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|  | LIFE 212 Syllabus |

Introductory Cell Biology Laboratory

Instructor: Cathy Radebaugh

**Office/Lab:** AZ E209

**Cell Phone:** (970) 218-3223

**Office Hours:** Monday 2:00 p.m. - 3:00 p.m. and Thursday 12:00 p.m. - 1:00 p.m. in AZ E209

Or by appointment

**E-Mail address:** catherine.radebaugh@colostate.edu (best way to reach me)

**Graduate Teaching Assistant:** Meghan Stettler

**Office hours:** Wednesday 9:00 a.m. -10:00 a.m. and Friday 11:00 a.m. -12:00p.m. in AZ E208A

 Or by appointment

**E-Mail address:** mstett@rams.colostate.edu

Class Times/Locatiaons:

**Recitation:** Pre-recordedvideo availableFriday afternoon after 4:00 p.m. on Canvas

**Lab Section** L01: Tuesday 9:00 a.m.-11:50 a.m./ Yates 316

**Course Description:**

# This laboratory course aims to equip students with hands-on laboratory skills that are fundamental to modern cell biology and biomedical research. Upon completing this course, students will:

* Master basic computational chemistry and units of measurements
* Understand the importance of accuracy and precision of lab instrumentation.
* Be able to utilize spectrophotometry to determine protein and solute concentrations.
* Know how to partially purify enzymes and how to study enzyme kinetics.
* Know how to analyze proteins using protein gel electrophoresis and immunoblotting.
* Be able to conceptualize and use immunoassays to detect antigens or antibodies in organisms or tissue extracts.
* Have acquired an understanding of the use of light and fluorescence microscopy to study cell ultrastructure and function.
* Have an enhanced understanding of respiration and photosynthesis.

# Required Lab Manual:

 Safadi-Chamberlain, Farida. (2020). “Cell Biology Laboratory Manual” (Fourth Edition). Kendal Hunt Publishing Company. Dubuque, IA.

You will need to purchase an access code for the manual from either the CSU bookstore or the publisher: https://he.kendallhunt.com/ using ISBN: 9781792443091.

This is an online manual that you can access from your LIFE212 CANVAS page. Lab Exercises and downloadable Reports are compiled in this manual. For support you can either email websupport@greatriverlearning.com or use the web support form to let Kendall Hunt know of any issues you are having.

# Additional Resources:

**CANVAS:** Exercises, instructions and supporting material will be posted online at
http://info.canvas.colostate.edu/login.aspx. This will be the online educational platform that your LIFE 212 instructor and TA will use to communicate with students.

# Course Organization:

Recitation: All students registered for LIFE 212, must watch the recitation lecture as part of your preparation for that week’s lab exercise. The lecture will provide background material and go over the exercise protocol that will be completed that week. Any changes to the online protocol and tips to help you avoid mistakes in the lab will also be presented in the lecture.

**Weekly Quizzes:** After viewing the recitation lecture, thoroughly reading the assigned exercise in the lab manual, and taking notes from the lecture slides you will need to take the weekly quiz. The quiz will be available on Canvas, Monday afternoon at 4:00 p.m. and will close at 11:00 p.m. of the same day. Each quiz will be worth 20 points and you will be given 15 minutes to complete it.

Lab: A three-hour lab time is reserved for students to run the experiments. During the lab you will conduct experiments using instrumentation and equipment found in a typical cell biology laboratory.

Classroom Climate: I am committed to creating an engaging learning environment that is consistent with the CSU mission of fostering the principles of community; a community that promotes learning, critical inquiry, and discovery. We as a class, (instructor, teaching assistant and students) will strive to uphold the CSU community principles of inclusion, integrity, and respect.

Special Accommodations for Student Abilities: Consistent with University policy, the Student Disability Center (SDC) and the College of Natural Sciences (CNS), I am committed to providing ALL students an environment that supports their learning. I will contact students after receiving a memo from SDC so that we may discuss their individual needs.

**Lab Rules:** No eating or drinking while in the lab. No open toed shoes may be worn. Your legs must be completely covered to just below your ankles.

Student academic misconduct

The weekly quizzes, lab reports, and exams must be your individual work and cannot be copied from any other source. Acts of student misconduct are defined as: cheating, plagiarism, unauthorized possession or disposition of academic materials, falsification, or facilitation of acts of misconduct. These acts are subject to disciplinary action by the instructor and the CSU Office of Conflict Resolution and Student Conduct Services. For more information, see: <http://learning.colostate.edu/integrity/index.cfm>

**Important information for students on COVID-19:**

**Masks are required inside university buildings. You must also meet university vaccine or exemption requirements.**

**All students are expected and required to report to the COVID Reporter** (<https://covid.colostate.edu/reporter/>) **when:**

* You suspect you have symptoms of COVID, regardless of whether or not you are vaccinated and even if your symptoms are mild
* You have tested positive for COVID through a non-CSU testing site, such as home test or test at a pharmacy
* You believe you may have been exposed to COVID go to the COVID Reporter and follow the guidance under “I believe I have been in close contact with someone who has COVID-19.” This guidance will depend upon your individual circumstances

You will not be penalized in any way for reporting symptoms or concerns.

**Do not ask me as your instructor to report for you. It is your responsibility to report through the COVID Reporter promptly.**

**As your instructor I may not ask you about vaccination status or if you have COVID but you may freely volunteer to send me information from a public health official  if you have been asked to isolate or quarantine.**

When you complete the COVID Reporter, the CSU Public Health office is notified. Once notified, that office will contact you and, depending upon each situation, will conduct contact tracing, initiate any necessary public health requirements and notify you if you need to take any steps.

