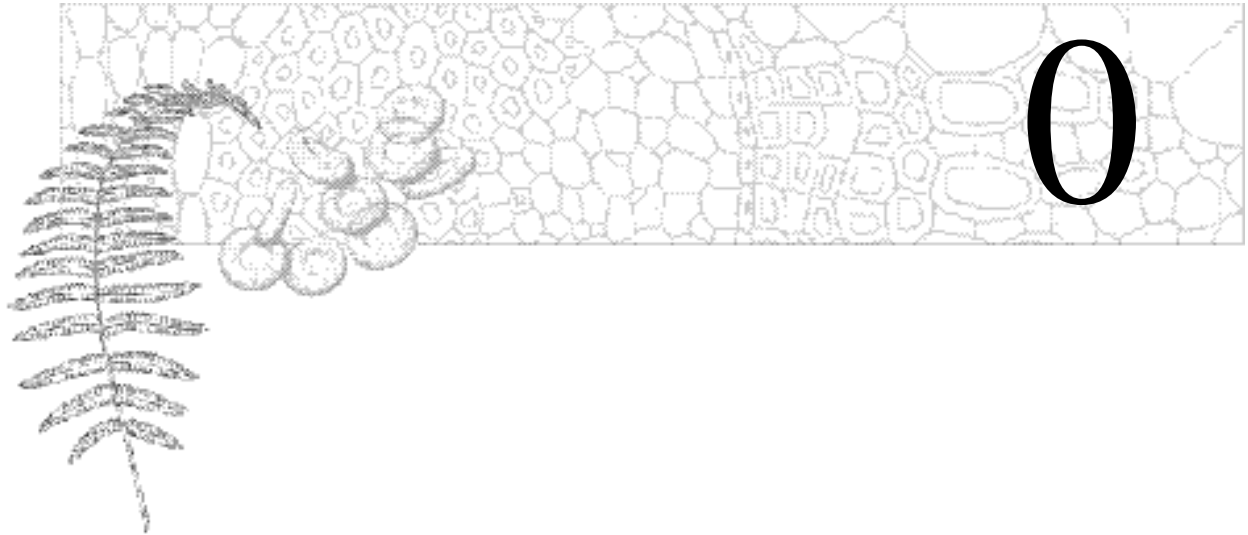


Laboratory



Lab Syllabus

BIOLOGY 172L LAB SYLLABUS Spring Semester 2008

DATE	LAB	LAB TITLE	PRE-LAB WORK SHEET	LAB SUMMARY DUE
1/14 - 1/19	0	Introduction to the lab		
1/21 - 1/26	1	Algae and Fungi	PLW	
1/28 - 2/2	2	Plant Life Cycles	PLW	Alage and Fungi
2/4 - 2/9	3	Plant Structure Monocots	PLW	Plant life Cycle
2/11 - 2/16	4	Plant Structure Dicots	PLW	Plasnt Structure Monocots
2/18 - 2/23	5	Botanical Field Trip on UH Campus	PLW	Plant Structure Dicots
2/25 - 3/1		LAB EXAM #1		
3/3 - 3/8	6	Platyhelminthes and Flatworms	PLW	
3/10 - 3/15	7	Mollusca	PLW	Platyhelminthes and Flatworms
3/17 - 3/25	8	Arthropoda	PLW	Mollusca
3/24 - 3/29		SPRING BREAK		
3/31 - 4/5	9	Echinodermata	PLW	Arthorpdoda
4/7 - 4/12	10	Vertebrata	PLW	Echinodermata
4/14 - 4/19		Oral Presentation 1		Vertebrata
4/21 - 4/26		Oral Presentation 2		
4/28 - 5/3		LAB EXAM #2		

The shaded weeks designate the times for the TA evaluations

LEARNING OBJECTIVES

Teaching Objectives

1. Discuss the relevant policies governing Biology 172L.

Student Learning Objectives (SLO)

1. At the conclusion of this introductory lab, the student will understand: lab grading policy, lab exams, lab summaries, lab notebook, attendance, holiday labs, sick policy, lab safety and the principles of the writing-intensive designation of this course.

WHY WRITING INTENSIVE

This course has been approved as writing-intensive (WI) and you will receive WI credit upon successful completion of the course requirements.

Careful thinking cannot be separated from effective writing. Being a biologist is not just about memorizing facts and terminology, or about mastering an increasing array of computer software and molecular techniques. Biology is a way of thinking about the world. It is about making careful observations, asking specific questions, designing ways to address those questions, manipulating data thoughtfully and thoroughly, interpreting those data and related observations, reevaluating past work,, asking new questions, and reflecting on old ones. It is also about communicating information—accurately, clearly, and concisely. The hard work of thinking about biology is at least as important as the work of doing it. Writing provides a way to examine, to evaluate, to refine, and to share that thinking. Writing is both a product and a process.

