

SYLLABUS

LIFE 212 INTRODUCTORY CELL BIOLOGY LAB

Instructor: Dr. Corey Rosenberg

Email: corey.campbell@colostate.edu. All emails will be answered within 36 hours. See Modules>Course Information for GTA contact info.

WEEKLY RECITATION, FACE-TO-FACE

Path 101, *Mondays 4-4:50pm*

RECITATION videos available in Canvas under Modules > Course information > Weekly recitation recordings

LAB sections

Section L04, Wed 2:00 - 4:50PM, Yates 311

Section L05, Thurs 9:00 - 11:50AM, Yates 311

Section L06, Thurs 2:00 - 4:50PM, Yates 311

Section L08, Thurs 9:00 - 11:50AM, Yates 309

Section L10, Thurs 2:00 - 4:50PM, Yates 309

Contact Dr Rosenberg directly, prior to class, if you are ill and cannot attend lab. Please speak to the TAs and Instructor directly to clarify concepts and due dates.

COURSE DESCRIPTION

LIFE 212, Introductory Cell Biology Lab, is an overview of important techniques employed by cell biologists and biochemists. Students learn basic scientific skills of data collection, interpretation, critical thinking and lab notebook entry skills, while practicing experimental methods and instrumentation in eight

major subject areas. The skills learned here are commonly used in cell and molecular biology research labs. We start with a review of basic lab math. Students learn the fundamental features of immunoassays for the detection of antigens, UV/visible spectrophotometry, enzyme purification and kinetics, protein gel electrophoresis and quantitation. Students also gain experience in basic principles of light microscopy and fluorescence cell structure visualization. Lastly, studies of respiration and photosynthesis are covered. Prerequisites- CHEM 112 and LIFE 210, both may be taken concurrently.

Each week, the pre-recorded lecture will cover important background material that sets the context for a given experiment or lab exercise. After watching the recitation lecture, and before attending lab, you will complete an online quiz to assess how well you've prepared for lab day. During the lab period, you will execute each experiment and submit a lab report.

COURSE OBJECTIVES

By the end of this course, you will be able to:

1. Demonstrate basic lab math skills.
2. Apply critical thinking principles to scientific data.
3. Predict results for experiments similar to those done in class, e.g., protein quantitation and separation and spectrophotometer use in the study of enzyme assays.
4. Practice reading scientific articles, learn scientific terminology and its importance to science communication.
5. Make use of hands-on skills with fundamental scientific instruments, e.g., microscopes, spectrophotometers, fluorescence microscopes.
6. Acquire working knowledge of how scale and imaging methods relate to the limits of resolution in subcellular imaging.
7. Have practical knowledge of the important features of immunoassays.
8. Practice scientific writing skills.

REQUIRED MATERIALS and resources

Lab Manual- Exercise instructions, background information, and weekly lab report forms are in an online lab manual this year. Purchasing is available to you through CSU bookstore or Kendall Hunt Publishing CO. ISBN: 9781792443091. "Safadi-Chamberlain, Farida. (2020). "Cell Biology Laboratory Manual" (Fourth Edition). Kendal Hunt Publishing Company. Dubuque, IA. The lab manual can be purchased directly from the CSU bookstore or Kendall Hunt at <https://he.kendallhunt.com/product/cell-biology-laboratory-manual-2>

For troubleshooting ordering/purchasing, you can email orders@kendallhunt.com or call 800-228-0810.

If you have trouble with your access code you can email websupport@greatriverlearning.com

or fill out the [Kendall-Hunt online help form](#).

Lab Manual modifications and corrections will be announced during Study sessions (recitation, Mondays 4-4:50pm on MS Teams) and posted in weekly lecture slides. Additional exercises and supporting materials will be posted on Canvas and should be downloaded prior to each lab period. Each recitation will be devoted to 1) weekly updates, announcements and important background information for the week's experiment. Recorded versions of older recitations are available as videos under the Lectures tab.

Goggles/safety glasses/prescription glasses must be worn while in the teaching lab.

