



**ENSC 1102.01  
LABORATORY FOR  
ENVIRONMENTAL SCIENCE II  
UNIVERSITY OF HOUSTON – CLEAR LAKE  
SPRING 2017**

**Instructor:** Dr. Gerald D. Pollack

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**Instructor's Office Suite:**

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**Office Hours**

Mondays

Tuesdays:

Wednesdays:

Thursdays:

Fridays:

**Teaching Assistant:**

**TA email:**

**Open Lab Hours:**

**Open Lab Location:** Bayou 3215

**Class Meeting:**

**Course Textbook – REQUIRED:**

Shanholtzer and Hall. 2017. Exploring the Environment. ISBN 978-073807831-1. This lab manual is to be brought to every class meeting.

**Additional Required Materials:**

- Safety glasses (available in the university bookstore)
- Lab coat (available in the university bookstore)
- Shoes for field work (boots, old sneakers, etc., not needed every class meeting)

**Co-requisites:** ENSC 1302

**Applied Critical Thinking Statement**

This course has been authorized by UHCL as an Applied Critical Thinking (ACT) Course which means that in addition to learning about the specified course content, students will be engaged with some or all of the Elements of Thought and Universal Intellectual Standards of critical thinking. The objective of an ACT course is to develop the student's ability to become skilled at analysis and evaluation by applying a set of intellectual tools that may be effectively used across all disciplines (as well as to the student's personal life). Based on the Foundation for Critical Thinking model (<http://www.criticalthinking.org/>), critical thinking involves thinking for a *purpose*, asking *questions*, using *information*, applying *concepts*, drawing *inferences and conclusions*, identifying *assumptions*, anticipating *implications and consequences*, and recognizing *points of view*. The Universal Intellectual Standards that are applied to these Elements of Thought of critical thinking in order to develop Intellectual Traits include *clarity*, *accuracy*, *precision*, *relevance*, *depth*, *breadth*, *logic*, *significance*, and *fairness*.

**Catalog Description:** Laboratory exercises in environmental quality assessment techniques, field sampling techniques and related studies of local environments. Optional and required field trips.

### **Applied Critical Thinking in ENSC 1102**

Critical thinking is best developed through practice using the Elements of Thought and the Universal Intellectual Standards. Critical thinking is integrated into this course through the formulation and testing of hypotheses, evaluation of data validity, and application of concepts in order to improve understanding of environmental problems. Curiosity is central to formulating a hypothesis and then evaluating it and will be assessed throughout the semester through exam questions geared towards your desire to know more. Students are expected to be able to answer central questions such as:

How do scientists gather, interpret, and represent quality data?

How can understanding concepts of toxicology enable us to make better environmental choices?

What role does energy play in the environment?

How do environmental scientists assess water quantity and quality?

How do environmental scientists assess air quality?

Practice of critical thinking within this course includes application of the scientific method. The scientific method is a well-defined procedure for testing logical ideas (hypotheses) with accurate and precise observations. The scientific method begins with asking questions and proposing hypotheses. The hypotheses can be used to make predictions. The predictions are tested through direct observation or experimentation, which generates data. The data is analyzed for relevance, accuracy, precision, and fairness prior to interpretation. Data analysis and interpretation draws inferences and conclusions that either support or refute the hypothesis.

### **Learning Outcomes:**

Upon successful completion of this course, students will:

- Delineate relationships between living and non-living components of biogeochemical systems that comprise the biosphere
- Understand natural resources and relate environmental problems to man's use of these resources
- Communicate a practical understanding of the biology, chemistry and physics that relate to environmental quality and the scientific methods used to measure the pertinent parameters
- Communicate ways of living that minimize environmental problems
- Collect and analyze field data and write reports
- Work with peers to apply content knowledge in problem solving
- Effectively communicate solutions and reasoning to classmates and course instructor

### **Applied Critical Thinking Student Learning Outcomes (ACT-SLO):**

ACT-SLO1: Understand the *PURPOSE* of using **relevant** experiments to evaluate information (hypotheses).

ACT-SLO2: Collect **accurate**, precise, and fair *INFORMATION* (unbiased data).

ACT-SLO3: Draw accurate and **logical** *INTERPRETATIONS AND INFERENCES* (conclusions) from gathered data in order to support hypotheses.

