

**COURSE INFORMATION****Instructor: Farida Safadi-Chamberlain, PH.D.****Office: Yates 314**

Office hours: Thursday and Friday 12-1 pm ONLINE, in Yates 314 or by appointment.

Office Phone: (970) 491-1771

E-Mail address: [fsafadi@colostate.edu](mailto:fsafadi@colostate.edu)**Recitation: Monday, 4:00 pm to 4:50 pm ONLINE (attendance mandatory)****LAB Sections:**

<b>L02 and L06</b>	<b>Tues 9:00 - 11:50 AM</b>	<b>L01 and L05</b>	<b>Tues 2:00 - 4:50 PM</b>
<b>L03</b>	<b>Wed 2:00 - 4:50 PM</b>		
<b>L07 and L08</b>	<b>Thu 9:00 - 11:50 AM</b>	<b>L04 and L09</b>	<b>Thu 2:00 - 4:50 PM</b>

**Lab Rooms: Yates 311; Yates 316****Important information for students on COVID-19:**

All students are required to follow public health guidelines in any university space, and are encouraged to continue these practices when off-campus(es). Students also are required to report any COVID-19 symptoms to the university immediately, as well as if they have potentially been exposed or have tested positive at a non-CSU testing location. If you suspect you have symptoms, please fill out the COVID Reporter (<https://covid.colostate.edu/reporter/>). If you have COVID symptoms or know or believe you have been exposed, it is important for the health of yourself and others that you complete the online COVID Reporter. Do not ask your instructor to report for you; if you report to your instructor that you will not attend class due to symptoms or a potential exposure, you are required to also submit those concerns through the COVID Reporter. If you do not have access to the internet to fill out the online COVID-19 Reporter, please call (970)491-4600. If you report symptoms or a positive test, your report is submitted to CSU's Public Health Office. You will receive immediate, initial instructions on what to do and then you will also be contacted by phone by a public health official. Based on your specific circumstances, the public health official may:

- choose to recommend that you be tested and help arrange for a test
- conduct contact tracing
- initiate any necessary public health requirements or recommendations and notify you if you need to take any steps

If you report a potential exposure, the public health official will help you determine if you are at risk of contracting COVID.

For the latest information about the University's COVID resources and information, please visit the **CSU COVID-19 site** (<https://covidrecovery.colostate.edu/>).

**Graduate Teaching Assistants**

TA name	Lab Section	Office Hours	Office Location	Email Address
<b>IN-PERSON</b>				
Ashlyn Chen	L02 -Tues 9:00 - 11:50 AM	Thursday 1-3 pm	virtual	<a href="mailto:ashlyn.chen@colostate.edu">ashlyn.chen@colostate.edu</a>
Gaia Bublitz	L06 -Tues 9:00 - 11:50 AM	Tuesday 1-3pm	virtual	<a href="mailto:gaia.rachel.bublitz@colostate.edu">gaia.rachel.bublitz@colostate.edu</a>
Kaz Knight	L01-Tues 2:00-4:50 PM	Friday 12-2pm	virtual	<a href="mailto:kaz.knight@colostate.edu">kaz.knight@colostate.edu</a>
Pablo Maldonado	L05-Tues 2:00-4:50 PM	Wednesday 8-10 am	virtual	<a href="mailto:p.maldonado@colostate.edu">p.maldonado@colostate.edu</a>
Harper O'Neill	L03 - Wed 2:00-4:50 PM	Tuesday 2-4 pm	virtual	<a href="mailto:honcill7@rams.colostate.edu">honcill7@rams.colostate.edu</a>
Lindsay Peterkin	L04-Thurs 9:00 - 11:50 AM	Tuesday 9-11 am	virtual	<a href="mailto:lindsay.peterkin@colostate.edu">lindsay.peterkin@colostate.edu</a>
Andrew Dillon	L07- Thurs 9:00 - 11:50 AM	Monday 12-2 pm	virtual	<a href="mailto:andrew.dillon@colostate.edu">andrew.dillon@colostate.edu</a>
Daniel Kunk	L08- Thurs 2:00-4:50 PM		virtual	<a href="mailto:daniel.kunk@colostate.edu">daniel.kunk@colostate.edu</a>
Meghan Stettler	L09 -Thurs 2:00-4:50 PM	Monday, 12-2pm	virtual	<a href="mailto:mstett@rams.colostate.edu">mstett@rams.colostate.edu</a>
<b>REMOTE</b>				
Sage Myers	L02, L06 900-1150 AM	Tuesday 12 – 2 pm	virtual	<a href="mailto:sage1010@alumni.colostate.edu">sage1010@alumni.colostate.edu</a>
Parag Aryal	L01, L05 200-450 PM	Monday 12-2 pm	virtual	<a href="mailto:parag.aryal@colostate.edu">parag.aryal@colostate.edu</a>
Farida Safadi-Chamberlain	L03 200- 450PM	Friday 12 -1		<a href="mailto:Farida.Safadi-Chamberlain@colostate.edu">Farida.Safadi-Chamberlain@colostate.edu</a>
Sage Myers	L07, L08- Thurs 9:00-11:50 AM	Tuesday 12 – 2 pm	virtual	<a href="mailto:sage1010@alumni.colostate.edu">sage1010@alumni.colostate.edu</a>
Parag Aryal	L04, L09 -Thurs 2:00-4:50 PM	Monday 12-2 pm	virtual	<a href="mailto:parag.aryal@colostate.edu">parag.aryal@colostate.edu</a>
<b>Josh Hattis</b>	<b>LabArchives Curator &amp; Coordinator</b>			<a href="mailto:jahattis@rams.colostate.edu">jahattis@rams.colostate.edu</a>