Face masks/face shields will be required for entry into the teaching lab. No exceptions.

Closed toed shoes and leg coverings to the knee are required for entry into the lab.

MS Word. This course will require online report, lab notebook and quiz submissions. Lab reports and the electronic lab notebook have been provided as MS Word fillable documents.

CANVAS online. Exercises, instructions and supporting material will be posted online at <http://info.canvas.colostate.edu/login.aspx>. This will also be the platform for instructor and TA-to-student communications.

Lab Teams pledge. All students are required to agree to the Teams Honor Pledge (under the quiz tab) by the deadline in order to participate in this course.

EXECUTION OF EXPERIMENTS

Instrumentation and equipment will be used that is found in a typical cell biology research laboratory. Experiments will be done individually, and lab reports will be submitted individually through Canvas. Ultimately, it is up to

you, as an individual student, to ensure that all data is collected during the lab session and all assignments are submitted on time.

WEEKLY ASSIGNMENTS

WEEKLY RECITATION will provide theoretical principles behind the week's experiments, potential changes in the protocol, and emphasize key principles covered on weekly quizzes.

QUIZZES (20 points each) should be taken after viewing the lecture, reading the course manual and taking notes from the lecture slides. The weekly open notebook quiz will cover the current week's lab (pre-lab write-up and background principles) and more comprehensive material from the previous week's lab.

Students who read background material prior to the lecture, maintain a well-organized notebook and are conscientious in their observations and data evaluation/processing should do well on quizzes and laboratory reports. Study sources for quizzes include lecture slides and videos, lab notebook, and lab manual background information.

LAB AND LABORATORY REPORTS

Wet lab experiments will be done each week.

Lab Reports (50 to 100 points each) Students will be required to turn in weekly laboratory reports containing sketches of observations, tables, and/or graphs pertaining to the in-person lab exercises. The reports will be a mix of data reporting and critical thinking responses. If an experiment produces atypical or unusual results, be sure to provide a short explanation as to the possible reason for any anomalies. **Laboratory reports will be due the following week at the beginning of the lab period.** Late laboratory reports will be penalized 10 pts.

Submission types available- .docx, MS365 files, fillable documents

[Help with submitting Google doc files](#)

[Help submitting MS 365 files](#)

KEYS TO SUCCESS

A. On Monday of each week, 1) Look over the lecture slides and course manual for important background material before the weekly lecture. 2) Attend the recitation lecture and take notes in your e-notebook (a MS Word document of your own making- see more important details in the syllabus about the lab notebook, because it will be graded throughout the semester). At the weekly lecture, tips for success, important reminders, added details pertinent to the week will be explained. Also, this is a great time to get answers to your questions! 3) Take the weekly quiz on Monday. 4) Complete the pre-lab writeup BEFORE your lab period.

B. Your active engagement with Instructors and TAs shows us that you are invested in the course material and want to succeed. Please keep in mind that the TAs are teachers in training, so they might not know all the answers. If you are not satisfied with a TA's response, ask the Instructor. In problem-solving, show all your work and calculations; do not simply write the answer. Write out everything of importance. The bottom line is that your math should be easy to follow. If a problem asks for repetitive calculations, provide one example calculation and indicate a statement to that effect in the answer.

C. Always include units (note: some values are unitless), including on graphs.

D. Lab reports or any other assignment turned in late may be subject to point reduction (10 pts per day).

E. If your experimental data do not come out as expected, be sure to write a **detailed explanation** for what went wrong in the same location as the erroneous data in the lab report. Data collection is a prelude to data analysis, so if you don't have data to analyze, and subsequently cannot fill out other questions on the lab report, you may lose points for the uncompleted portions of the report. Please bring data collection problems to the Instructor's attention immediately.

