

**ENVR112L:  
Environmental Science Laboratory  
Fall 2013**

<b><u>Instructor</u></b>	<b><u>Phone</u></b>	<b><u>E-mail</u></b>	<b><u>Office</u></b>
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<b><u>Office Hours:</u></b>	Mondays	1:00 – 2:00 PM
	Wednesdays	9:00 – 10:00 AM
	Thursdays	1:30 – 2:30 PM
	Fridays	9:00 – 10:00 AM

*I can also meet with you at other times, but please make an appointment ahead of time.*

**Class Meeting Times:**

Tues/Thurs 10:20 AM-11:30 AM  
117 PPHAC

**Scheduled Final Period:**

Friday, December 13<sup>th</sup>, 1:30PM

**Lab Meeting Times:**

Tuesdays: 12:45 – 3:45 PM

301 Collier Hall of Science

**Required books:**

- Wright, R.T. and Boorse, D.F. *Environmental Science: Toward a Sustainable Future*, 12<sup>th</sup> ed. Boston: Benjamin Cummings, 2014.
- Laboratory notebook for laboratory portion of the course. The notebook should be bound with numbered pages and the pages should contain grids (i.e. look like graph paper).

**Course description:**

As is the case with most scientific laboratory courses, students are involved in hands-on learning experiences that complement the lecture courses. By actually “doing science” rather than just hearing or reading about it, students typically get a better sense of what science is all about, develop a better comprehension of concepts discussed in lecture, and gain a sense of satisfaction of obtaining data and coming to conclusions about information they generate.

In this particular course, the focus will be on exposing you to:

- The scientific method and experimental design;
- The importance of observations and experimental design in the laboratory *and* in the field.
- Critical analysis of observations, data and conclusions; and
- Experimental approaches used in the interdisciplinary field of environmental science as well as other activities that should help you gain an appreciation for the scientific way of learning.

I will typically post information about the lab activity for the week on either the Friday or Monday preceding our Tuesday lab meetings. Please check Black Board for this information and read the materials prior to coming to lab.

**Of key importance in the lab:**

1. Safety;
2. An understanding of the principles underlying the experiments and other activities;
3. Attendance and participation;
4. Asking questions; and
5. Good record keeping and observation skills!

***Lab Safety Policies:***

1. Safety is one of the topics for the first laboratory session, but can never be over-emphasized. Never underestimate the potential for an accident to occur or the possible dangers that chemicals or certain laboratory activities pose to human health and safety.
2. Know the proper procedures to follow directions for the safe handling of all chemicals. I will review these at the beginning of any lab session in which we work directly with chemical reagents.
3. Goggles are a must for some of the experiments that we will do. (*Goggles are to protect your eyes – so don't do any good if they are not worn or worn around your neck!*)
4. No one will be permitted in the laboratory if they are wearing shorts, midriff tops, or sandals.
5. No food or drink is permitted in the laboratory. Of course, smoking is out as well!
6. Note that the laboratory contains many safety features; be sure to know the location of the eye wash stations, safety shower, fire extinguishers, first aid kit and nearest telephone – just in case!
7. Never perform unauthorized experiments.
8. Handle glassware carefully.
9. Safe practices will be reviewed throughout the semester. It is expected that each student will take safety seriously and practice good laboratory techniques.
10. On field trips, please follow the specific safety guidelines given for each specific site. Wearing appropriate footwear (e.g. good walking/hiking shoes or boots) and dressing for the weather are both important. Hats, sunblock, and insect repellent may be needed.

***Other Laboratory Policies: (The important “list of rules”)***

1. It is important to keep the lab clean and organized. At the end of each laboratory, you are responsible for making sure that all materials and equipment are returned to the correct location and that the lab has been left clean for the next class.
2. It is expected that you read the laboratory materials (e.g. lab separates) **BEFORE** coming to lab each week. I will typically distribute these either in lecture or via the Blackboard site for the course. I will often assign some sort of pre-lab exercise to be completed prior to coming to lab and that must be submitted within the first five minutes of the laboratory period. Assignments from the previous week will also be due at the beginning of the class. **LATE WORK WILL NOT BE ACCEPTED.**
3. All students will enter data, observations, etc. in laboratory notebooks. All the data collected in the laboratory must be **entered directly in ink**. Each student is expected and required to work individually when writing and recording in their notebook, even though data may be collected cooperatively with a partner or a small group during the experiment.

