

E475 ~ Techniques in Environmental Science ~ Spring 2003

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Classroom Lecture: Tuesday, 1:00 pm to 2:15 pm, SPEA 270.

Lab: TBA.

Field labs always meet at SPEA loading zone (east end of SPEA parking lot).

Texts: A Handbook of Biological Investigation, by H.W. and K.P. Ambrose.

Prerequisites: E272 or H316

Equipment

A laboratory or field notebook is absolutely required. Always bring your notebook on field trips and bring a pencil to take notes – ink will smear if it rains. Wear sturdy shoes, bring rain gear and other protective clothing for inclement weather when necessary. Water, snacks, sunglasses, first aid supplies, binoculars, a magnifying lens, etc, may also be helpful.

Course Description

E475 is a course that exposes students to a variety of research topics and techniques used in the environmental sciences. Students will gain knowledge AND skills applicable to professions in the environmental sciences by actively participating in research experiences and demonstrations, scientific report writing and discussions of current literature in environmental science journals. Topics will include approaches to research design, hypothesis testing and data collection, analysis and interpretation. Students will also participate in laboratory and field sessions that employ different equipment and methods to examine different aspects of the environment.

Course Objectives

By the end of E475, each student should have an experienced-based and theoretical-based concept of how the scientific method is applied to measuring and monitoring physical, chemical and biological aspects of the environment. Students should:

1. Be familiar with and/or knowledgeable of several basic field and laboratory techniques used in the environmental sciences;
2. Maintain accurate and dependable field and laboratory notes;
3. Demonstrate competence in several basic field and laboratory techniques used in the environmental sciences by actively engaging in such techniques and by expressing results with standard scientific reporting (both written and oral);
4. Understand the relationship between scientific theory and practice.

Expectations, Policies and Grading:

- ◆ Please complete all reading assignments prior to attending labs.
- ◆ Assignments are due as shown in the schedule, however, this schedule is subject to change, based on weather and/or availability of guest lecturers. **I do not accept late assignments**, except in the case of a genuine emergency where proper documentation is required. If you anticipate a serious conflict that prevents you from completing an assignment on time, please come to my office hours (TBA), or call me (855-1600), or

e-mail me (mlaney@indiana.edu) at least 24 hours before the assignment is due. You may call me at home (323-9919) before 10 PM. Excused late assignments will lose 5% of the total points of the assignment per day of lateness..

- ◆ Written assignments must be typed, concise and organized. A poorly written report will not receive full credit. Graphs must be neatly constructed by computer. The structure of reports should follow traditional publication format (title, abstract, introduction, methods, results, discussion/conclusions, references). See Ambrose and Ambrose.
- ◆ Do not exceed maximum length requirements of assignments.
- ◆ References MUST be cited within the text of your report and included in the references section. Plagiarism in any form WILL NOT be tolerated. If it is determined that academic dishonesty has occurred, an “F” will be given for the course. Please refer to the Code of Student Ethics for descriptions of academic dishonesty. Please see <http://campuslife.indiana.edu/Code/index.html> for an online copy of the code.
- ◆ Material from the internet is not allowed as a primary source. It is not peer-reviewed, therefore, anyone can publish anything! While the internet can be a rich information source, such material is acceptable as a supplemental source only.
- ◆ Students are encouraged to work together in the lab and field exercises and to discuss methods and results, however students MAY NOT work together on final reports unless directed to do so by the instructor. Each assignment must be an original work by individual students unless otherwise specified.
- ◆ Lecture and lab attendance is expected. The participation grade is based on attendance; unexcused absences will be reflected in a lower participation grade. All students are allowed only TWO unexcused absences during the semester.