LAB NOTEBOOK

(includes weekly pre-laboratory write-up and experimental planning):

Students will enter the pre-lab writeup, recorded data and experimental results into an electronic lab notebook to be uploaded to Canvas. Your e-notebooks will be prepared in MS Word and will become a single running document that you will progressively build as the semester progresses. Example hard copy notebook entries are available in the teaching lab if you need guidance. Your lab notebook is a single document (each week, add the new pre-lab writeup, etc to the end of last week's lab writeup.) For each weekly exercise, the **Title & Date, Introduction** and **Materials and Methods** sections should be completed

before you watch the recitation. Pre-lab write-ups should be written in your own words, not copied directly from the Lab Manual. **Pre-lab writeups and notetaking will help you do well on all open notebook quizzes and to understand fundamentals of the weekly experiments. They will also help you finish your experiments with fewer mistakes.** In the e-lab notebook, you will outline the experimental plan before the lab period; during the lab period, you will document your experimental data and conclusions. Any calculations, notes, and results should be recorded directly into the notebook during the lab period. The laboratory notebook of a scientist is a legal document that shows the progress of experiments on a given day. Notes will be written in the notebook as the experiment proceeds. Elements of your laboratory notebook will be graded on a weekly basis. Your e-notebook should be well-written and coherent. Below are detailed descriptions of each of the essential elements of your lab notebook.

The lab notebook will be graded each week for the following elements

1. Table of Contents: This section will be placed in the first few pages of your notebook and will include the title and page numbers for each experiment.
2. Title and Date: The title of each experiment should be concise and descriptive.
3. Introduction: This section, written with your own words, briefly summarizes 1) the general scientific theory behind the experiment (not more than 3 to 5 sentences), 2) the experimental question, hypothesis or objective (for exercises that don't allow for a hypothesis), 3) the predicted results (one to two sentences maximum). Cutting and pasting from instructional material is NOT acceptable. Highlight the beginning of each statement to make it easy for the grader to see each required element. (Write this as a narrative rather than a numbered list)
4. Materials and Methods: This section should be written before the lab period and then modified as needed during execution of the experiment. This section should contain the materials and critical reagents and the methods (protocol). **Use a flow chart whenever possible; this will shorten the time required to describe the materials/methods and become a roadmap for you to follow as you execute the experiment.**
5. Results and discussion: **For the purpose of this class**, your lab report will serve as a Results and Discussion section and will be kept separate. (Normally, this section contains your observations, sketches of biological specimens, raw data, calculations, tables and graphs that you generate from the data, as well as any other notes. For legal reasons such as patents of experimental results, your raw data should go **directly** into your notebook.)
6. Graphs (depending on the weekly exercise) **You should keep e-copies of graphs, because you may need to refer to the graph before the graded work is returned to you.**
7. Conclusions: (Not more than 10 sentences) This section should be written immediately after the experiment is completed. Summarize (and highlight) 1) the results of the experiment, 2) your interpretation of the results, 3) the significance of your findings and what you learned from this experiment, 4) what would you do next to carry over and expand the results, 5) answer the question: "did I achieve my objective/s?" Think *critically about your data*. Just

because you may have followed the protocol does not mean that your experiment succeeded. An important objective of this course is to learn to *critically evaluate data*. Analyze your results and comment on why an experiment failed, if necessary. If the failed experiment is not repeated, state what you might do differently to derive a successful outcome or what you could do to improve it in the future. Students are not penalized for non-optimal results, however, it's essential that you thoroughly and accurately report your actual results. (Write this as a narrative rather than a numbered list) Use technical terminology as much as possible.

Post-laboratory clean-up All students are required to disinfect their work stations, glassware and reagent tubes when finished. At the end of each laboratory period you are required to clean your bench area, properly dispose of experimental waste, dump ice, wash any used glassware with hot water and detergent and put away all assigned equipment. Finally, wipe your bench with a cleaner disinfectant before you leave. Failure to comply with these instructions will affect your lab performance grade.

