

Course Syllabus

BIO 449, Ecology Laboratory

Term I, 2006/07, 2 credits

Instructor: Stokes S. Baker, Ph.D.

Location: LS307 Ford Life Science Building

Lab. Times: Thursday, 2:00PM to 4:50 PM

Office Hours: 12:00 to 1:00 PM, MWF; 2:00 to 3:00, TR

(Additional hours by appointment, or **just drop by**)

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Optional Text: Dretzke, B.J. 2005. Statistics with Microsoft® Excel, 3rd ed. (Prentice Hall, Upper Saddle River, NJ).

Description:

A laboratory course designed to introduce students to experimentally derived concepts in ecology. Ecological principles presented in Bio448 will be demonstrated by collecting and analyzing experimental data. Topics covered and methods used include statistical methods to analyze biological data, phenotypic plasticity, heterotrophic succession, soil chemistry and nutrient cycling, symbiosis, nitrogen fixation, natural selection, food chains and global atmospheric change. Upon completion of this course, the student will be able to:

- design an ecological study using the scientific method
- perform appropriate searches of the scientific literature
- perform appropriate statistical analysis of data
- write scientific research papers

Instructional methods:

This laboratory course is a unique experience because the answers to the questions being asked are not known. In other words, this is real research. Because of this, the instructional methods will be different from those you have experienced in other laboratory courses. First, written instructions will provide an outline on how to accomplish goals, but will not provide specific procedures. Thus, you and your classmates must develop and agree upon specific procedures. Second, to accomplish our goals (schedule below) the class will need to delegate tasks to specific students. Thus, it is important that you and your classmates work together to develop effective strategies and procedures to accomplish the goals. This method of instruction is known as cooperative learning. Finally, to foster critical scientific thinking, students will present and discuss preliminary data analysis in class before writing their formal research reports.

Prerequisites:

MTH131 or MTH140 and Bio290. You will be expected to perform statistical analysis for your lab reports. The techniques required **will be** taught in this course. Thus, you will need to be proficient in algebra and have a basic understanding of the concept of probability.

Computer usage:

Mathematical calculations and statistical analysis will be facilitated with the use of spreadsheets. Instructions on the use of spreadsheets will be for the university's official spreadsheet, Microsoft® Excel. This program can be found in all the computers in the university's computer labs.

By being a student at the University of Detroit Mercy (UDM) you have Internet access through the university's computer labs. You are required to have an active Email account (either a university

account or a private account). I also assume you know how to use Internet browsers. If you do not know how to use these programs, please feel free to talk to the instructor.

Internet Resource	URL
Course web page on Blackboard™:	http://knowledge.udmercy.edu

Tentative* Schedule:

Date	Activities
Week 1	Writing a research paper Phenotypic plasticity
Week 2	Phenotypic plasticity continued: Statistical techniques: measuring a population parameter
Week 3	Phenotypic plasticity continued:
Week 4	Lab report due: Phenotypic plasticity lab report due CO ₂ effects on primary and secondary productivity in an aquatic ecosystem
Week 5	Evolution: Natural selection of alcohol resistance in <i>Drosophila</i> Productivity lab continued
Week 6	Lab report due: Rewrite of phenotypic plasticity lab report Wood anatomy and species' niches Productivity lab continued
Week 7	Start effects of CO ₂ on primary and secondary productivity in an terrestrial ecosystem
Week 8	Lab report due: Wood anatomy and species' niches Completion, CO ₂ effects on primary and secondary productivity in an aquatic ecosystem
Week 9	Start Nitrogen fixation by <i>Rhizobium</i> and ecosystem productivity
Week 10	Lab report due: CO ₂ effects on aquatic ecosystems Completion: Start effects of CO ₂ on primary and secondary productivity in an terrestrial ecosystem
Week 11	Behavioral ecology of mouse response to scents from predators
Week 12	Lab report: Effects of CO ₂ on primary and secondary productivity in an terrestrial ecosystem Completion: Nitrogen fixation by <i>Rhizobium</i> and ecosystem productivity
Week 13	Lab report due: Mouse ecology Possible field trip
Week 14	Lab report due: Nitrogen fixation by <i>Rhizobium</i> and ecosystem productivity Completion: Natural selection of alcohol resistance in <i>Drosophila</i>
Week 15	Oral Presentation: Natural selection of alcohol resistance in <i>Drosophila</i>
Swing lab**	Population sampling

*The laboratory schedule is tentative. I cannot control the organisms, equipment breakdown, etc..

**Denotes an alternative laboratory exercise due to inclement weather.

Important Dates

- The University's calendar can be found at the following web address:
http://www.udmercy.edu/academics/acad_cal.htm
- Exam and laboratory schedule can be found in the table entitled, "Laboratory Schedule".

