

# BIO 234 Ecology Laboratory

FALL 2006

W 1:00-4:00 PM, SC 106

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*To do science is the search for repeated patterns, not simply to accumulate facts, and to do the science of ... ecology is to search for patterns of plant and animal life ...*

Robert MacArthur

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**Instructors:** Dr. Karen Kackley  
**Office:** SC 138  
**Office Hours:** W 12:00-1:00  
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**Prerequisites:** BIO 121 & 122

**Credits:** 1.0

**LA Course:** Writing II

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**Course Description:** Ecology is the study of the interactions between an organism and the environment and how these interactions influence the abundance and distribution of the organisms. Laboratory studies emphasize collection, analysis, and interpretation of data from field and lab experiments, and are designed to complement concepts discussed in lecture.

**Course Objectives:** You will participate in 3 semester research projects and will report your findings in scientific papers. By the end of the semester, you will be able to:

- evaluate & use basic ecological research techniques.
- design & implement an ecological study.
- analyze & interpret data collected from such a study.
- maintain a professional field/lab notebook.
- write a scientific paper suitable for publication in a professional scientific journal.

**Learning Outcomes/Assessment:** The following is a list of the learning outcomes for this course and how each will be assessed:

- **Outcome:** Students will develop critical thinking, scientific reasoning, and quantitative reasoning skills in the design, analysis, and interpretation of ecological studies. **Assessment:** Students will report the findings of their research in a scientific paper.
- **Outcome:** Students will develop the ability to communicate clearly and effectively through the written word by reporting the results of their research. **Assessment:** Scientific research papers.

- **Outcome:** Students will develop the ability to understand and respond to issues of local, national, and global significance through conservation-related research. **Assessment:** Scientific poster and research paper.

**Required Texts:** Cigliano, J.A., 2002. *Ecology Field & Laboratory Manual*.

**Other Required Materials:** Bound notebook suitable for fieldwork, pen with waterproof ink or pencil.

**Class Attendance:** Regular attendance is **mandatory**, as well as arriving to lab on time. Your final grade will be reduced 10% for each missed lab.

**Late Assignments:** All assignments are due on or before their due dates. The grades for an assignment turned in late will be lowered by **10 points** of the original value for each day the assignment is late. No assignment will be accepted once it has been returned to the rest of the class.

#### **Assignments & Grading:**

- Laboratory exercises will consist of both lab and field research projects. These projects are designed to introduce ecological techniques and concepts while answering specific research questions. To be a competent ecologist (or any scientist) you need to understand how to ask questions and how to apply and execute appropriate research methods.
- Written reports (paper and poster) will be required for each research project. Posters will follow the standard format. Papers will follow the format of the journal *Ecology*. It is strongly suggested that you refer to the sections *Written Report Format* and *Poster Report Format* in the laboratory manual for instructions on the proper format for each. While your research will be a group effort, each researcher will be required to submit her **own** paper and poster. Obviously each paper and poster will be based on the same data and you should work together on the analysis and interpretation of your data but each student must write her own paper and poster.

**All papers must be submitted by email as a MS Word attachment. For posters, each student will submit electronically a “thumbnail” of the poster (MS PowerPoint slide) and each section as separate documents (either MS Word or MS PowerPoint). All students are required to use their Cedar Crest College email account. I will not accept attachments from non-Cedar Crest accounts and, due to privacy issues, will not respond to emails from non-Cedar Crest accounts.**

**A minimum of THREE references is required for each paper and poster.** Two of these must be primary research articles and only **one source can be from the Internet**. This relates to Internet published sources. Sources that are published in the traditional manner (i.e., on paper) that are available online are not considered Internet based. Papers should be 5-8

pages in length (double-spaced, 2.54 cm (1 inch) margins, 12 pt. Times font) and must be typed. Hand written papers will not be accepted. Fonts for posters will vary depending on the section of the poster. This will be discussed in lab.

**A draft of each paper is required.** These drafts will be graded and returned with suggested corrections. **A final draft will also be required of each paper and poster.** Drafts must be complete– incomplete drafts will not be accepted and a 0 will be entered for a grade.

**Attached is the evaluation checklists that will be used to grade your papers and poster.**

It is strongly suggested that you begin writing the papers and poster at the start of each study. You will find it difficult to keep to the schedule for submitting drafts unless you start writing them at the beginning of each study. You can write the Introduction, Material and Methods, and most of the Literature cited sections even before you begin the study.

- Field/lab notebook. You will keep a field/lab notebook and will submit the notebook at the end of the semester. **REFER TO THE LAB MANUAL FOR PROPER FORMAT.** These will be graded on format (10 pts.), completeness (20 pts) and clarity (20 pts).