PROCEDURE FOR ASSIGNMENT REGRADING

If you feel that a mistake has been in grading your assignment, follow these steps. Submit the packet described below to Dr Rosenberg; at that time, she will discuss the question with you and come to a decision about whether points will be awarded. **Compile a packet containing-**

1. **The question/answer with the mistake should be circled and highlighted.**
2. **If the answer is based on lecture material, print out a copy of the lecture material showing the information that is pertinent to the question.**
3. **Provide a written explanation of the reason you should receive point(s) back.**

LAB PERFORMANCE GRADE

(5 points per week; up to 65 points per semester) is a measure of your weekly participation in the lab classroom, execution of the experiment, thoroughness in following the protocols, lab courtesy and safety, as well as tidiness and the conscientious use of lab supplies and equipment. You are expected to complete each experiment and work on the report during the lab period. You are also required to clean up your lab bench and get instructor approval of that cleanup prior to leaving. Neglect of any of these items can result in the loss of lab performance points.

Coming to lab prepared is essential to success. Instructors will ascertain student participation when assigning lab performance grades. Scientific

research and experimentation require special qualities of patience, organization, and accuracy. Careful experimental planning (ie., laying out the sequence of the steps in a protocol) and good time management will help you efficiently obtain accurate and successful experimental results. Note that due to the nature of biological research, some experiments require that you come at a later time of the day or week to finish up. Group discussions with your peers and the TAs regarding questions in the report are highly encouraged.

Missed laboratory sessions cannot be made up and may result in a Zero score on the Lab Report. If you cannot attend a lab, contact Dr Rosenberg (not the TA) in advance to arrange to attend another laboratory section. If you cannot contact the instructor in advance, plan to submit a documented medical release form signed by your physician.

ACADEMIC INTEGRITY

Cheating/Plagiarism All written work in quizzes, reports and exams shall be the work of the individual student; using another student's work is considered cheating. Falsification of data from experiments is also considered cheating. Plagiarism is the use of information without appropriate citation of sources. Instructors allow quizzes to be taken with an open lab notebook. This is meant to encourage detailed note-taking. Plagiarism and cheating are academically dishonest and, as such will incur penalties in accordance with CSU policy. Appropriate use of Resources: If Internet or primary literature sources are used, they must be cited every time they are used in a written assignment. Penalties for cheating/plagiarism/data falsification: In accordance with CSU Academic Integrity Policies, cheating/plagiarism may result in a reduced grade for a given assignment, a failing grade for the course or the removal of the repeat/delete option for the course.

- Cheating; includes using unauthorized sources of information and providing or receiving unauthorized assistance on any form of academic work or engaging in any behavior specifically prohibited by the faculty member.
- Plagiarism; includes the copying of language, structure, ideas, or thoughts of another, and representing them as one's own without proper acknowledgment.
- Unauthorized Possession or Disposition of Academic Materials; includes the unauthorized selling or purchasing of examinations or other academic work; stealing another student's work; unauthorized entry to or use of material in a computer file; and using information from or possessing exams that an instructor did not authorize for release to students.
- Falsification; any untruth, either verbal or written, in one's academic work.
- Facilitation; knowingly assisting another to commit an act of academic misconduct.
- The use of online "homework helper" sites including, but not limited to, Chegg, NoteHall, Quizlet, and Koofers is not permitted in this course. Please reach out to me to discuss if a specific service you are thinking about using for this course is acceptable.

- Use of these types of resources will be considered receiving unauthorized assistance and, therefore, a violation of the student conduct code. Using them may result, at the discretion of the instructor, in a zero for the course, assignment, quiz, or exam. All incidents of this type will be referred to the CSU Student Resolution Center and may be subject to additional University disciplinary action.

EXAMS

(200 points each) There will be a midterm and a cumulative final exam of 200 pts each, which will be administered online (see your group schedule). The final exam is cumulative. Practice exams are available under the 'Quiz' tab in Canvas.