January 8

Classes Begin

January 12	Last Day to Declare Audit or Pass/Fail Option
January 15	Martin Luther King, Jr. Holiday (No classes/Offices Closed)
January 16	Last Day to Add a Class
February 2	Last Day to Drop a Class without a "W"
February 27	Mid-term grades Due from Faculty
March 5-10	Mid-Winter/Spring Break (No classes/Offices Open)
March 30	Last Day to Withdraw from Class for Winter
April 6-8	Easter Recess - University Closed
April 23-28	Final Exam Week

Grading:

Your grade will be based on your performance on six laboratory reports. There are 600 points in the course. The tentative due dates are listed in the above schedule. Only the first lab report will have an optional rewrite.

Attendance and class participation:

This laboratory involves group activities. If you do not participate or collect data at the appointed time, the entire class suffers. Absences are only permitted due to legitimate reason, such as serious illness. All non-legitimate absences will be penalized by reducing scores by 20 points per absence from your laboratory report. If you do not collect data at an appointed time, 10 points will deducted your grade.

Laboratory Reports:

You will be writing formal laboratory reports containing the following sections. Details will be described in a separate handout.

Introduction: A short introduction to the experiment you performed. There should be enough information to let someone else not familiar with the experiments understand what questions you were addressing (i.e., your hypothesis), and why you were asking them.

Materials and Methods: A concise description of the study site where the experiments were performed, the materials collected and/or used, and the methods employed. There should be enough information and detail to allow another scientist to repeat your experiments and obtain similar results.

Results: A concise description of the results you obtained from your investigation. This is where you present the facts.

Discussion: This is where you get to explain what your results mean and their significance. This is where you get to present your opinions and conclusions.

Literature Cited: The sources of information you used and cited in the paper.

Late Policy:

For each day that a laboratory report is late, 5 points will reduce the grade.

Grades:

You are guaranteed the following minimum grades based upon the following percentile scale:

A = 95 to 100%	A- = 94 to 90%	
B+ = 89 to 85%	B = 84 to 80%	B- = 79 to 75%
C+ = 74 to 70%	C = 69 to 65%	C- = 64 to 60%

D+ = 59 to 55%	D = 54 to 50%	
F = 49 to 0%		

To calculate your grade, use the following formula: $\% = (\text{points received} / \text{points possible}) \times 100$

Class Cancellation Policy:

Class will only be canceled if the President's office closes the university. If data presentation or laboratory reports were due, they will be due the following class period.

Laboratory Safety

- 1) Eating, drinking, and the application of cosmetics or medications are not permitted in the laboratory.
- 2) You must wear shoes that completely cover your feet (i.e., no sandals). Canvas shoes are not permitted.
- 3) You will be using some chemicals that are potentially dangerous. When instructed to, you will be required to wear laboratory safety equipment (i.e., chemical splash goggles and aprons).
- 4) Lab cleanliness is a safety issue. No trash is permitted in the sinks. In the past, people have been cut due to hidden glass. Additionally, paper is a fire hazard. You will not be allowed to leave the room until all lab tables and work areas are clean.
- 5) All glass is to be thrown in a designated glass bucket. NEVER place glass in the regular trash. The janitors may cut themselves when emptying the canisters.
- 6) Whenever you work with microorganisms, the work area is to be washed with disinfectant when you are finished.
- 7) Many normally safe microorganisms are potential pathogens to people with seriously compromised immune systems. For your own safety, any student with **seriously** compromised immune systems (e.g., being treated for cancer, taking antigrift-rejection drugs, HIV positive, taking steroidal drugs [antihistamines are OK]) should inform the instructor, though you do not need to disclose the nature of the condition. Alternative laboratory activities will then be assigned. Any such information will be kept in strict confidence. (NOTE: By law, you are not obligated to disclose this information to the instructor.)
- 8) No pipeting by mouth.

Courtesy

1. You must be courteous to your fellow classmates, teaching assistant and instructor. To this end, talking during lectures is not permitted. If you are disturbing others in class, the instructor will require you to leave the laboratory.
2. You will place materials back in their proper places. It is disrespectful to expect the teaching assistant or instructor to clean up after you.

Academic Integrity

I expect you to follow the norms of academic conduct. You will adhere to the policies outlined in Appendix A of the 2006/07 Student Handbook of Policies and Procedures. I recommend that you read this appendix. Students caught plagiarizing or cheating will received a grade of zero for that assignment.

Though you will be working together during the laboratory session, and sharing data, you are expected to **independently** perform your own data analysis, perform you own library research, and write your own research reports. Thus, the following activities are considered cheating:

1. sharing of outputs from computer programs (If you copied the file, it is not your own work!)
2. copying materials from other students lab reports
3. borrowing passages or ideas from other sources without citing the sources.