

Biol 301- Cell Biology Laboratory, spring 2024.
Wednesday (2:30- 5:20 pm), Thursday (2- 4:50 pm) (ISC 304)

Instructor:

Dr. Ming-Mei Chang, ISC 352 (office)/ 346 (lab), Phone: 245-5416, Email: chang@geneseo.edu

Office Hours:

In-person: Monday (12- 1:30 pm)

Virtual: Friday (11:30 - 1 pm) <https://teams.microsoft.com/l/meetup-join/19%3ameeting_YmMwMGVhZTgtMmIzOC00NTA2LTkzYjMtMDdiNTU5MjhhZDY4%40thread.v2/O?context=%7b%22Tid%22%3a%2202ce934f-066a-4d00-b828-cedba7cf4f79%22%2c%22Oid%22%3a%227efe60b1-d70f-497d-87d4-69b35dcc9a14%22%7d>

Meeting ID: 285 711 468 921

Passcode: aXQFYD

OR Email for appointments

Learning Outcomes:

- 1) **To reinforce essential concepts in cell biology.** The lab will help you better understand the contents and principles taught in lectures involving cell signaling, protein structure, enzyme kinetics, and biochemical reactions in mitochondria.
- 2) **To learn and practice data collection, analysis, interpretation, scientific experimental design, and experimental result communication with others.** By the end of this course, you will have acquired and improved your skills in i) collecting, organizing, and interpreting data, ii) integrating the results of a scientific experiment with what is known about the topic, iii) designing novel experiments, iv) testing hypotheses, and v) presenting experimental results through writing.
- 3) **To be able to master common techniques used in cell biology.** You will develop skills in working with chemicals, i.e., making solutions and dilutions, and practice the associated techniques, i.e., microbial culture, protein quantification, SDS-PAGE, enzyme assay, cell fractionation, and organelle isolation.

Course Materials and Supplies:

- *Sharpie fine point permanent marker* is for marking tubes, and a *USB drive* is for storing data.
- *UV-protective glasses or Goggles* for protection.
- *Notebook/ loose-leaf notepaper* for taking notes, recording your data, and making calculations.

You should hand-write data into your notebook/ loose-leaf notepaper rather than only enter it into the computer. There were more than once when groups lost all or part of their data because of a computer problem.

- *Lab protocols* will be posted in Brightspace. Please PRINT it out, READ it through, PLACE it in a *3-ring binder*, and BRING it to the lab. *Failing to do so will affect your lab performance grade* because reading and following protocols directly from electronic devices while carrying out experiments is one major cause of experimental error in the lab. Besides, making a physical mark as you complete each step in a multi-step procedure is a good practice.
- *Lab coats* are optional, but we will work with chemicals that stain or are corrosive.

Attendance and Professional Behavior in the Lab:

Perfect attendance is expected for this course. We meet weekly for 13 lab periods, among

which 10 are wet labs, and three focus on data analysis and discussion. If you are sick or there is an unavoidable conflict, please contact me ASAP to work out options. Each *unexcused* absence will result in a one-letter grade drop (e.g., from a B+ to a C+). You might miss labs for legitimate reasons, but you can not miss more than two labs during the semester, as falling behind too much can affect your learning and grade, and you may need to consider withdrawing. In such case, you need to contact the Dean of Students, Dr. Sancilio (sancilio@geneseo.edu), who can assist you in determining the best course of action. If you are experiencing cold or flu-related symptoms but feel well enough to attend, wear a well-fitting mask, come to the lab, and maintain physical distance as much as possible.

Your behavior in the lab affects your learning experience and those of other students. Please *arrive on time, turn off your cell phone, stay throughout the lab, and limit conversation except for directed lab discussions in the lab. Laptops* are permitted and even encouraged for data collection and analysis, but texting, using social media, checking Email, and other non-lab-related uses are prohibited because they reduce lab participation and distract people around you. You may be asked to leave if you disrupt the lab or distract others.

Grading:

Group Data Analysis and Questions (D & Q) (35 %)

Making solutions and calculation
Cell Signaling
Protein structure
Enzyme kinetics
Mitochondria

Group Abstracts (A.B.s), Laboratory Reports (L.R.s), and Experimental Outline (E.O.) (30 %)

5 pts: Abstract of "Quorum Sensing"
20 points: Lab Report of "Protein structure"
5 pts: Experimental Outline of "WGAP Investigative Lab"
15 pts: Lab Report of "WGAP Investigative Lab"
5 pts: Abstract of "Mitochondria"

Individual Test (25 %)

There will be a test after completing each module, including **basic concepts** in fill-in, matching, short answer, and true/false questions; **data analysis** in calculation and Excel graphing, where experimental data will be provided for you to calculate, prepare graphs, and make concluding statements as you do for the D&Q.

Peer Evaluation, Lab Participation, and Performance (10 %)

- *All submissions except lab reports (submitted through Email) must be hard copies.*
- *All assignments are due at the beginning of the lab unless indicated otherwise. There will be a 2-point penalty per day for late assignments.*
- Any grade disputes must be initiated **WITHIN ONE WEEK** after the assignment is handed back.

Academic Policies of the Biology Department-ACADEMIC DISHONESTY:

Students are expected to know and obey the College policies concerning academic dishonesty.

The School will deal with any alleged cheating and plagiarism as a disciplinary problem following College policies as stated in the Bulletin. Be aware that academic dishonesty includes *cheating in exams, putting a group member's name on a group project that he/she did not contribute to, and turning in lab reports where the material has been copied from previous semesters' lab reports. If your name is on a project, you must ensure the work is authentic and adequately referenced; you are responsible if your group plagiarizes material.* The faculty will take all necessary steps to deter academic dishonesty, all cases of which will be reported to the Dean of the School for possible disposition as a College disciplinary matter. To learn about plagiarism and how to avoid it, self-enroll in Courses, Internships, & Tutorials: Home (geneseo.edu/library/library-workshops) for more information.