GRADING POLICY

The following grading standards will be used in this class:

Grade	Range
A	100 % to 90.0%
B	< 90.0 % to 80.0%
C	<80.0% to 70%
D	< 70.0 % to 50.0%
F	< 50.0 % to 0.0%

Course points allocation- 1295 pts possible

	<i>Points each</i>	<i>Semester totals</i>	<i>Semester Pts total</i>
Quizzes	20 pts	9	180
Lab reports/other	50-60	6	320

Remote assignments	40-50	7	290
Lab notebook-weekly checks	20	6	120
Lab performance/safety			65
Exam	100	2	200
e-poster staged assignments	35		35
e-Poster	20		20

STAGED SCIENTIFIC WRITING ASSIGNMENT (E-POSTER)

A LIFE 212 topic of your choice (subjects: Michaelis-Menten kinetics, protein electrophoresis, mitochondrial respiration, immunofluorescence), may be used as subject matter for a formal lab report, composed in the form of an e-poster. Students are expected to independently consult online sources to find additional detailed peer-reviewed information pertinent to the subject matter and appropriately cite those sources in the assignment. **You will report your own data from a LIFE 212 experiment. You are encouraged to think creatively on how best to report that information in an engaging format for the reader.** The creative use of illustrations, graphs and diagrams are strongly encouraged. Drafts of specific parts of this assignment will be graded in stages by the GTAs. This will allow you to make progress in a step-wise fashion and perhaps garner helpful feedback from the TAs on appropriate content for a peer-reviewed journal article. Detailed e-poster instructions will be available on Canvas under Canvas/ 2021FA-LIFE-212/ Modules/ eposter. The final e-poster will be submitted electronically through Canvas (see below for dates). The final product should be formatted with the same quality and attention to detail that would be required for a brief report in a peer- reviewed journal. The limited space will require that your writing be highly concise, while conveying all the essential experimental details and results.

There are additional guidelines for literature searches available at our course [scientific paper help site](#), prepared especially for us. Feel free to contact the librarian on the website if you want additional pointers for finding quality peer-reviewed articles.

Library & Research Help The [CSU Libraries Help Desk](#) provides both research (Ph. 970-491-1841) and technical (Ph. 970-491-7276) support.

CANVAS INFORMATION & TECHNICAL SUPPORT

Canvas is the where course content, grades, and communication will reside for

this course.

- Login: canvas.colostate.edu
- Support: info.canvas.colostate.edu
- For passwords or any other computer-related technical support, contact the [Central IT Technical Support Help Desk](#).
 - o (970) 491-7276
 - o help@colostate.edu

The [Technical Requirements](#) page identifies the browsers, operating systems, and plugins that work best with Canvas.

ACADEMIC INTEGRITY & CSU HONOR PLEDGE

This course will adhere to the CSU [Academic Integrity/Misconduct policy](#) as found in the General Catalog and the Student Conduct Code.

Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, I will ask that you affirm the CSU Honor Pledge as part of completing your work in this course.

UNIVERSAL DESIGN FOR LEARNING/ACCOMMODATION OF NEEDS

I am committed to the principle of universal learning. This means that our classroom, our virtual spaces, our practices, and our interactions be as inclusive as possible. Mutual respect, civility, and the ability to listen and observe others carefully are crucial to universal learning.

If you are a student who will need accommodations in this class, please contact me to discuss your individual needs. Any accommodation must be discussed in a timely manner. A verifying memo from [The Student Disability Center](#) may be required before any accommodation is provided.

The Student Disability Center (SDC) has the authority to verify and confirm the eligibility of students with disabilities for the majority of accommodations.

While some accommodations may be provided by other departments, a student is not automatically eligible for those accommodations unless their disability can be verified and the need for the accommodation confirmed, either through SDC or through acceptable means defined by the particular department. Faculty and staff may consult with the SDC staff whenever there is doubt as to the appropriateness of an accommodative request by a student with a disability.

The goal of SDC is to normalize disability as part of the culture of diversity at Colorado State University. The characteristic of having a disability simply provides the basis of the support that is available to students. The goal is to ensure students with disabilities have the opportunity to be as successful as they have the capability to be.

Support and services are offered to student with functional limitations due to visual, hearing, learning, or mobility disabilities as well as to students who have specific physical or mental health conditions due to epilepsy, diabetes, asthma, AIDS, psychiatric diagnoses, etc. Students who are temporarily disabled are also eligible for support and assistance.