Numerous concerns about student's writing have been raised. First, bad writing often reflects fuzzy thinking, so questioning the writing generally guides the student towards a clearer understanding of the biology being written about. Second, effective communication is such a key part of the biologist's trade that students really must learn to do it well. As the writing improves, so, too, will the student's understanding of what they are writing about. **(This explains WI Focus Hallmark 1: The course uses writing to promote the learning of the course materials).**

LABORATORY POLICIES

1. Grading

Your final grade will be determined by a combination of the following areas:

- | | | |
|----------------------|-----|---------------|
| 1. Lab summaries | 45% | of your grade |
| 2. Lab exams | 40% | of your grade |
| 3. Pre-lab worksheet | 10% | of your grade |
| 4. Oral Presentation | 5% | of your grade |

Exams and lab summaries will not have any curve applied until the grades are assessed at the end of the semester.

Student achievement in this lab is designated by the following grades: A, (high achievement); B, (meets expectations); C, (below expectations); D, (inadequate performance); F (failure).

Biology majors are required to maintain a grade of C or higher for this lab to be acceptable for graduation requirements.

This explains WI Focus Hallmark 3: Writing contributes significantly to each student's course grade: writing assignments must make up at least 40% of each student's course grade. The combination of lab summary and pre-lab worksheets comprise a total of 55% towards the final lab grade.

2. Laboratory Notebook

You are required to maintain and use a lab notebook in this lab.

You should ALWAYS bring your lab manual and notebook with you to lab. The manual contains the instructions you need to complete the experiments and the notebook is required to keep a record of your observations and data AS they are obtained. You are not encouraged to use scraps of paper to collect your data in the lab as it is easy to lose the paper. Do not rely on your memory to record data after the lab has been completed. These are scientifically unsound practices.

3. Pre-lab Worksheet

Pre-lab worksheets are generated to assist you to prepare for that day's experiments. They also provide practice in critically thinking about the experimental material. These worksheets will be available about the week prior to the lab on the Biology Program web-site. Each worksheet consists of not more than 5 questions which you should answer in a brief, yet concise manner. Your TA will expect this sheet to be submitted at the start of the lab period. These sheets will be graded on a scale of 0-5 points.

4. Laboratory Summaries

A laboratory summary is required for each lab you perform. The format and guidelines for this summary can be found in Appendix 1 and 2 of this lab manual.

The grade awarded for your lab summary is dependent on **numerous** factors. The most important is the quality of your scientific writing. The important hallmarks of a well written summary or paper produced in this lab must follow the conventions of scientific thinking you reviewed during the Fall semester (Biology 171L) with respect to the following points: **clarity, accuracy, precision, relevance, depth, breadth, logic, and significance**. It is strongly advised that you make good use of the text "Writing for Biology" which you used in 171L.

You will also be required to submit sketches which will be graded with respect to how well they follow the guidelines found in Appendix 3.

Your summaries will be graded on a basis of a total of 35 points. The point distribution is:

- a) **Title**.....1 point
- b) **Abstract**.....4 points
- c) **Introduction**.....10 points
- d) **Results** (Data or Sketches).....10 points
- e) **Conclusions/Discussion**.....10 points

Interaction with your instructor (TA): Your TA will act as the expert and you, the student, as an apprentice in a community of writers. The types of interaction will vary, depending on the assignment. Typically, you will be required to complete a formal lab report for each lab. This semester, however, your labs consist of living and preserved specimens which require you to make observations and comparisons as we progress through the numerous phyla. Occasionally you may be required to write a different form of report. For these, your TA will demonstrate and discuss in the lab the different techniques you will use to draft and complete your assignment. Afterwards, your papers will be returned with comments or notation to help you learn how to write. There will also be a required meeting between you and your TA regarding your work.

This section explains WI Hallmark 2: The course provides interaction between teacher and student while students do assigned writing.

Length: Your summary is to be not less than three (3) pages, nor more than four (4) pages length, exclusive of sketches/drawings or data required by your TA. Papers which exceed this total will have points deducted.

Submission date: Your summary will be due at the beginning of the following week's lab session.

Construct: You are required to follow the format which is explained in Appendix 1 and 2. There is NO material and methods section for your summary. Your summaries must be typed (double-spaced) using no smaller or larger than a 12 point font.

When submitting your summary, please put your name, your TA's name and your lab section on the back of your summary in the upper right hand corner of the page. This is done so your TA can grade your summary and then seal it with a staple or tape so others cannot see your grade. We strictly comply with University regulations requiring confidentiality of student grades.

This section complies with WI Focus Hallmark 4: The course requires students to do a substantial amount of writing—a minimum of 4000 words or about 16 pages.