**COURSE DESCRIPTION**

This laboratory course is designed to equip students with hands-on skills in molecular methods and tools employed in modern genetics research. The lab exercises encompass methods in Recombinant DNA Technology, development of organisms, and online tools for studying genes. Lab exercises and assignments are designed to teach students how to design and run experiments, problem solve, and critically evaluate and communicate their experimental results.

**Learning Outcome: Upon completion of this course students will be able to:**

- Grow and safely handle bacteria used in DNA cloning and analysis
- Isolate, transfer and analyze DNA prepared from bacteria using recombinant DNA technology
- Analyze gene expression and regulation.
- Synthesize and amplify DNA using Polymerase Chain Reaction (PCR)
- Understand DNA Fingerprinting
- Utilize online Bioinformatics tools to analyze genes

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**Textbook:**

**No specific textbook is assigned for this course.** Lab material which consists of the Lab background, Lab exercises and assignments will be posted prior to the lab period on [CANVAS](#) CSU Learning Management System. It is your responsibility to print them out and to bring them to the lab. Using the lab printer for printing is NOT allowed Lab.

**Labarchives E-notebooks:** An electronic notebook (E-notebook) supplied by Labarchives is required for the lab writeups. Access to the notebook can be purchased from CSU bookstore. Students will self-subscribe to their section on lab archives via a link that we will post on CANVAS front page on the first week of classes. Students will have complimentary access to the notebooks until the end of the Add Drop period after which they must make a purchase for further access to their electronic notebook.

**SnapGene:** Labarchives provides you access to the Plasmid software SnapGene, Instructions will be given

**Google drive:**

A Google Drive will be set up for the course to deposit lab results that include images of the DNA gels. Students will submit access request, free of charge, for the course google drive during the first week of class.

**Microsoft Teams Meeting Platform: 'CNS-BMB Course SP21 LIFE 203'**

DUE to the COVID-19 Pandemic, the weekly recitations on Mondays at 4:00 pm will be held synchronously through Microsoft Teams platform. You will join the Monday recitations through a link that we send out to at the beginning of the semester and will be updated weekly. Microsoft Teams can be accessed directly at <https://teams.microsoft.com> or by logging onto the Office 365 Portal at <https://portal.office.com>, clicking the 'waffle' icon (top-left), and clicking the 'Teams' tile.

VIDEO Streams of lectures and other lab instructions will be shared with students on Canvas and on Teams

**Clickers:**

iClicker Cloud will be used during the weekly recitations to remotely administer the 10-point weekly quiz and other discussions. Students can use the iClickers on a mobile device, tablet, or a computer. See [these instructions](#) for participating in iClicker Cloud polling and creating an iClicker Reef account.