Final grades will be based on the following assignments (due dates are indicated in parentheses):

<i>Assignments</i>	<i>Points</i>
Hypothesis Testing Exercise (February 7)	50
Planarian Toxicology Report (February 21)	100
Waste Report (March 7)	100
Natural Resource Management Report (March 28)	100
Research Project Topic Due (April 1)	25
Coal Leachate Report (April 11)	100
Wetland Delineation Report (April 25)	100
Research Project (May 2)	150
Research Project Presentation (May 2)	100
Lab/field Notebook Checks (3)	75
Participation	50
<i>Total Points</i>	<i>950</i>

Other important dates:

- Lab notebook Check 1 – February 11.
- Lab notebook Check 2 – March 11.
- Lab notebook Check 3 – April 15.
- Choose research project groups – March 25.
- Choose research project topic – April 1.

Session One - Basic Tools for Practicing Environmental Science

- Week One
Basic Tools for Practicing Environmental Science
T 1/14 Goals and expectations of class, notebook upkeep, introduction to the scientific method.
R 1/16 Experimental design, data collection and measurements. SPEA 275.
Reading: Chapters 1, 2 & 5 Ambrose, Handout 1
- Week Two
T 1/21 Theoretical overview of hypothesis testing and statistical methods.
R 1/23 Practical overview of hypothesis testing and statistical methods using Excel. SPEA 151.
Reading: Chapters 3, 6 & 7 Ambrose, Handout 2
- Week Three
T 1/28 Putting everything together - creating a scientific report.
R 1/30 Graphing in Excel. SPEA 151.
Reading: Chapters 8 & 10 Ambrose

Hypothesis Testing Exercise due Friday, February 7 in Melissa's mailbox

Session Two - Planarian toxicology

- Week Four
T 2/4 Introduction to environmental toxicology and planarian biology.
R 2/6 Planarian observations and dosing. SPEA 375.
Reading: "R"
- Week Five
T 2/11 Dose-response curves.
Turn in lab notebook for Check 1.
R 2/13 Planarian observations. SPEA 375.
Reading: "R"

Planarian Toxicology Report due Friday, February 21 in Melissa's mailbox

Session Three – Waste management

- Week Six
T 2/18 Landfill design and construction.
R 2/20.
Reading: "R"
- Week Seven
T 2/25 Wildlife exposure monitoring.
S 2/29 Anderson Road landfill.
Reading: "R"

Waste Report due Friday, March 7 in Melissa's mailbox

Session Four - Natural Resource Management Techniques

- Week Eight
T 3/4 Techniques for estimating wildlife populations.
R 3/6 Yellowwood State Forest transect & Brown County State Park transect.
Reading: "R"

- Week Nine
T 3/11 Public management techniques.
Turn in notebook for Check 2.
R 3/13
Reading: "R"

Natural Resource Management Report due Friday, March 28 in Melissa's mailbox

Session Five - Effects of coal mining on stream environments

- Week "Ten" - SPRING BREAK - Enjoy!
- Week Ten
T 3/25 Contaminants from acid mine drainage (AMD) and coal mining.
R 3/27 IU's coal storage facility → could still possibly complete during class.
Reading: "R"
- Week Eleven
T 4/1 Theory of atomic absorption spectroscopy (AAS). ???
R 4/3 Analysis of coal storage facility samples for Fe and Mn. SPEA 375.
Reading: "R"

Coal Leachate Report due Friday, April 11 in Melissa's mailbox

Session Six - Wetland delineation

- Week Twelve
T 4/8 Introduction to wetlands.
R 4/10 Yellowwood State Forest Jackson Creek area.
Reading: "R"
- Week Thirteen
T 4/15 Wetland delineation techniques.
Turn in notebook for Check 3.
S 4/19 Yellowwood State Forest Jackson Creek area.
Reading: "R"

Wetland Delineation Report due Friday, April 25 in Melissa's mailbox

Session Seven – Project work, conclusions and presentations

- Week Fourteen
T 4/22 Presentation tips and expectations.
R 4/24 **NO LAB** – Project work week.
- Week Fifteen
T 4/29 Class conclusions and evaluations.
R 5/1 Project presentations.

Research Project due Friday, May 2 in Melissa's mailbox

- ◆ Finals Week: *No final exam!*
T 5/6 We will meet during our scheduled final exam time to finish project presentations, if necessary.