5. Critical Thinking (or Scientific Thinking)

Everyone thinks. But much of our thinking, left to itself, is biased, distorted, partial, uninformed, or down-right prejudiced. Yet the quality of our life and that of what we produce, make, or builds, depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life.

Scientific thinking, within the confines of critical thinking, is a mode of thinking—about any scientific subject, content, or problem—in which the thinker improves the quality of his or her thinking by skillfully taking charge of the structures inherent in thinking and imposing intellectual standards upon them.

A well cultivated scientific thinker;

- Raises vital scientific questions and problems, formulating them clearly and precisely;
- Gathers and assesses relevant scientific data and information, using abstract ideas to interpret them effectively;
- Comes to well-reasoned scientific conclusions and solutions, testing them against relevant criteria and standards;
- Thinks open mindedly within convergent systems of scientific thought, recognizing and assessing scientific assumptions, implications, and practical consequences; and

- Communicates effectively with others in proposing solutions to complex scientific problems.

Scientific thinking is, in short, self-directed, self disciplined, self-monitored, and self-corrective. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem solving abilities as well as a commitment to developing scientific skills, abilities, and dispositions.

Each lab (or experiment) begins with a pre-experimental critical thinking form. You must have this form completed BEFORE you enter the lab. The questions posed are designed to get you thinking about the experiment before you do it.

NOTE: Students who do not complete this form will be excused from the lab for that day and will receive a “zero” for that lab. These students are not prepared to scientifically indulge in the experiment or science experience of the lab.

6. Lab Exams

There are TWO lab exams scheduled in BIOL 172L. The specific dates can be found in the syllabus.

Your exams are practical in nature, which means stations will be set up in the lab where you will answer the questions found at that station. The exam is timed and this means you will have TWO MINUTES per station. These exams will not last more than 1 hour. You will need to adjust your review and study habits so that you are ready for this type of exam.

Exams are graded on a 0-100 point system. Your TA will give you additional information about the exam as their scheduled date approaches.

7. Late Laboratory Assignments

No late reports, such as pre-lab work sheet, critical thinking forms, and lab summaries are accepted in this lab.

8. Oral Presentation

Oral presentations will provide you the opportunity to discuss a relevant biological question, problem, or area you are interested in. This presentation consists of a maximum 10 minute power point presentation. Your presentation must be done and presented using Microsoft's *Power Point*. You will present your power point during the last two weeks of the semester. Please refer to the syllabus calendar for the timing.

Attendance at this oral presentation is mandatory. Failure to attend these presentations will result in a grade of “0” for this part of the lab.

Your oral presentation will provide you experience in developing communication skills and your ability to present a scientific topic which will be an advantage in your profession as well. Current surveys indicate college graduates with a high level of public speaking skills are very desirable job candidates. You also profit by receiving a lot of information on the different topics presented by other students in the lab.

9. Lab Attendance

You are expected to regularly attend your assigned laboratory section. Without an authorized excuse, you will receive a “zero” for the lab summary and the pre-lab quiz. If you miss a lab you will be expected to know the material you missed. The TAs will not create a special test for you to accommodate a missed lab.

You cannot just show up in another lab section. Unless the receiving TA has been informed and agrees to let you attend his/her section, they have been instructed to refuse you admittance to the lab. You will not receive any credit for that lab and your grade will be recorded as a zero. We do not want students moving freely between lab sections without permission, since each lab is already filled to maximum capacity and your presence in a different lab would place an additional strain on the TA.

Consult with your TA should special circumstances arise and ask what you need to do. The TA, if unsure, will consult with the lab coordinator for guidance. If you need advice regarding this policy, please ask us.

Also, if you need to switch sections to accommodate changes in your schedule, you must be sure you notify A&R. At the end of the semester, if your grade shows up in one lab section but the grade sheet states you are listed in another section, you will be automatically awarded an “F” and you will be required to fix the registration before your grade will be changed.

10. Holiday Lab Sections

Labs which fall on a holiday will be held as scheduled. There are too few times in which to attempt to reschedule the lab.

11. Evaluation of TA and TI

There will be two opportunities during the semester to evaluate your TA and TI. The first one will be conducted in the fourth week of the semester and the second one during the last week of the laboratory. Your evaluation of the TA and TI provides important feed-back to

help them do a better job teaching. In this regard, we solicit your input to maintain high standards in the Biology Program teaching quality. Your comments also permit us to uncover areas where we can improve our laboratories, and thus our ability to provide a better science education to you.

Please note that your instructors will NOT see your evaluation until after the Biology Program office has compiled the numerical portion of the evaluation and has also typed your written comments which are also part of the evaluation process. By providing this early evaluation, you can help TAs improve their performance in the lab. Remember that your input counts and your suggestions and constructive comments will help us continually improve the quality of our teaching and ultimately, our Program.