**Vocabulary of Critical Thinking:** In this course, students will learn and use the vocabulary of critical thinking which will include an understanding and use of both the Elements of Thought and the Universal

Intellectual Standards.

**Elements of Thought**<sup>1</sup>: In this course, we will consider and use eight (8) elements of thought:

1. *PURPOSE*: Goals and objectives
2. *QUESTION AT ISSUE*: Problem, issue, and misconception
3. *INFORMATION*: Facts, data, evidence, observations, reasons, and experiences
4. *INTERPRETATION AND INFERENCE*: Solutions and conclusions
5. *CONCEPTS*: Definitions, models, laws, theories and principles
6. *ASSUMPTIONS*: Axioms, presuppositions, and a-priori facts or knowledge
7. *IMPLICATIONS AND CONSEQUENCES*: Inferences, effects, and outcomes
8. *POINT OF VIEW*: Perspectives, frames of reference, and orientations

**Universal Intellectual Standards**: In this course, we will consider and use nine (9) universal intellectual standards including **clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness**. There are four major aspects of the Applied Critical Thinking Process, termed as the 4 C's: curiosity, connections, creativity, and communication. In this course, the predominant C in the student learning objectives is Curiosity.

**Course Format and Requirements:**

This course will consist of face-to-face laboratory activities. Review questions and module assignments will summarize laboratory exercises and be submitted either in hard copy (paper) or electronic format, as designated by the instructor.

**Attendance:** Students who miss lab exercises perform very poorly in this course. The primary objective of any lab course is to provide the student with a “hands-on” experience that will support and illustrate the concepts covered in the lecture portion of the course. Lab is about seeing and doing. Therefore, consistent and timely attendance to lab is a must for success in this course! Lab will start promptly at the scheduled time. Important introductory and safety information will be given at the beginning of each lab. Late arrival to lab will affect your understanding of the entire lab exercise and may pose a safety hazard to you and other students.

Due to logistical and safety concerns, there will be no make-up labs. Any graded materials collected during the missed class, such as assignments and/or review questions, cannot be made up and will be graded as a zero. Students are responsible for understanding all laboratory procedures and any course content covered during their absence. Open lab is provided to students for additional practice using laboratory equipment, acquiring data from missed laboratory experiments (when applicable), and assistance with course content.

**Communication:**

Class communication will be through Blackboard or your UHCL student email account (@uhcl.edu). The class schedule including a list of topics are located on the class calendar in Blackboard (<http://blackboard.uhcl.edu>).

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<sup>1</sup> Paul, R., and Elder, L. (2009). *Critical Thinking: Concepts and Tools* (6th ed.). Tomales, CA: Foundation for Critical Thinking Press Critical Thinking Process.

**Assessment:** Assessment will consist of four in-class tests (non-cumulative), four module assignments, and twelve sets of review questions. Test questions will be mostly short answer, with some calculations and graphing exercises as well.

**Graded Materials:** Review questions are to be submitted within the first 10 minutes of lab and will not be accepted late. Review questions that are not submitted will be assigned a grade of zero. Questions left blank will be graded as completely incorrect unless otherwise instructed. No make-up review questions will be allowed. Only the top 10 grades on review questions will be used to calculate student grades.

Module Assignments will consist of exercises, lab reports, or other activities as the instructor feels fits the needs of the class. The course instructor will notify students of the details concerning each assignment at least two weeks prior to the assignment's due date. All assignments will be used to calculate student grades.

Lab reports will be used to promote Critical Thinking. In your lab reports, you will be graded on the **clarity, accuracy, and precision** of each section, the *INFORMATION* that you produced using **logical** and **fair** data, facts, and observations, the use of *CONCEPTS* through defining laws and principles, and your level of *INTERPRETATION AND INFERENCE* by drawing conclusions. At a minimum each lab report must have:

1. A cover page that includes a **relevant** title.
2. An introduction that provides background *INFORMATION* and identifies the *PURPOSE* and **significance** of the study.
3. A methods section that states the procedure used in the study.
4. A results section that presents the *DATA* gathered in the study. A data table and graph are expected as well.
5. A discussion section that states the **logical IMPLICATIONS AND CONSEQUENCES** derived from the data.
6. A conclusions section that summarizes the *INTERPRETATIONS AND INFERENCES*. Recognition of the *ASSUMPTIONS* is expected. Improvements to the study are to be recommended. Potential extensions of the study to expand its impact or sphere of relevance will be used to demonstrate Curiosity.