#### Grading:

| Assignment            | Points     |
|-----------------------|------------|
| Drafts                | 130        |
| Final Papers & Poster | 390        |
| Field/Lab Notebook    | 50         |
| <i>Total</i>          | <i>570</i> |

**Extra-credit Policy:** No extra credit assignments will be given.

**Final Grade:** Final grades will be calculated as follows:

| Grade | Total Points |
|-------|--------------|
| A     | 530          |
| A-    | 513          |
| B+    | 496          |
| B     | 473          |
| B-    | 456          |
| C+    | 439          |
| C     | 416          |
| C-    | 399          |
| D+    | 382          |
| D     | 359          |

|   |         |
|---|---------|
| F | <358.99 |
|---|---------|

The above are minimum points needed for each grade. Grades are calculated as a range, *e.g.*, a B=473-495.99. *Grades will not be curved or rounded up.*

**Honor Code:** The instructors fully support the Cedar Crest College Honor Code and the Classroom Protocol code as stated in the Student's Guide Book (Section A.I).

**Plagiarism:** Plagiarism is a serious offense. In academia, few offenses are considered more serious. As such, we fully support the College's policy on plagiarism. **Please see the Student's Guide (Section A.I) for a definition of plagiarism and the College's policy on plagiarism.** Students who are found to have committed plagiarism will either be required to redo the assignment or will get an F for that assignment, depending on the severity of the offense. Under certain situations, those who have committed plagiarism may be suspended or expelled from the College. All cases will be reported to the Provost.

**College Accommodations Policy:** Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.

### Lab/Field Schedule

| Date*                   | Study  |
|-------------------------|--|
| 4/6 September           | <i>NO LAB – LABOR DAY</i>  |
| 11/13 September         | Wildlands Vegetation and Insect Surveys**  |
| 18/20 September         | Wildlands Vegetation and Insect Surveys continued**  |
| 26/28 September         | Wildlands Vegetation and Insect Surveys continued**  |
| 2/4 October             | Intraspecific & Interspecific competition lab set up   |
| 9/11 October            | <i>NO LAB - FALL BREAK / WILDLANDS DRAFT DUE IN LECTURE 13 OCTOBER</i>                             |
| 16/18 October           | Biotic and Abiotic Factors of a Boreal Bog **  |
| 23/25 October           | Biotic and Abiotic Factors of a Boreal Bog continued **or Poster Construction Party & Bog Analysis |
| 30 October / 1 November | Collect competition data / Competition Data Analysis discussion / <i>WILDLANDS FINAL DRAFT DUE</i> |
| 6/8 November            | Biotic and Abiotic Factors of a Boreal Bog continued** or Poster Construction Party & Bog Analysis |
| 13/15 November          | Poster Construction Party & Bog Analysis/ <i>Competition Draft Due</i>                             |
| 20/22 November          | NO LAB – TURKEY DAY  |
| 27/29 Nov               | OPEN / <b>Bog Poster Due</b>   |
| 4/6 December            | <i>Final Competition Draft Due; FIELD/LAB NOTEBOOKS DUE</i>  |

\*Note: dates may change to take into account weather conditions. We will announce any corresponding changes in due dates.

\*\* Outdoor labs, dress appropriately.

†Field trip. No assignment

## Paper Evaluation Checklist

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**Drafts:** Each check box equals 1 pt. except where noted (total : 65 pts.)

**Final paper:** Each check box equals 2 pts. except where noted (total: 130 pts.). An extra 2 pts. (*i.e.*, 4 pts.) will be deducted for each box that is not checked for the draft and is not checked for final paper.

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### General

- ☐ Report is of appropriate length, double-spaced, 2.54 cm (1 inch) margins, and 12 pt. Times font **(3 pts)**
- ☐ All information in introduction and discussion is relevant to study **(4 pts)**
- ☐ Author demonstrated overall understanding of study **(4 pts.)**

### Title

- ☐ Descriptive and concise

### Authors

- ☐ Writer is first author, research partners(s) second (third, etc.) author

### Abstract

- ☐ 250 words or less
- ☐ Written in past tense
- ☐ Contains purpose of experiment' clearly stated and is correct
- ☐ Contains brief description of methods
- ☐ Contains results
- ☐ Contains conclusions and significance

### Introduction

- ☐ Contains background introduction from the literature.
- ☐ Selected references relevant to study.
- ☐ Citation format is correct.
- ☐ Citations are paraphrased. Quotation marks are not used.
- ☐ Objectives/hypothesis of study are correctly and clearly stated.
- ☐ Justification is given for hypothesis; clearly stated and correct

### Materials and Methods

- ☐ Materials are *NOT* listed separately
- ☐ Written in paragraph form (not listed like steps in a recipe)
- ☐ Written in past tense.
- ☐ Contains all relevant information to enable reader to repeat the experiment.

### Results

- ☐ Figures and/or tables are present
- ☐ Figures are numbered in the order in which they are discussed in the text.
- ☐ Figure captions are below the figure and are the proper format.
- ☐ Tables are numbered in the order in which they are discussed in the text.
- ☐ Table captions are above the table and are the proper format.
- ☐ Figure and table captions adequately describe the data being presented.
- ☐ Table format is correct.
- ☐ The results are summarized and reference is made to each table and figure. (3 pts.)
- ☐ Results are relevant to hypothesis and predictions
- ☐ Results and analysis are correct and appropriate
- ☐ References that suggest statistical analysis are only made when statistical analysis have been conducted (e.g., references to “significance,” “correlation,” etc.).
- ☐ Written in past tense.
- ☐ No explanation is given for the results.

