

**PITTSBURG STATE UNIVERSITY**  
**GENERAL BIOLOGY LABORATORY [BIOL 112] FALL 2018**  
**SYLLABUS**

**Class Meets:** T Th 8-9:50 AM Heckert-Wells 221  
**Instructor:** Dr. Anuradha Ghosh  
**Office:** Heckert-Wells 321  
**Email:** [aghosh@pittstate.edu](mailto:aghosh@pittstate.edu)  
**Phone:** 620-235-4532  
**Hours:** 11-1 MWF, 2-3 MTWTh, or by appo.

**Purpose:** The purpose of this laboratory course is to illustrate selected lecture topics in smaller group settings, provide opportunities for students to explore different applications of biology today, and encourage the life-long habit of examining current biological topics from several viewpoints.

**Lab Manual:** FACE-TO-FACE teaching strategy. The Lab Manual binder is available for purchase at the campus bookstore. All individual labs will be found on Canvas as well for reference. Students required to bring their own Manual in every lab.

**General Education:** This course counts toward the requirements in General Education for your degree program. General Education is an important part of your educational program at Pittsburg State University and has been designed to implement the following philosophy.

*General education is the study of humans and natural world in their global context.* The general education curriculum, therefore, acts as the heart of a university education by developing the capacities that typify the educated person and providing a basis for life-long learning and intellectual, ethical, and aesthetic fulfillment. General education examines the world around us and fosters an understanding of our interactions with the world and our place in the universe. General education celebrates the creative capacities of human kind and helps to preserve and transmit to future generations the values, knowledge, wisdom, and sense of history that are our common heritage.

**Learning outcomes:**

Upon completion of this laboratory course, students will be able to demonstrate skills in the following laboratory topics:

1. Microscopy
2. Quantitative measurement skills incorporating the metric system
3. Analytical and statistical skills including presenting and/or interpreting graphs and tables
4. Experience with living organisms in the laboratory and/or field setting
5. Identification and proper use of laboratory equipment

**Grading Criteria:** Quizzes: 100 points (top 10 quiz scores will be used)  
Midterm: 100 points

Final: 100 points  
Lab Reports and in-class assignments: up to 100 points  
Group Presentation: 50 points  
Grades will **NOT** be curved.

**Grading Scale:** A = 100-90%  
B = 89-80%  
C = 79-70%  
D = 69-60%  
F = 59% and below

**Class Structure:** This is a hands-on course where students will work in groups. Material from each lab has a potential of being on a quiz. It is advised that you read the pertinent lab manual before coming to class in order to familiarize yourself with what you will be doing on that day.

*This laboratory requires dissections. If you are not willing to dissect, please transfer to Environmental Life Sciences ASAP.*

**Assignments:** Up to 24h delayed submission of the assignments will be considered with a 20% deduction. After that it is a zero.

**Quizzes and Exams:** Weekly quizzes will be given. An exam will be given during dead week. The final exam, as well as the midterm, will be a combination of multiple choice questions and lab practical.

If a practical exam or quiz is missed, the resulting grade is a zero, even if the student comes in after a test or quiz has been issued, so please be on time. The only exception is if notification is given beforehand.

**Attendance:** Students not attending lab for the first two weeks will be dropped.

Formal attendance will not be taken. However, if you miss more than 6 quizzes and/or days the Lab Manuals are checked, and do not have an excuse for them, will face the same consequences.

If you know that you will be missing a lab due to a previous engagement, I require two days prior notice by email. This will give us time to make arrangements for alternatives for any assignments that may be due.

If you are absent due to illness, notify me via e-mail. We will discuss alternative options for the missed lab. Remember some labs cannot be made up due to the materials used.

**Academic Accommodations:** Please see Center for Student Accommodations (CSA) if you are in need of any accommodations. <http://www.pittstate.edu/office/center-for-student-accommodations/>

CSA is responsible for ensuring that currently enrolled students with documented learning and physical disabilities are provided the tools, appropriate accommodations, and support from the University to fully participate in all aspects of campus life.

**Academic Honesty:** Zero tolerance on cheating on quizzes or writing assignment.

<http://www.pittstate.edu/audiences/current-students/policies/rights-and-responsibilities/academic-misconduct.dot> This is the URL for more information on PSU policies concerning academic honesty and integrity.

**Other Information:** Additional Information about courses, calendars, scheduling, etc. can be found at “Syllabus Supplement” for Fall 2018 semester-

<https://www.pittstate.edu/registrar/syllabus-supplement.html>

**Lab Rules:** Cell phones are not to be out during labs or quizzes, except with instructor’s permission. Phones should be on silent/vibration upon entering the lab. Laptops are allowed for note-taking unless they become distracting.

*Food is not allowed in the lab, however beverages with lids will be.*

**Example assignment 1. Seed germination experiment- A scientific inquiry**

**Lab Report Guidelines:**

These sections should be included in your Powerpoint presentation.