Any student who is enrolled at CSU, and who self-identifies with SDC as having a disability, is eligible for support from SDC. Specific accommodations are determined individually for each student and must be supported by appropriate documentation and/or evaluation of needs consistent with a particular type of disability. SDC reserves the right to ask for any appropriate documentation of disability in order to determine a student's eligibility for accommodations as well as in support for specific accommodative requests. The accommodative process begins once a student meets with an accommodations specialist in the SDC.

THIRD-PARTY TOOLS/PRIVACY

Please note that this course may require you to use third-party tools (tools outside of the Canvas learning management system), such as Skype and others. Some of these tools may collect and share information about their users. Because your privacy is important, you are encouraged to consult the privacy policies for any third-party tools in this course so that you are aware of how your personal information is collected, used and shared.

COPYRIGHTED COURSE MATERIALS

Please do not share material from this course in online, print, or other media. Course material is the property of the instructor who developed the course. Materials authored by third parties and used in the course are also subject to copyright protections. Posting course materials on external sites (commercial or not) violates both copyright law and the CSU Student Conduct Code. Students who share course content without the instructor's express permission, including with online sites that post materials to sell to other students, could face appropriate disciplinary or legal action.

UNDOCUMENTED STUDENT SUPPORT

Any CSU student who faces challenges or hardships due to their legal status in the United States and believes that it may impact their academic performance in this course is encouraged to visit Student [Support Services for Undocumented, DACA & ASSET](#) for resources and support. Additionally, only if you feel comfortable, please notify your professor so they may pass along any additional resources they may possess.

TITLE IX/INTERPERSONAL VIOLENCE

For the full statement regarding role and responsibilities about reporting harassment, sexual harassment, sexual misconduct, domestic violence, dating violence, stalking, and the retaliation policy please go to: [Title IX - Sexual Assault, Sexual Violence, Sexual Harassment](#).

If you feel that your rights have been compromised at CSU, several resources are available to assist:

- Student Resolution Center, 200 Lory Student Center, 491-7165
- Office of Equal Opportunity, 101 Student Services, 491-5836

A note about interpersonal violence: If you or someone you know has experienced sexual assault, relationship violence and/or stalking, know that you are not alone. As instructors, we are required by law to notify university officials about disclosures related to interpersonal violence. Confidential victim

advocates are available 24 hours a day, 365 days a year to provide support related to the emotional, physical, physiological and legal aftermath of interpersonal violence. Contact the Victim Assistance Team at: 970-492-4242.

RELIGIOUS OBSERVANCES

CSU does not discriminate on the basis of religion. Reasonable accommodation should be made to allow individuals to observe their established religious holidays. Students seeking an exemption from attending class or completing assigned course work for a religious holiday will need to fill out the Religious Accommodation Request Form and turn it in to the Division of Student Affairs, located on the second level of the Administration building.

Once turned in, the Division of Student Affairs will review the request and contact the student accordingly. If approved, the student will receive a memo from the Dean of Students to give to their professor or course instructor. Students are asked to turn in the request forms as soon as the conflict is noticed. Similarly, unanticipated conflicts requiring a religious observance, such as a death in the family, can also be reviewed.

CSU PRINCIPLES OF COMMUNITY

Inclusion: We create and nurture inclusive environments and welcome, value and affirm all members of our community, including their various identities, skills, ideas, talents and contributions.

Integrity: We are accountable for our actions and will act ethically and honestly in all our interactions.

Respect: We honor the inherent dignity of all people within an environment where we are committed to freedom of expression, critical discourse, and the advancement of knowledge.

Service: We are responsible, individually and collectively, to give of our time, talents, and resources to promote the well-being of each other and the development of our local, regional, and global communities.

Social Justice: We have the right to be treated and the responsibility to treat others with fairness and equity, the duty to challenge prejudice, and to uphold the laws, policies and procedures that promote justice in all respects.

DIVERSITY AND INCLUSION

The [Mission, Vision, and Focus](#) webpage of the Vice President for Diversity includes a comprehensive statement of CSU's commitment to diversity and inclusion.