Tests will mostly consist of short answer questions that relate to each module. Although tests are not generally considered cumulative, understanding basic data acquisition, graphing, and interpretation is expected. Tests are composed of three sections that relate to each of the exercises covered in the module. Tests are given during the first 80 minutes of the designated lab period. Following the test and a brief break, you are expected to complete exercises related to the next module. As the last test is given during the last lab meeting, there are no additional exercises to complete after it. However, students permitted a make-up test, will complete it at this time. A make-up test will only be permitted, if a student asks for one by email within one week of the original test. As the fourth test occurs in the last class meeting, students asking for a make-up will need to apply for an Incomplete. Upon acceptance of a petition for an incomplete, arrangements will be made for the make-up test. Only one make up test will be granted per term. Students must be on time for their scheduled tests. Students entering class after the test has begun may not have adequate time required to finish the test. Students entering class after the first student has completed their test, will not be permitted to start the test. All test grades are used to calculate student grades.

Individual student assessment levels for each ACT-SLO will be accomplished according to the following scale:

Excellent: 90% and above

Acceptable: 70-89%

Unacceptable: 69% and below

Incomplete: Failure to submit Assignments

Artefacts	Assignment Details	Targeted SLO
Module D Lab Report	Students will be assessed on their ability to:	
	Identify the PURPOSE	ACT-SLO1: Understand the PURPOSE of using relevant experiments to evaluate information (hypotheses).
	Accurately and precisely report INFORMATION	ACT-SLO2: Collect accurate, precise, and fair INFORMATION (unbiased data).
	Logically develop INTERPRETATIONS AND INFERENCE	ACT-SLO3: Draw accurate and logical INTERPRETATIONS AND INFERENCE (conclusions) from gathered data in order to support hypotheses.
Exam Questions	Students will be assessed on their:	
	desire to understand concepts better.	ACT-SLO1: Understand the PURPOSE of using relevant experiments to evaluate information (hypotheses).
	ability to think beyond the confines of the examples.	ACT-SLO3: Draw accurate and logical INTERPRETATIONS AND INFERENCE (conclusions) from gathered data in order to support hypotheses.

**Use of Class Products in Assessment:**

The University of Houston-Clear Lake may use your work in this class to generate assessment data. Any works used will be used only for educational purposes.

**Grade Determination:**

Grading Criteria	Percentage
Tests (4)	60%
Module Assignments (4)	28%
Review Questions (12)	12%
<b>TOTAL</b>	<b>100%</b>

**Grading Scale:**

Final Grades will be given on the university scale:

Letter Grade	Percent Range						
A	100-93%	B	87-83%	C	77-73%	D	67-63%
A-	93-90%	B-	83-80%	C-	73-70%	D-	63-60%
B+	90-87%	C+	80-77%	D+	70-67%	F	60-0%

**Laboratory safety policies and procedures***General Lab Safety*

1. Only students enrolled in the laboratory course are allowed in the laboratory.
2. No one is allowed to eat, drink, smoke, or apply cosmetics while in the lab.
3. Shoes that completely cover the feet are required for lab. Bare feet, sandals, and open-toed shoes are not allowed.
4. Long hair, dangling jewelry, or loose clothing should be tied back or otherwise confined during lab.
5. Desk areas should be kept uncluttered. The tabletop area is not to be used for materials that are not essential to the experiment (e.g., pocketbooks, lecture text books, etc.).
6. Desktops must be cleaned after each laboratory meeting.
7. Lab coats, gloves, and goggles must be worn while working with preserved specimens, hazardous chemicals, or as indicated by your instructor. Students must bring lab coats and goggles to all lab meetings.
8. In the event of any accident, notify the instructor immediately. Do not attempt to clean up broken glass or spilled chemicals yourself.
9. Bandage all cuts on hands before dissecting or using chemical reagents.
10. Small sharp objects such as used slides or small pieces of broken glass should be placed in a Sharps container or other container as indicated by your instructor.
11. No lab material of any kind may leave the laboratory.
12. No students are allowed in the laboratory outside regular laboratory class time or open lab unless a faculty member is present.