**Introduction:** Should contain background information justifying why you are testing your specific hypothesis. The introduction should end with a clear statement of your hypothesis and expectations.

**Methods:** Should be a detailed description of how your experiment was conducted. It should be detailed enough that someone else could read it and recreate your experiment. *Suggestion: You may use the procedure from this laboratory and add any additional instructions that you think would help someone complete the exercise.*



**Results:** This section should only report what you found. This is not the place to try to explain your results. Instead, present a graph(s) of your data and then report in text what you see in the graphs.

**Analysis and Conclusions:** These sections are sometimes listed separately, but for this simple project we will lump them together. Here is where you explain why you think you got the results you reported above (This may take several paragraphs). Then, in another paragraph, explain what you learned and what is the take home message from this project. Your conclusions should include the answers to some of these questions:

- What did you learn about seed germination?
- Was your hypothesis supported? If so, why do you think it was? If not, why do you think it was not? (Explain to the best of your ability what happened.)
- What would you do differently next time?

## **Example assignment 2. Osmosis and diffusion lab**

This individual lab report should be created in ppt and submitted on Canvas. Follow the rubric for ppt preparation. The excel file with all lab data is also attached.

<b>Some Rubric</b>  			
You've already rated students with this rubric. Any major changes could affect their assessment results.			
<b>Criteria</b>	<b>Ratings</b>		<b>Pts</b>
Add title slide with hypotheses and goals of experiment for diffusion and osmosis Remember to include osmosis hypothesis for both salt and water treatment	4.0 pts Full Marks	0.0 pts No Marks	4.0 pts
Add two line graphs: 1. mean diameter data, 2. rate of diffusion with proper title, axes labels. Refer to excel sheet attached.	4.0 pts Full Marks	0.0 pts No Marks	4.0 pts
Add slide showing diffusion data interpretation, conclusion, suggested modification	2.0 pts Full Marks	0.0 pts No Marks	2.0 pts
Add 8 bar graphs for osmosis using mean data (refer to excel sheet) for each sample showing proper title, axes labels Total 4 bar graphs for salt treatment Total 4 bar graphs for water treatment	8.0 pts Full Marks	0.0 pts No Marks	8.0 pts
Add slide showing osmosis data interpretation, conclusion, suggested modification	2.0 pts Full Marks	0.0 pts No Marks	2.0 pts
			Total Points: 20.0

**Example assignment 3. Photosynthesis and respiration lab**

For photosynthesis experiment:

Create a **line graph** in excel. The line graph **MUST** include **standard deviation** bars. Paste the graph on a ppt slide with suitable graph title and axes titles. Describe the graph, write a conclusion and suggest modifications, if needed.

[Refer to the photosynthesis lab worksheet below.](#)

For respiration experiment:

Create a **bar graph** in excel. The bar graph **MUST** include **standard deviation** bars along with proper X, Y axes labels and a scientific chart title. Add couple of sentences on the conclusion that you can draw from the graph.

[Refer to the respiration worksheet below.](#)

Upload **one single** ppt presentation combining photosynthesis and respiration on canvas.

**Example assignment 4. Orientation behavior of Planaria – an example of negative phototaxis**

**Guidelines for Writing Lab Reports**

**Word document format:** 1” margin all sides, 12 font, Times New Roman, 1.5 line spacing, maximum 5 pages including table(s)/figure(s) and references.

**Format for Lab Reports.** Lab reports should be written according to these guidelines, in the following format using the section headings as illustrated. Scientific reports are written in the third person imperfect tense. Do not say “I measured 13 grams of NaCl.” The appropriate statement is “Thirteen grams of NaCl were measured.” See the **Sample Lab Report** for an example of the appropriate style, format, and content.

**Title of the Lab Activity (TITLE  
should be descriptive) Your Name  
(Subject Major)**

BIOL 112-Section #, Semester Year

**Introduction.** This section sets the stage, letting the reader know why this activity was undertaken and what it is expected to demonstrate. First it summarizes the relevant background information by briefly introducing the subject. Next it describes how the experiment fits into what we already know and why it is important to do this experiment. Then it states the **purpose** or objectives of the activity. It should also state the **hypothesis** that includes what outcome is expected. **LINK TO PREDICTIONS AND WHAT WILL BE MEASURED IN EXPT**

**Methods.** Clearly and completely describe the experimental design: how the activity was carried out, how and what data were collected, what the treatments were, what the sample size was, how many replicates there were and how the data were analyzed. This allows others to examine how the activity was performed and to repeat it on their own to verify the results. Because many procedures are standard and understood, every single detail is not necessary, simply the key factors that need to be known in order to repeat the activity. State if any **statistical analysis** was performed.

