Inquiry Activities (only 2 collected worth **100 points)** *(Gen Ed Assessment assignment)* \*\* These are complete Lab reports with citations for Biology Majors. | 25% |
| Attendance & field disposition/attitude (**100 points)** | 5% |
|  **Total** | **100%** |

**V. Class Schedule and Topical Outline**

Scientific Inquiry in the Field Bio 107: The assignments for this course are broken into two parts. Part I is the pre-departure schedule. Part II takes place in Costa Rica. Please be sure to pay close attention to the dates and the contexts of each assignment

**Part I: Tuesdays 5:25 – 7:25PM Room 240 SB**

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| **Date** | **Topic** | **Learning****Objectives** | **Reading Assignments** |
| January 28 | 1. Introduction to Course and Journaling | 1. Introduction to the Tropics and expected biodiversity.2. How to document journaling reflections; examples from Naturalists. | Bring Textbooks to class. Selected readings from Graham et al. (TBA) |
| February 4 | 2. The Power of Field Observation | 2. Documenting Phenomena2. Stating a hypothesis3. Making a prediction4. The Alternative Hypothesis | READ the entire Price Book (appx.40 pages)\*Read Grinnell Handout |
| February 11 | What are Endangered Species and why are they of special concern? WHO CARES?? HINT: Do they tell us anything about ourselves?2. Documenting Biodiversity | 1. To build empathy about Conservation Practices around the world. Is Ecotourism good or bad?2. Documenting Biodiversity through Illustration, photography, sound, museums and collections | Chapter 14 –Handouts(Deforestation and Conservation of Biodiversity) and Appendix (Hey, Let’s be Careful Out There)(pp 334 – 388) Of Kricher’s Neotropical Companion.(Ecotourism Assignment Due) |
| **February 18: Warm Up/Ecotourism Assignment due: See details on pp. 7-8 of this syllabus** |
| February 18th  | 1. Sampling Biodiversity in: Terrestrial, Aquatic, and Marine Habitats. | 1. To evaluate the relationship between people and their land.  | Be prepared to discuss Chapters 6 (The Neotropical Pharmacy) and 11 (Coastal Ecosystems, Mangroves, Seagrass, and Coral Reefs) Of Kricher’s Neotropical Companion. |
| February 25th | 1. Reporting Biodiversity in terms of Biodiversity Indexes | 1. To discuss the rights and responsibilities that scientists have to the international community? | Selected readings from Graham et al. (TBA) |
| March 10th | 1. Reflecting on Naturalists and their notebooks.2. responsibilities and course expectations | 1. Compare and contrast historical and contemporary naturalists. |  (EXAM) |
| **March 19th at the end of class Pre-Field Biodiversity Exam** - Open Book test that will assess your preparation for traveling in the field. It will measure safety, personal responsibility, and disposition, as well as your understanding of the interrelationships between organisms in a field-location of study. It will evaluate your understanding of ethics and respect in the field in a group/team setting. It will measure your understanding of how to journal and sample in the field, and the time management required to effectively perform these tasks. You must show proficiency before you can travel. Students that do not show proficiency will be required to spend every moment of their time in Costa Rica with Dr. Pinou |

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| March 15 – 23 | The Applied Scientific Inquiry Component of the course:1. Analysis of data2. Conclusions & presentations | To explore and document, and explain biodiversity. | Journaling and Scientific Inquiry Worksheets to summarize lab activities. Scientific Inquiry Worksheets will be transcribed into lab reports for Biology Majors. |
| March 24th | Reflecting on our learning.1. Conservation Laws and Practices; Local versus global. | To compare and contrast the terrestrial and aquatic life. Summarizing morphological and physiological adaptations of tropical plant and animals. | Journals collected and Final Exam.\*\*Lab reports collected from Biology Majors |
| **March 24th Final Exam**. The final exam is cumulative and will include 40 multiple choice questions (2 points each), and four (of seven) short essay questions (5 points each). Time allowed for the final exam is 60 minutes. **Journals:** Remaining class time will be used to polish journals and make sure they are ready to be submitted. (See journal instructions on p. 9 of the syllabus) |