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4. Science laboratory courses are meant to both give you hands-on experience in relevant laboratory procedures and techniques and to reinforce concepts from lecture courses. Science is about learning and *doing* – so it is expected that every student actively participate in the laboratory course.
5. Academic integrity is of utmost importance and cheating will not be tolerated. You have already read and signed the Academic Honesty Policy that I distributed in lecture. This policy applies to the laboratory portion of the course as well. **Note:** Even when you work on an experiment in groups, each student is expected to write up their own post-lab work. It is perfectly acceptable to discuss the data and assignment with others in the group or larger class, but I ask that you then work independently on the actual write-up of the report or whatever type of assignment I give.
6. **ALTERATION OF EXPERIMENTAL DATA WILL ABSOLUTELY NOT BE TOLERATED.** The elimination of any data from a table or graph must be noted and fully justified. The discussion of the data and the explanation of data that does not correlate with the expected results is more important than having the "right answer".
7. Missed Labs: Lab periods should not be missed except under extreme circumstances and it will be almost impossible to make up lab sessions.
8. Most experiments will be performed in small groups. Participation and cooperation by each group member is essential to complete the experiments on time. Division of labor is often a good idea. Group members must be able to work together and communicate with each other. You may meet with others in the group or with other class members to discuss the experiment and interpret the results, but your assignments and lab reports must be individually prepared. It is your responsibility to obtain all of the necessary data and enter it into your notebook before leaving the lab for the day.
9. Please do not remove any items from the laboratory.
10. Please don't use cell phones during the lab period!
11. Food, drinks, water bottles are not permitted in the lab. This is an externally mandated safety regulation. When we go on field trips, you may bring food and should bring water along.
12. For the various field trips, there will be a number of safety issues to consider. A must is good shoes for hiking with sturdy soles and ankle support. Sandals or open-toed shoes are not allowed, period.

### ***Laboratory Assignments and Grading:***

I will provide specific details regarding my expectations during the first lab session and throughout the semester. For instance, feedback from graded reports and assignments should be utilized to make corrections, modifications and improvements on subsequent work submitted.

As noted above, data, observations, etc. are entered directly into laboratory notebooks in ink. For some experiments, a formal laboratory report may be required. Alternatively, there may be a quiz or problem set or some other form of assignment to complete. Details will be provided during the weekly pre-lab lecture. Laboratory technique (including safety and clean-up) and participation in the class discussions are also a part of the grade for each laboratory exercise.

Incompletes will be NOT be given, except for extreme circumstances beyond the student's control. The final decision is up the instructor.

As per the syllabus for the lecture portion of the course, the lab grade counts for 20% of the overall course grade. 50% of your lab grade will be based on laboratory and field technique and participation, and 50% will be based on assignments, quizzes, pre-lab exercises and lab reports.

### **WRITTEN LABORATORY REPORTS**

A written formal laboratory report, if assigned for a particular experiment, will be due one week following the completion of an experiment. Not all labs will involve a report and sometimes, an experiment or project may run for more than one week.

#### **LATE LAB REPORTS WILL NOT BE ACCEPTED.**

All reports must be typed using proper grammar, complete sentences and paragraphs. Tables and graphs must be in ink also. Do not use pages from your laboratory notebook for your reports. Reports will be evaluated for their accuracy, completeness, format and quality (including neatness and professional looking graphs and tables). Reports that are written incorrectly or that are incomplete will be returned ungraded. In these cases, you will usually have the opportunity to redo the report after discussing the problems with me.

Manuscripts in scientific journals (not review articles) provide examples of format and content. I highly suggest that you browse through some journals in the library to see what scientific reports are like. Specific guidelines will be given for individual reports, but a general format for your reports follows.

Do not wait until the last minute to write up a lab report. It is easier to start when the procedure and data are still fresh in your memory. That way, if you have questions, you will also have more time to ask me questions. I may not be available to deal with problems of those who wait until the last minute to do their lab reports.

### **GENERAL LABORATORY REPORT FORMAT**

#### **Title Page**

- Include experimental title, date, lab section, and name(s) of experimenter(s).

#### **Introduction**

- The introduction should be a brief explanation of the experimental objectives and the general approach used to address the scientific question. Some theory underlying the experiment should also be included.

#### **Methods**

- The details of the methods should be described in complete sentences (not a list of tasks performed) only as they differ from the methods listed in the text, handout or other reference used. The source of the complete procedure should be formally referenced in the bibliography at the end of the report.
- The methods section, as well as others, are written in the past tense (what was done). Also avoid "first person" usage ("I treated the samples with..."); rather, write using a passive voice ("The samples were treated with.....").

## Results

### Data:

- Tables and graphs of the raw data collected are included in the Results section of a report. The textbook includes instructions on preparing graphs and tables; there are also some examples included in this syllabus. Typically raw data is used to construct preliminary tables and graphs that would not be included in a formal publication, but I would like these included in your reports so that it is easier for me to find errors should they exist.

- Tables and figures should contain legends, should be neat and in ink, and should be titled, numbered, and clearly labeled (including units). Someone unfamiliar with the data and experiment should be able to remove a figure or table from a report and be able to determine the meaning and significance of the information within it without having to refer to the text of the report.

### Calculations:

- Always show a sample calculation for all mathematical data manipulations so that I can check them for accuracy.

### Text:

- Sometimes short explanations or descriptions of the data are included in the Results section, but analysis or interpretation of the data is not included here.

## Discussion

- This section is a summary and explanation of the results in terms of the principles to be learned. Relate the results back to the objective(s) stated in the Introduction. You should explain how the data demonstrates what was predicted or why the data deviates from the expected or literature values. "Experimental error" is not a specific enough explanation, but one that I commonly encounter when grading.

- Any questions asked in the lab handouts should be addressed in the Discussion section of the report.

## References

- All reports should include a list of citations used for the methods, literature values, and theory or analysis included.

**Other Expectations:** See syllabus for lecture portion of the class. In particular, pay attention to the sections on Attendance, Academic Honesty, Appropriate Literature Sources, and the Learning Services Office.

*Best wishes for a great semester!*

*- D. Husic*