**Hybrid Teaching:**

Social distancing due to COVID19 pandemic mandates that we reduce the occupancy of the labs. The lab attendance therefore is divided into biweekly hybrid teaching of remote and in-person labs exercises. For a given week, in-person labs will accommodate only half the students registered for that section. The other half will be completing online remote assignments that are related to and support the in-person labs. Students switch roles for the following week. Students are randomly designated to a **GOLD** or **GREEN** group and are given differentiated schedules of their weekly exercises. Weekly Lessons and Lab exercises are explicitly marked with either REMOTE or IN\_PERSON to guide students in their lab preparation and attendance schedule.

**TENTATIVE SCHEDULE**

<b>Course Objective 1: Recombinant DNA Technology</b>			
Weeks	Dates	LECTURE AND LABORATORY	Resources
Week1	Jan 19	Orientation, Remote Assignment 1 (Report 1) Units, Syllabus Quiz	Lab material/Canvas Videos of sterile techniques
Week 2/3	Jan 25 Feb1	Recombinant DNA technology 1 <b>In-Person:</b> Isolation and analysis of plasmid DNA. <b>Remote:</b> Restriction Enzymes Assignment	Lab material/Canvas Plasmid Tales Videos
Week 4/5	Feb 8 Feb 15	Recombinant DNA technology 2 <b>In-Person:</b> Gel electrophoresis, Ligation and transformation, Blue White inoculation <b>Remote:</b> Analysis of Recombinant DNA/Orientations	Lab material/Canvas Videos
Week 6/7	Feb 22 March 1	Recombinant DNA technology 3 <b>In-Person:</b> Analysis of Blue and white selection, Recombinant DNA Gel electrophoresis <b>Remote</b> : Blue and White Data images and Analysis	
Week 8	March 8	MIDTERM	
<b>Course Objective 2: Molecular and Computational Methods in studying Genes</b>			
Week 9/10	March 15 March 22	GENE EXPRESSION and Bioinformatics (GEP curriculum) <b>In-Person:</b> Gene Expression and Transcription Regulation in yeast <b>Remote</b> : GEP Steps 1 and 2	
Week 11/12	March 29 April 5	PCR and Bioinformatics (GEP curriculum) <b>In-Person:</b> Nuclear DNA Polymorphism and Polymerase Chain Reaction (PCR). <b>Remote</b> : GEP Step 3	
Week 13	April 12-18	Spring Break	
Week 14/15	April 19 April 26	All REMOTE: PCR Gel Electrophoresis and GEP PCR gel analysis (continued) GEP Step 4 GEP curriculum: Steps 5-6	
Week 16	May 3	Bioinformatics Group presentations All REMOTE	
Week 17	May 10	FINAL EXAM (Comprehensive) All REMOTE	

**Note: A library instruction session will be scheduled during the semester to help you with searching the library database. Library database is needed for answering lab report questions and conducting and writing your projects.**

**TEACHING METHOD**

The Introductory Genetics course is designed with hands-on experiments that are supported with background material that is necessary for understanding the experiment. We emphasize the science behind the experiment and the technical reason for using the steps and the reagents in the protocols. The curriculum is heavily supported by assignments to help all methods of students learning. To SUCCEED in this course it is enough to Keep up with the assignments and make sure that you understand the flow of the experiments and the reasons behind every step you do. Below are details of the course assignments.

### Pre-lab Preparation:

It is essential that you plan your experiments (in person and remote) before you attend the lab. This will help you do well on the quizzes and finish labs on time. To do this you are required to complete assignments that are **due Sunday Midnight**, these include:

- **Lecture:** Listen to a pre-recorded lecture about the week's Lab/assignment
- **Reading assignment:** Complete the reading assignments
- **Videos:** Watch any videos that are relevant to the labs/Assignments
- **Pre-lab Writeup (5-points)** Complete a Pre-laboratory write-up in your **E-Notebook**. See **Lab writeup section below and the specifics for notebook writing in the Addendum**
- **Learning Activities:** Complete the Learning Activities that are assigned for the week
- **Pre-Lab Quiz (5 points):** Complete a 15-point quiz to assess your preparation for the week's Lab

### Recitation Monday: 4:00-4:50 pm

Attendance is mandatory. No formal Lecture will be given during recitation, Only Questions and Answers Discussion. **Iclicker questions will be implemented for 10 points.** Learning activities may be presented and discussed to emphasize certain concepts in the theoretical background and the protocol behind the week's experiments.