**Part II: Field Lab Schedule in Costa Rica March 15-23:**

Mar 15: Arrive Liberia Costa Rica (LIR)

 14:30 - 16:30 Orientation, Unpack,

 22:30 – 24:00 Goldring-Gund Marine Biology Station: Orientation

Mar 16: 10:00 Breakfast

 12:30 – 14:45 Beach Patrol Training

 15:00 – 17:00 Nest Excavations/temps

 18:00 Dinner

 19:30 – 00:30 Turtle Patrol

Mar 17: 5 :00 – 9:00 Morning Beach Patrol

 10:00 Breakfast

 12:30 – 15:00 Field Lab - Intertidal pools Playa Carbon

 16:00 – 17:30 Temps and Excavations

 18:00 Dinner

 19:30– 00:30 Notebooks and Journaling

Mar 18: 05:00 -9:00 Morning Beach Patrol

 10:00 Breakfast

 11:30 – 13:30 Study of Tropical Dry Forest Habitat (Murren Reserve) & Estuary Lab

 13:30 – 15:00 Time for notebooks

 15:00 – 1700 Temps and Excavations

 18:00 Dinner

 19:00 Journaling

 20:15 – 02:00 Turtle Patrol

Mar 19: 5:00 – 9:00 Morning Walk

 10:00 Breakfast

 11:30 – 14:00 Journaling and Inquiry Sheet write-ups

 15:30 17:30 Excavations

 18:00 Dinner

 19:30 Lecture Lecture: sea study and marine life preparation

 20:30-02:30 Turtle Patrol

Mar 20 5:00 – 9:00 Morning Beach Patrol

 10:00 Breakfast

 12::30 Visit El Jobo

Mar 21 5:00 – 7:00 Morning Beach Patrol

 11:00 Breakfast

 13:30- 18:00 Rincon dela Vieja (Montane Forest) – biodiversity lab

Mar 22 5:00 – 8:00 Morning Beach Patrol

 9:00 Data Clean-up

 11:00 Breakfast

 12:00- 16:00 Salt marsh study

 18:00 Visit Tamarindo - Local culture

Mar 23 5:00 Pack, leave for the airport & Home

## VI. Academic Honest Policy

<http://www.wcsu.edu/facultystaff/handbook/forms/honesty-policy.pdf>

**VII.** **Disability Accommodation**

Americans with Disabilities Act: The Department of Biological and Environmental Sciences does not discriminate on the basis of disability as regards to any program or activity covered by federal or state laws and regulations. It is each candidate’s responsibility to contact the Accessability office if you have special needs (website <http://www.wcsu.edu/accessability/>).

**VIII. Technology Disclaimer**

**WARNING!**  User discretion is advised in all courses. When you connect to the Internet your hardware/software is vulnerable to security threats, offensive content, explicit images, and profane language. When you go online in this course, you accept total responsibility for what you see, read, hear, and do. If you are concerned about encountering offensive content online, please immediately withdraw from this course. <http://www.cslib.org/eisguide.htm>

**IX. Course Policies and Procedures**

1. Your final grade is a combination of lecture and lab (see IV. Grading). Attendance counts and will be taken at the beginning of every class. It is your responsibility to sign-in. Signing a name other than your own is an act of academic dishonesty that will be reported to the Office of Student Affairs and will result in serious penalties.
2. You must bring your textbook to class every day. If you do not then 1 point will be deducted from attendance and disposition. Your textbook can be in electronic format.
3. You are expected to participate in class discussions and to take class notes.
4. All assignments are due as noted on the syllabus. Two points will be deducted for every late day.
5. Please turn all phones and personal electronic devices off, or to vibrate while in class.
6. You must wear proper attire in the field. Closed toed shoes, long hair tied back, clothing to cover most of your body, sunscreen and insect repellent. I would advise that you bring a light jacket or sweater because the beach can get chilly in the evening.