13. Know the location of emergency equipment, emergency exit locations, and telephone. Report any condition that appears unsafe or hazardous to your instructor.

14. Wash hands before leaving the laboratory.

15. Microscopes are to be put away properly with scanning objective in place, cord wrapped with Velcro, and mechanical stage is centered so that extended arms DO NOT hit into other scopes or walls of the cabinet.

#### *Chemical safety*

1. Some chemicals used in this laboratory may be absorbed by contact lenses. It is advisable to remove contacts before lab or wear tight fitting goggles during lab exercises that will involve these chemicals.

2. Dispose of all chemical waste in the proper waste container as indicated by your instructor. NEVER pour any chemical down the sink without permission from your instructor.

3. Do not taste chemicals or pipette solutions by mouth, unless specifically instructed to do so by your instructor.

4. Wash your hands if you contact any chemical solution. Assume that all reagents are poisonous and act accordingly. Read labels on chemicals for any safety precautions and know the nature of the chemicals you are using.

5. Students with special conditions (pregnancy, nursing mothers, allergies, depression of immune system through such things as disease, chemotherapy, transplants, etc.) should be aware that science laboratories contain materials which, if handled improperly, may have a hazardous effect on them. These students should contact their doctor for advice about continuing in the laboratory. Students who wish to withdraw from a laboratory after consultation with their doctor should submit a letter from the physician within the first two weeks of class indicating that the student should not continue in the laboratory due to a health risk. Information about the chemical compounds used in science laboratories is available from the lab coordinator.

#### *Biohazard safety*

1. Any biologically contaminated items (toothpicks, sheep blood, swabs, and slides) must be placed into the appropriate disposal container as indicated by your instructor.

2. Do not use the microscopes if you have an eye infection.

3. Preserved animals that are used over multiple lab periods must be sprayed with preservative, placed in an appropriate storage bag, sealed, and placed in your group's bin or can at the end of each lab period. Any parts from the animals must be discarded into the biohazard container as indicated by your instructor. Organisms that are used for only one class period must be discarded into the biohazard container as well.

**Last Day to Drop/Withdraw:** It is your responsibility to withdraw from this course if you no longer want to remain in the course. I will not withdraw you for lack of attendance. You will be assigned the grade you have earned if you stop attending class with zeroes for all missed exams and missed quiz scores. In other

words, you will fail the course if you stop attending class and you don't withdraw yourself. The deadline to withdraw from 15-week session courses without evaluation (receive "WQ" on your transcript) is **TBD**.

**Return of graded materials:**

All graded materials will be returned within one week of submission. After returning materials, there will be a one-week window of opportunity for students to have corrections made to scores on these materials. Exam grading keys will be available for review by any student on the date that the exam is returned. After this date, grading keys only will be available during office hours or a scheduled appointment. After the one-week window, the electronically recorded score will become the permanent score in a spreadsheet.

**Academic Honesty:**

Each student is charged with the responsibility of maintaining all requirements as outlined in the undergraduate catalog in the section entitled "Academic Honesty Policy." Intentional cheating can result in loss of assignment credit, course credit, and/or failure in the course. Intentional acts of cheating can also result in dismissal from UHCL.

The first violation of the Academic Honesty Policy will result in a grade of "0" (zero) for that graded assignment and submission of the associated university paperwork. The second violation will result in assignment of a grade of "F" for the course and submission of the associated university paperwork. If you are caught cheating on the final exam, you will fail the course (the grade of "F" will be assigned) and the associated university paperwork will be submitted.

**Extra Credit:** You are expected to attend and to master the material presented during the lectures and from your reading of the textbook (and any supplemental handouts), and your grade will be determined solely on the basis of your performance on the criteria listed under the heading of "Grading". Therefore, there will be **NO opportunity for you to earn extra credit by individual efforts** such as out-of-class papers, book reports/reviews or any other type of project that might be submitted for this purpose.

**Electronic Devices:** Use of tablets (or similar technology) is required for some lab activities. A tablet will be provided to you for use in those lab activities where internet access is required for data acquisition or analysis. You are permitted to use your own device however the university and your instructors will not be responsible for any financial costs associated with required or recommended applications (apps) or damages incurred during use of your personal electronic device (e.g. cell phones, computers, etc.). Additionally, these devices are very distracting and may be damaged by chemicals used in the lab. Use of electronic devices during unauthorized times in the lab is not permitted. In order to avoid damage to electronics associated with lab supplies, please put them away during lab activities other than those requiring their use.