12. Laboratory Safety

Many of the laboratory exercises involve manipulation of live organisms or chemicals for which the use of personal protective gear is required by the University's Biological Safety Program and/or Chemical Hygiene Plan. Even in those labs where no manipulation occurs, we will abide by the regulations established throughout the University community.

This means you must wear the following items for every lab:

- **lab coat (must be worn at all times for every lab), and**
- **Closed toe shoes (must be worn for each lab)**

For those labs where hazardous chemicals are used, you will be informed in this lab manual to also wear the following items:

- Safety-goggles (Note: safety glasses are inadequate)
- Safety gloves

Lab coats, safety goggles, and safety gloves can be purchased from the UH Bookstore or at local hardware stores. Slippers and open-toe shoes can not be worn for lab exercises, as spilled chemicals or broken glassware can injure you. You can not conduct any lab exercises without the proper protective gear and your TA is instructed to prevent you from conducting any experiments until you are properly dressed.

Additional guidelines for safe lab conduct include (these are also found on the back of the Assumption of Risk and Release Form in this manual):

- No eating, drinking, or smoking in the lab.
- Wash your hands after the exercises, and during, if necessary.
- Tie back long hair

- Immediately report any injuries or chemical spills to the TA
- Be aware of the locations of the first-aid kit, the fire extinguisher, and the emergency eyewash

13. Emergency evacuation procedures

If the fire alarm sounds, prepare to leave the room and building immediately. The TA in charge should make sure everyone is ready to leave. Anyone with hearing problems or other disabilities will be helped to leave the room and building. The TA will be the last one to leave. If conditions are safe to do so, re-assemble by the (dry) fountain in Varney Circle, so your TA can be sure everyone is accounted for and is safely away from the building.

14. Laboratory Equipment and Policy

In this laboratory you will be using precision equipment. You will be instructed on their proper use and care. Please help us keep the equipment in good condition by taking proper care of it.

15. Lab Clean Up

The Biology 172 laboratory receives considerable use, where as many as 4 sections per day are held. It is **IMPERATIVE** that you thoroughly clean up your bench top before you leave and return all equipment to its proper place. You will be expected to leave your lab bench in the same the clean state in which you found it when you started your lab. Here are some guidelines to keeping your bench top clean at the end of each lab period:

- Properly put away any instruments or equipment you have used, e.g., microscope or spectrophotometer.
- Clean and return all supplies to their proper place(s).
- Clean your workspace with disinfectant (in the red bottles). Dispense a small amount onto the bench surface and spread around using a dry paper towel. Wipe up the excess and let it air dry.
- Broken glass, used cover slips, and other sharp objects should be placed in the specially marked **GLASS ONLY!** box. This box **SHOULD NOT** be used to discard used microscope slides. You should clean used slides and return them to the proper slide box for re-use in following labs.



DO NOT dispose of any glass in the regular trash containers! It may inadvertently injure the custodial staff.

Finally, if you break something, or something doesn't work as expected, don't keep it a secret. Please let your TA know so that it can be repaired.

16. Lab Partners

You will frequently work in pairs or groups using the other students at your bench. Please take some time to "break the ice" and get to know them. It will really help you when doing experiments to be able to rely upon your partner.

17. Internet

The Biology Program maintains a web site on its own server. You will be given instructions as to how to access both the lecture and laboratory sites. The pre-lab power point presentations will be made available on the Biology webpage prior to the start of the current week's lab so you can obtain additional, in-depth background information germane to the lab experiments. By setting up this venue, we hope to facilitate the exchange of information as well to stream-line the labs. You should access the lab site before coming to the lab to ensure you have any last minute information.

REVIEW OF SCIENTIFIC METHOD

- Good scientific questioning leads to a hypothesis (plural: hypotheses) that generalizes from specific observations. This process is called inductive reasoning. A hypothesis is testable and can be disproved.
- Most hypotheses and their predictions are tested within the controlled environment we call experiments. Each experiment consists of two parts, the treatment and control. The treatments are variables that you manipulate or test as part of the hypothesis. The control is an identical experiment without any treatments which is carried out to provide a standard against which an experimental result can be evaluated. As you will see in many experiments we do, these controls consist of a positive control and a negative control.
- Conclusions which are drawn from the results of the experiment either support or reject your hypothesis and probably would give rise to new questions.
- A hypothesis that has been repeatedly tested and never been disproved is known as a theory.

Keep these features in mind when you are performing future experiments, since you will be asked to first establish a hypothesis

and then perform an experiment, with appropriate controls, and show whether your data validates or disproves this hypothesis.