**X. Assignment Descriptions and Rubrics**

**Warm Up/Ecotourism Assignment:** This is an independent writing assignment that requires that every student understand the advantages and disadvantages of “ECOTOURISM.” It will require that you find information that is valid. This means that the articles or books you read must be written by reputable authors, and based on evidence and accurate interpretation. You are free to use the Internet to obtain information, but you must cite your sources and be sure that you can justify why your information is legitimate. When we return from this field experience you will be asked to comment on whether you think the travel experience qualifies as “Ecotourism.” This assignment also prepares you to think like a scientist and learn to ask meaningful questions. **(Due February 18th).**

**Warm-up assignment Rubric/Outline (100 Points)**

After completing all the required fields below, write your report in single sided, double spaced format. The font should not be smaller than12 points. **We will be using** **the Journal** **of Natural History** as a **guide** for writing and the bibliography see (www.tandf.co.uk/journals/authors/style/quickref/tf\_C.pdf).

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| --- | --- |
|  | 1. What is Ecotourism? **(10 points)**
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|  | 1. Provide an example of ecotourism in the United States and another example from Latin America, Asian, or Africa. Explain your reasoning for why these qualify as examples of Ecotourism. **(30 points) – be sure to include at least 2 primary sources.**
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|  | 1. What do you find most interesting about your chosen examples? Explain in a well- developed paragraph. **(10 points)**
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|  |
|  | 1. Provide two advantages and two disadvantages of Ecotourism. **(15 points) – be sure to include at least 2 primary sources.**
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|  | 1. Under what conditions do you feel Ecotourism is a successful strategy of conservation practice? Why? **(8 points)** **Include a primary source.**
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|  |
|  | 1. Under what conditions do you feel Ecotourism is a poor strategy of conservation practice? **(8 points)** **Include a primary source.**
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|  |
|  | 1. Do you see yourself involved in any aspect of the Ecotourism Industry? Explain your response. **(4 points)**
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|  | 1. State a single question you would like to investigate about Ecotourism and explain in a well-developed paragraph why you feel this is a valuable question. **(15 points)**
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Student Name:

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FINAL SCORE:

**Field Notebook/Journal Format:** Field Notebooks will be reviewed while on the field by Dr. Pinou to assure proper format is being followed**. (Due March 24th)**

**Notebooks will not be accepted unless they are in proper format. The format consists of:**

1. The student’s name and course number should be clearly indicated in the front of the Journal.
2. The Journal should have an expandable *Table of Contents* that lists each day’s lab activity and the page number. ALL WRITING IS DONE IN PENCIL!
3. Each day the student will date the top right of the page and begin the Journal record.
4. A Journal record includes a daily objective.
5. A Journal record includes military time for each documented journaling observation.
6. A Journal record includes a description of the weather and climate conditions under which you are recording an observation.
7. At the end of a day’s entry you must include a species list.
8. At the end of your Journal you should keep species pages that include important field characters and helpful hints for identification.
9. You are encouraged to use illustrations/drawings to remember where you are and what you see. These can be photographs too.
10. Scientific Inquiry worksheets should be attached to the end of your daily account.

**Inquiry Activity Format**

**Name: Inquiry Activity Title:**

**Scientific Inquiry Worksheet: Turn in with any accompanying graph(s) at the end of the lab period.** YOU MUST CHECK writing (e.g., grammar, spelling).

1. **Why do you want to know?** Explain the biological context for conducting the study?
2. **Clearly state the hypothesis** that was tested and briefly explain the rationale for this hypothesis.
3. **How was the study conducted?** Briefly describe the experimental design. What were the dependent and independent variables? What controls were used and why?
4. **What were the results?** Graph the results on graph paper. Attach graph(s) to this sheet. Make sure graphs are clear and appropriately labeled.
5. **What do the results mean relative to the biological context?** Was the hypothesis supported or not? Explain your answer, in particular why you think the results turned out the way they did. Briefly explain how the study could be improved upon.

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