If you do not have internet access to fill out the online COVID-19 Reporter, please call (970)491-4600.

For the latest information about the University’s COVID resources and information, including FAQs about the spring semester, please visit the **CSU COVID-19 site** <https://covid.colostate.edu/>.

**Lab Attendance:** You are expected to attend all lab sessions unless you are ill or in quarantine. If you need to miss a lab session, please email your lab instructor so alternate arrangements can be made.

**Lab Assessments:**

**Quizzes:** There will be tenquizzes, each worth 20 points that need to be taken as described above. Quiz questions will come from material that was presented in the recitation lecture, the background material, and the methods for each lab exercise.

**Lab Technique Grade (LTG):** Each week that we meet in the lab and start a new exercise you will be assessed an LTG. This grade is given based on:

1) Coming into the lab with a mask on. We will be wearing paper, surgical type masks during the entirety of each lab session. If you are not wearing a paper mask when you arrive, please put on one that will be provided to you. (5 points)

2) Having your electronic notebook up to date and ready for use. This includes additions to your Table of Content, a completed Introduction, and a completed Materials and Methods section for that day’s exercise. After the first session the Results and Conclusions sections from the previous week’s exercise should also be completed. (30 points)

3) Prior to leaving the lab the bench area should be cleaned and sanitized. (5 points)

These points will be assessed by your teaching assistant or instructor at the beginning and end of your lab session.

**Lab Reports:** Each weekly lab exercise has a lab report that can be found in the manual. You will need to print the report and answer the questions, using your results were applicable. The completed lab report is due at the **beginning** of the following week’s lab and is worth 50 points. Late lab reports will have 10 points deleted for each day they are late.

**Exams:** There will be two exams that will be given in-class during your assigned lab time. Each exam will be worth 100 points and will designed to be completed in less than 1.5 hours however, you will be given up to 3 hours to complete the exam.

**End of Semester PowerPoint Presentation:** Details on this presentation will provided later in the semester. It will be worth 100 points.

# Letter Grade Scheme: Point Allocation:

* A- 90% and above Quizzes: 200 points (14%)
* B- 80% and above LTG 400 points (29%)
* C- 70% and above Reports 500 points (36%)
* D- 60% and above PPT Presentation 100 points (7%)
* F- Below 60% Exams 200 points (14%)

**Specific Instructions for your Electronic notebook write-ups:** You shouldfollow the following format:

* 1. Table of Contents: This includes the title and the page number of each experiment. Keep this up to date with each weekly experiment.
	2. Title and Date: The title of each experiment needs to be descriptive yet concise. Record the date the experiment was carried out.
	3. Introduction: This section should be written using your own words before you come to lab. Cutting and pasting from the manual or handouts is NOT allowed. The introduction should contain:
* the theory or background behind the experiment (not more than 2 to 3 sentences)
* the question to be investigated based upon the background and methods (one sentence)
* the objectives of the experiment (one to two sentences).
	1. Materials and Methods: This section should be written before you come to lab and can be modified as needed as you carry out the experiment. It should contain:
* the materials and reagents,
* the equipment used
* the methods (protocol) that you will follow during lab

 5. Results: This section should contain observations that were made and data that was collected as you completed the lab exercise. Data should be recorded into a table when possible for clarity. Any graphs that will be needed for subsequent labs should be included in this section.

 6. Conclusions: This section is written right after the experiment is completed and includes:

* A summary of the results of the experiment
* A brief interpretation of the results
* Significance of the findings

 7. Signatures: Instructor’s or TA’s signatures for signing in and out of the lab.

**Recitation and Lab Schedule**

 **Recitation:** Review of solution concentrations and accuracy versus precision

1/25 **Lab:** Concentrations of solutions, accuracy, and precision of instruments

 **Recitation:** Introduction to Spectrophotometry

2/1 **Lab:** Quantitative determination of protein concentration

 **Recitation:** Introduction toprotein purification and enzymes

2/8 **Lab:** ENZYMES I: Partial purification and characterization of Tyrosinase from potato tubers

 **Recitation:** Effect of the environment on enzyme activity and enzyme kinetics

2/15 **Lab:** ENZYMES III: Kinetic analysis of Tyrosinase: KM and VMAX

 **Recitation:** Cellular fractionation, Mitochondria isolation and respiration

2/22 **Lab:** Isolation of mitochondria and respiration assay

 **Recitation:** Introduction to photosynthesis: Light/Hill reaction

3/1 **Lab:** Isolation of chloroplasts and Hill reaction assay

 **Recitation:** Exam review

3/8 **Lab:** Exam

3/12-3/20 Spring Break

 **Recitation:** Light microscopy

3/22 **Lab:** The compound light microscope: types and proper use, cells of living organisms

 **Recitation:** Protein gel electrophoresis, staining and transfer to nitrocellulose

3/29 **Lab:** SDS PAGE of yeast proteins, gel staining and electroblotting

 **Recitation:** Immunochemistry use in cell biology experiments

4/5 **Lab:** Immunoblot hybridizations and protein detection

 **Recitation:** Fluorescence microscopy (No Quiz)

4/12 **Lab:** View previously prepared slides

 **Recitation:** Fluorescence microscopy presentation (No Quiz)

4/19 **Lab:** Work on PowerPoint presentations

 No recitation and no quiz

4/26 **Lab:** Fluorescence microscopy PowerPoint presentations

 **Recitation:** Exam2 review

5/5 **Lab:** Exam 2