### **Discussion**

- ☐ Results are briefly restated
- ☐ The conclusions/interpretations are justified given the data/results.
- ☐ The significance of the results is explained.
- ☐ References cited
- ☐ Discussion flows from introduction and puts study into broader context (3 pts)
- ☐ Factual results are distinguished from speculation and interpretation

### **Literature Cited**

- ☐ There is a minimum of 3 references, with no more than one from the Internet.
- ☐ At least two of the references come from the primary literature
- ☐ Reference format is correct and complete.
- ☐ All references were cited in the text. All citations in the text have been included in the Literature Cited Section.

### **Convention**

- ☐ Provide the scientific names of all organisms in text of article when first mentioned. Common names may be used when convenient after stating the scientific names.
- ☐ Genus names must be spelled out the first time they are used, but may be abbreviated to a single letter thereafter if no confusion will result.
- ☐ Genus name is capitalized, specific epithet is in lower case, and scientific names are italicized
- ☐ Units of measure must conform to the International System of Units (SI), i.e., metric

### **Writing**

- ☐ Writing is efficient
- ☐ Writing is formal and appropriate for scientific papers
- ☐ Paper is well organized

- ☐ Writing is clear; concepts are explained and defined when first appear
- ☐ Paper is organized correctly; information put into appropriate section (e.g., results not in methods)



# Report Evaluation Checklist

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Each check box equals 2 pts. unless otherwise noted (total: 130 pts.).

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## General

- ☐ Overall aesthetics: poster is readable from 3 m, attracts readers and holds the attention of readers **(8 pts)**
- ☐ Appropriate font and font size for each section (title, author and affiliation, section headings, text, etc.) **(8 pts.)**
- ☐ All information in introduction and discussion is relevant to study **(8 pts)**
- ☐ Author demonstrated overall understanding of study **(8 pts.)**

## Title

- ☐ Descriptive and concise

## Authors

- ☐ Writer is first author, research partners(s) second (third, etc.) author

## Abstract

- ☐ 250 words or less
- ☐ Written in past tense
- ☐ Contains purpose of experiment' clearly stated and is correct
- ☐ Contains brief description of methods
- ☐ Contains results
- ☐ Contains conclusions and significance

## Introduction

- ☐ Brief (1-2 paragraphs)
- ☐ Contains background introduction from the literature.
- ☐ Selected references relevant to study.
- ☐ Citation format is correct.
- ☐ Citations are paraphrased. Quotation marks are not used.
- ☐ Objectives/hypothesis of study are correctly and clearly stated.
- ☐ Justification is given for hypothesis; clearly stated and correct

## Materials and Methods

- ☐ Organized as bulleted list **(3 pts.)**
- ☐ Contains all relevant information to enable reader to repeat the experiment.

## Results

- ☐ Figures and/or tables are present, readable and clear
- ☐ Figure captions are below the figure and are the proper format.
- ☐ Table captions are above the table and are the proper format.

- ☐ Figure and table captions adequately describe the data being presented.
- ☐ Table format is correct.
- ☐ Results are relevant to hypothesis and predictions
- ☐ Results and analysis are correct and appropriate
- ☐ References that suggest statistical analysis are only made when statistical analysis has been conducted (e.g., references to “significance,” “correlation,” etc.).
- ☐ Written in past tense.
- ☐ No explanation is given for the results.

### **Discussion**

- ☐ Brief
- ☐ Results are briefly restated
- ☐ The conclusions/interpretations are justified given the data/results.
- ☐ The significance of the results is explained.
- ☐ References cited
- ☐ Discussion flows from introduction and puts study into broader context (**3 pts**)
- ☐ Factual results are distinguished from speculation and interpretation

### **Literature Cited**

- ☐ There is a minimum of 3 references, with no more than one from the Internet.
- ☐ At least two of the references come from the primary literature
- ☐ Reference format is correct and complete.
- ☐ All references were cited in the text. All citations in the text have been included in the Literature Cited Section.

### **Convention**

- ☐ Provide the scientific names of all organisms in text of article when first mentioned. Common names may be used when convenient after stating the scientific names.
- ☐ Genus names must be spelled out the first time they are used, but may be abbreviated to a single letter thereafter if no confusion will result.
- ☐ Genus name is capitalized, specific epithet is in lower case, and scientific names are italicized
- ☐ Units of measure must conform to the International System of Units (SI), i.e., metric

### **Writing**

- ☐ Writing is efficient; not overly wordy for poster
- ☐ Writing is formal and appropriate for scientific poster
- ☐ Poster is well organized; information flows from top left to lower right (**5 pts.**)
- ☐ Writing is clear; concepts are explained and defined when first appear