### Quizzes (On-Line and Open notebook)

- 5-points per lab: Sunday pre-laboratory preparation
- 10-points during recitation Iclicker questions
- 30 points every two weeks

Quizzes will cover the current week's pre-lab preparation and the previous lab's principles and results. Quizzes will be cumulative; questions will be repeated from earlier labs to enforce retention of the information. Students who do their pre-lab preparation, keep up the notebook writeups, and who are conscientious in their experimental observations and data evaluation/processing will do well on the quizzes.

### In-Person Labs:

Graduate Teaching Assistants (GTAs), aided by Undergraduate Teaching Assistants (UTAs), lead the instruction and supervision of lab experiments in the labs. Additional pointers and potential changes to the protocol will be discussed at the beginning of the labs. Due to the Pandemic, Individual (no teams) students conduct the experiments using instrumentation and equipment found in a typical molecular genetics research laboratory. The laboratory exercises do not necessarily follow closely the lecture material in LIFE 201A/B. Some labs use biological material that is subject to availability, in cases when a biological material is not accessible, an exercise substitute will be used, and the syllabus and the handouts will be modified

### Remote Labs/Assignments

Will be run Remotely and Synchronously via Teams meeting platform. Mandatory synchronous attendance will be facilitated by Graduate Teaching Assistants (GTAs) and Undergraduate Learning Assistants.

### Pre-Lab Write up Grade (PLWG) in Labarchives (5 points)

Write in your own wording, do not copied from the handouts. Include: **Title & Date of the experiment or remote assignment, Introduction and Materials and Methods**. These sections will be set up for you in the E-Notebook. A **conclusion** for the previous lab must be completed as a part of the 5-points pre-lab writeup grade. (PLWG) This will be assessed by your LA at the beginning of your lab section.

**Lab Implementation Grade (LIG) (5 points)**

LIG assess 5 points per lab for students' performance during the in-person lab or remote assignment implementation. This includes the students' participation in the experiment or remote assignment, accuracy in following the experimental protocols and obtaining data, tidiness of the bench and the careful use of the lab supplies and materials. These points will be assessed by the instructors upon the students' signing out of the lab. The lab period is about 3 hours; *students are expected to fill the lab period with the experimentation and writing the report.* Note that due to the nature of biological research, **some experiments require that you come during a later time of the day or week to complete steps or take some observations.** Your seriousness about these observations counts towards the LIG. Similar policy is followed for the Remote Labs, Students' synchronous participation and Implementation of the remote assignment is assessed by the instructors running the remote labs.

**Exams (100 points each):** There will be a midterm exam and a final comprehensive exam. These will be administered online

**Laboratory Reports (50 points each)**

Lab results or remote lab assignments with accompanying sketches of observations, tables, and graphs, and their analyses are reported in a weekly laboratory report. Group discussions with your peers and the TAs regarding questions in the report are highly encouraged. However, individual students **are expected to write and submit their reports independently**. Remote assignments will be submitted **by student pairs** to encourage student connection. A student must attend lab to submit a report. Copied reports will be treated as cheating and will get a ZERO grade. Laboratory reports from the previous week will be due at the end of recitation on Monday of the following week unless otherwise stated. **LATE REPORTS will be assessed 10 points deduction per day.**

**Assessments and Grading**

Student evaluation will be based upon the weekly quizzes, two exams, lab reports, lab notebooks, assignments, and the lab notebook writeups and lab implementation grade. Additional extra credit questions will count towards the grade as **additional % above the 100% total assignments.** Letter grade scheme is as follows:

A+ = 95.1% and above                      A = 90 or greater and less than 95.1    A- = 89 or greater and less than 90  
B+ = 85.1 or greater and less than 89.    B = 80 or greater and less than 85.1    B- = 79 or greater and less than 80  
C = 70 or greater and less than 79        D = 55 or greater and less than 70        F = less than 55