**Results.** This section simply **describes** the results of the activity and includes tables and/ or graphs that provide the evidence. It includes a written description of the pattern for each graph or table, but should not simply restate values reported in a table. There should be some comparison of the similarities and differences, but no explanation regarding why these might exist. It should draw attention to interesting or unusual results. This section presents “just the facts” without interpretation. Because of this, another scientist can examine the outcome of the experiment and decide what they might mean on their own. Explain chi-square values. **Avoid redundancy, do not use tables and figures for reporting the same information. Do not repeat values in text, rather summarize the trends.**

**Discussion.** In this section the author **interprets** the results, relates them to the objectives of the activity, and explains what they mean. First, the results are summarized and

a clear statement is made whether they support the hypothesis or not. Each graph or table is used as evidence by explaining what it means and how it supports the interpretation. If the results differ from what was expected, this must be addressed by explaining why they did not match the expected outcome. Finally a **conclusion** is presented, summarizing the results and discussing how this activity relates to what was previously known and how it extends our knowledge/ understanding. If there are other factors that might be relevant to the activity that were not included, these should also be discussed as things to be considered in future activities.

## References.

References should be cited in the accordance with the CBE Style Manual [Council of Biology Editors].

Some Rubric (1) (1)			
You've already rated students with this rubric. Any major changes could affect their assessment results.			
Criteria	Ratings		Pts
Scientific title- Name and Major subject	1.0 pts Full Marks	0.0 pts No Marks	1.0 pts
Introduction (300-500 words), cite at least 2 references (book/lab manual, at least one scientific journal). Objective of the study (include null and alternate hypothesis).	4.0 pts 4	0.0 pts No Marks	4.0 pts
Methods (300-500 words), not in bullets/incomplete sentences	4.0 pts Full Marks	0.0 pts No Marks	4.0 pts
Results- Interpret the result (2 points). All group raw data (for all lab sections only) in table format, table title (3 points). Bar graph based on all lab data (no standard deviation), figure legend (3 points). Refer to figure and table within the result section (2 points).	10.0 pts Full Marks	0.0 pts No Marks	10.0 pts
Discussion (300-500 words)- compare the result with negative phototaxis behavior, mention thigmotaxis as another influencing orientation behavior, a conclusion based on the results.	4.0 pts Full Marks	0.0 pts No Marks	4.0 pts
List of references in scientific format	2.0 pts Full Marks	0.0 pts No Marks	2.0 pts
			Total Points: 25.0

### *Discussion Questions in Lab*

1. We considered two possible outcomes for the Planaria in this experiment: 1) no difference, 2) more in the dark.

Might there be another possible outcome? Explain.

How would we set up hypotheses for an experiment that would include a third possible outcome?

2. Can we say definitively that the only reason Planaria move to the dark side is to get out of light?



Why, or Why not? What alternative explanations might there be?

3. Based on the results of this experiment, what can we say about the behavior of these Planaria in sunlight?

In incandescent light?

4. Thigmotaxis is an orientation behavior that allows an animal to maximize contact with solid surfaces. Animals that display thigmotaxis tend to aggregate under solid objects, such as rocks. Orientation by some of these animals has sometimes incorrectly been attributed to a negative phototaxis behavior. Recall from the background information for this lab that planarians are typically found in ponds underneath rocks.

How can we be sure thigmotaxis is not involved in the behavior we just tested in this lab?

How should we design an experiment to test for thigmotaxis?

## Oral presentation

*Chosen topic should be related to Biological Science. The topic and outline of the talk need to be approved by the instructor. Each group should comprise 3-4 students. Follow the rubric below in order to prepare your presentation. Also, watch the uploaded youtube videos which are guiding tools for your preparation and presentation.*

### **Rubric for the Group Presentation Assignment (50 points)**

#### Points Possible Earned

#### **I. References** **5**

- a. Number: You must cite at least 5 sources of information. Three of these must be scientific articles. Two may be from the internet (provide the URL) or a non-science journal.
- b. As you speak to the class, tell them who you are citing or quoting. Give the authors of the information credit.

#### **II. Organization of Presentation**

##### **A. Introduction**

**10**

- a. Turn in an outline of the presentation to your Instructor by email
- b. The topic should be related to biology with a current relevance, and you should provide evidence to the class that it is of current relevance.
- c. Visual aid are used for clarity (animated powerpoint slides). Length of video should be limited (1-2 min)

##### **B. Body of the Presentation**

**10**

- a. Every group member's contribution/participation is evident
- b. Information provided by various members is synthesized.
- c. More than one view is presented during the presentation.
- d. Views are supported with facts or logic.

##### **C. Conclusion**

**5**

- a. Brief summary of the presentation
- b. What questions remain (future aspect)

#### **IV. Presentation**

**15**

- a. All group members participated relatively equally to the presentation

- b. Group members speak to the listeners from notes, suggesting that they are familiar with the material, and **do not just read it**.
- c. Although group members may have researched different parts of the presentation separately, they explain how the different aspects of the topic presented by each member are **connected**.

**v. Question-Answer session** **5**

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- a. Reflected understanding on the topic.
- b. Took turns among group members to address the questions.
- c. Length of presentation (15 minutes)

**Assignment Points** **50**

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