Accommodations:

SUNY Geneseo is dedicated to providing all students with an equitable and inclusive educational experience. The Office of Accessibility (Erwin Hall 22, (585) 245-5112, access@geneseo.edu) will coordinate reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities and medical conditions related to pregnancy or parenting. Students with letters of accommodation should submit a letter to each faculty member at the beginning of the semester and discuss specific arrangements.

Tentative Schedule:

Week	Date	LAB EXERCISE	Materials Due
1	1/24, 25	Introduction, Pipetting, Making Solutions and Dilutions	<i>Assign. due at 5:20 pm/4:50 pm</i>
		Module I: Cell Signaling	
2	1/31, 2/1	I. Bioluminescence and Quorum Sensing (Q.S.)	
3	2/7, 2/8	II. Q.S. controls the bioluminescence of <i>V. harveyi</i>	<i>D&Q: Quorum Sensing I</i>
		Module II: Protein Structure	
4	2/14, 2/15	I. Protein Quantification and Sample Prep. T1: Q.S.; Making Solution and Dilution	<i>D&Q: Quorum Sensing II Abstract</i>
5	2/21, 2/22	II. SDS-PAGE and Gel Staining	<i>D&Q: Protein Structure I</i>
6	2/28, 2/29	Data Analysis and Discussion on Lab Report T2: Protein Structure	<i>D&Q: Protein Structure II</i>
		Module III: Enzyme Kinetics	
7	3/6, 3/7	Wheat Germ Acid Phosphatase (WGAP) Assay	<i>L.R. I: Protein Structure</i>
8	3/13, 3/14	Spring Break	
9	3/20, 3/21	I. Preliminary Study for Phosphatase Investigative Lab Design Investigative Lab and its Outline	<i>D&Q: Enzyme Kinetics Outline due at 4:50/ 5:20 pm</i>
10	3/27, 3/28	Phosphatase Investigative Lab	
11	4/3, 4/4	Data Analysis and Discussion; T3: Enzyme Kinetics	
		Module IV: Mitochondria	
12	4/10, 4/11	I. Cell Fractionation and Mitochondria Isolation	<i>L.R. II: Enzyme Kinetics</i>
13	4/17, 4/18	II. Control of Mitochondrial Succinate Dehydrogenase	<i>D&Q: Mitochondria I</i>
14	4/24, 4/25	Great Day	
15	5/1, 5/2	Data Analysis and Discussion; T4: Mitochondria	<i>D&Q: Mitochondria II</i>
16	5/8	Last Day of Class (5/8)	<i>Abstract due at 5 pm</i>

"Reproducing materials from this course other than for your personal use without the author's consent is prohibited."

LAB REPORT (*The new trend in writing: Use active, short, and concise sentences.*)

Title:

The title should reflect the paper's content and be appropriate for the readers (*describe the subject or summarize the results*). It shows the factors tested, the measured effects or responses, the specific topic or organism under study, and the researcher's name (s). Be as concise as possible.

Abstract/Summary:

Write this part last after you have all the others completed.

The abstract is the "preview" of what will come in the paper and should be less technical. It should be a shorter version (1-2 paragraphs) of the paper. Readers can quickly scan the paper and decide whether to read more. It can be apart from the paper by briefly introducing background information and telling what you did, what happened as a result, and what you concluded. It summarizes the introduction leading to the objective/purpose, methods, results, and conclusions.

- 2-3 **introductory sentence(s)** leading to the purpose of the study
- 2-3 sentences on what you did, **materials/methods**, including the organism (A brief description of the experiment)
- Summarize the **major findings/results** (1-2 sentences each)
- Major conclusion(s)** for the paper

Introduction:

The introduction should clearly state the questions to answer or tasks to accomplish for your study. Summarize the relevant literature to help readers understand why the study is interesting/ important, and include enough background information to make your report understandable. What do you want to accomplish? What question(s) do you ask? End with one or two sentences to address what you accomplished OR explain the question(s) you asked. The cited papers in this section can be used for discussion later. It is usually 2-4 paragraphs.

Results:

The results should contain tables and figures. Before citing and showing them in the text, there should be a brief description of the contents. Tables and figures/graphs should be numbered and labeled. For graphs, the **dependent** variables should be on the vertical (Y) axes and the **independent** variables on the horizontal (X) axes. Linear, semi-log, or log graphs should be used where appropriate. The figure should have a stand-alone legend that readers can understand without reading the text. The table should have a title on top and footnotes at the bottom if needed. NO raw data (directly from the lab, like those shown in PowerPoint) or significant discussion, speculation, or explanation in the Results

Discussion:

HIGHLIGHT and DISCUSS *significant* results, but DO NOT repeat them.

Require literature citations to support your claims in the discussion.

Discuss if your results

- Relate to the original question/purpose of the experiment
- Support/achieve your hypothesis/objective

- ❑ Are consistent with previous studies (*citations*)
- ❑ Fit into the big picture

For unexpected results, try to explain why OR use other interpretations or further research to answer the questions raised by your results. END with 1 or 2 sentences to summarize your **conclusion** and emphasize why it is relevant. The discussion should include *conclusions from your results* and *whether your data are consistent with previous studies, relevant models, or hypotheses*.

Literature Cited:

Any facts or ideas not from you must be attributed to the source where you found them. Indicate such references by citing the corresponding paper(s) at the appropriate place in the text and listing a complete citation under "*Literature Cited*" at the end. All references cited **MUST** be cited in the text. Use the **AMA** format (PubMed) and ensure consistency throughout the section.