**Classroom Conduct:** Disruptive student behavior in an academic setting is defined as any behavior that interferes with teaching, administration, university activities, and the collegiate learning process. Determination of a behavior as disruptive is at the discretion of faculty or staff and can be dependent upon many factors. In the case where a student behavior is determined to be a disruption, you will be subject to the university Code of Conduct.

**Students with Disabilities:**

It is university policy, in accordance with 504/ADA guidelines, that no otherwise qualified disabled individual shall, solely by reason of disability, be excluded from participation in, be denied the benefits

of, or be subject to discrimination under any academic activity. Disabled students may request academic adjustments and auxiliary aids through the Office of Disability Services (SSCB 1302, Tel. 281-283-2648). Students who are registered with the office will have the documentation provided to the instructor within a timeframe as to allow accommodations to be made.

**6 Drop Rule Limitation:**

SB 1231 prohibits students from enrolling for the first time as a freshman during the fall 2007 academic term or any term thereafter from dropping more than a total of six courses in their entire undergraduate career. This total includes any course a transfer student has dropped at another 2-year or 4-year Texas public college or university. This does not apply to courses dropped prior to the census date (See Academic Calendar at [www.uhcl.edu/records](http://www.uhcl.edu/records)) or to courses for which the students receive an administrative withdrawal noted with a grade of “WX” and does not apply if the student withdraws from the term or session. More information can be found in the Student Handbook.

**Policy on receiving an Incomplete:**

The university policy (see Undergraduate Catalog) regarding the grade of “I” will be followed strictly. This grade is available only to students who, because of circumstances beyond their control, are unable to complete a relatively small part of the course, and who are passing the course at that time. If an Incomplete is granted, the missing work must be made up within the guidelines of the Undergraduate Catalog and the time limit set by the instructor.

**Statement of Non-Discrimination:** University of Houston - Clear Lake supports the Civil Rights Act of 1964, Executive Order #11246, Title IX, of the Educational Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act. No person shall, on basis of age, race, religion, color, gender, sexual orientation, national origin or disability, be excluded from participation in, or be denied the benefits of, or be subjected to discrimination under any program or activity of the college. Any individual with a grievance related to the enforcement of any of the above provisions should contact the Director of Human Resources or Ombudsperson.

**Grades at the end of the Semester:** Reports of student final grades will available via e-services. Due to privacy concerns, early release of final grades will only be done in person.

Course Schedule:

**Tentative Schedule of Laboratory Exercises**

<b>Week</b>	<b>Date</b>	<b>Lab Exercises (included activities)</b>
1	January 17	Paperwork Module D: Toxicology – Ex. 1: Introduction to Toxicology (1-4)
2	January 24	Module D: Toxicology – Ex. 3: UV Induced Mutations
3	January 31	Module D: Toxicology – Ex. 2: Blackworms and Toxicants (1-3)
4	February 7	<b>Test 1 (Module D)</b> Module C: Energy – Ex. 1: Energy Basics (1-3)
5	February 14	Module C: Energy – Ex. 2: Energy Audit of a Building (1-3)
6	February 21	Module C: Energy – Ex. 2: Energy Audit of a Building (1-3) Module C: Energy – Ex. 3: Solar Energy (1-2)
7	February 28	<b>Test 2 (Module C)</b> Module E: Water – Ex. 1: Water, Where Does It Come From? (1-3)
8	March 7	Module E: Water – Ex. 1: Water, Where Does It Come From? (2[field work], 3) Module E: Water – Ex. 2: How We Use Water/How Good Is It? (1,2 homework)
9	March 14	<b>No Lab – Spring Break</b>
10	March 21	Module E: Water – Ex. 2: How We Use Water/How Good Is It? (3)
11	March 28	Module E: Water – Ex. 3: Where Does It Go (1 - field trip)
12	April 4	<b>Test 3 (Module E)</b> Module H: Atmosphere – Ex. 1: Ozone, A Special Problem
13	April 11	Module H: Atmosphere – Ex. 2: Outdoor Air Quality
14	April 18	Module H: Atmosphere – Ex. 3: Indoor Air Quality
15	April 25	<b>Test 4 (Module H)</b>