**Point allocation**

Assessment	Points per assignment	Total # of	points	percent
Pre-lab quizzes	5 points per pre-lab	12 quizzes	60	
Iclicker quizzes	10 points per lab	12 quizzes	120	
Biweekly Quizzes	30 points each	6 quizzes	180	23 (all quizzes)
Laboratory Reports	50 -100 points each	10 reports	550	35
Exams	100 points/exam	2 exams	200	15
Laboratory Notebook	100 points each	2 grades	200	12
Pre-Lab Write-up Grade (PLWG)	5 points	12 labs	60	5
Lab Implementation Grade (LIG)	5 points/lab	14 labs	70	5
Lab assignments	vary	6	60	5
<b>Total</b>			<b>1500 pts</b>	<b>100.00%</b>
<b>Extra credit assignments</b>	vary			<b>5%</b>

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**MISSING LABORATORY SESSIONS:**

MISSING LAB ACTIVITIES CANNOT BE MADE UP; IF YOU MISS A LAB YOUR LAB REPORT GRADE WILL BE ZERO. Submitting a lab report using your partner results will NOT be accepted. If you cannot attend a lab for a very good reason email or see the instructor (not the TA) **before** the laboratory session to make alternate arrangements

**STUDENT ACADEMIC MISCONDUCT**

We take student academic conduct seriously, this course will adhere to the CSU Academic Integrity Policy as found on the Student' Responsibilities page of the [CSU General Catalog](#) and in the [Student Conduct Code](#). At a minimum, violations will result in a grading penalty in this course and a report to the Office of Student Resolution Center.

I would like to remind you of the student Honor Code that you took when you were admitted to CSU.

“As a student at Colorado State University, I recognize my active role in building a Campus of Character. This includes my commitment to honesty, integrity, and responsibility within the campus community. As such, I will refrain from acts of academic misconduct.”

IN LIFE 203, The weekly quizzes, reports, assignments, and extra credit exercises must be **your individual work** and -unless you are assigned a team assignment- cannot be copied from your friend or partner in the lab. Submitting copied work will be treated as cheating, your work will be assessed severe grading penalty and the student(s) committing the cheating will be subject to disciplinary actions at the discretion of the instructor, the CSU Office of Conflict Resolution and Student Academic Integrity Services. Acts of student misconduct are defined as: cheating, plagiarism, unauthorized possession or disposition of academic materials, falsification, or facilitation of facts are acts of misconduct.

Our course is heavily supported by teaching assistants and undergraduate learning assistants. Please reach out for the teaching team for help. The use of online “homework helper” sites including, but not limited to, Chegg, NoteHall, Quizlet, and Koofers is not permitted in this course. Many times your answers will be wrong or do not pertain to our course material. Please reach out to LIFE 203 teaching team 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.

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**ADDENDUM: LAB IMPLEMENTATION SPECIFICS**

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**LABELS:** All experimental material used by students should be labeled clearly: LABELS should include: **1)** Accurate *identity of tube content* **2) concentration** (if applicable), **3) date; including the year**, **4)** student *names* or *initials*, and **5) course number**.

**LABORATORY NOTEBOOKS**

- The laboratory notebook of a scientist is a legal document: outlines the daily progress of experiments.
- Physical notebooks are written in Ink: Calculations, notes, and results should be recorded directly into the notebook. No erasing should be done, mistakes and correction are done by crossing out the text to be deleted.
- Digital notebooks guarantee that all experimental procedures and data are secure and unchangeable. E-notebooks are time stamped, cannot be overwritten, and all edits are traceable.

**Specific Instructions:** Students need to follow the specific instructions outlined below in writing in their lab notebooks. Lab notebooks will be graded twice during the semester. Legible handwriting and neatness are crucial.

**Pre-laboratory write-up:**

Written before recitation on Monday in student's wording and not copied from the handouts. This will help you do well on the quizzes and finish labs on time. Prelab write-up includes

- **Title & Date of the experiment,**
- **Introduction**
- **Materials and Methods.**

**Lab notebook writeup format:**

1. *Table of Contents:* at the beginning of your notebook, dedicate a few pages for use as a table of contents; this should include the title of each experiment and the page numbers for each experiment. Keep it up to date as you write in your notebook.
2. *Title and Date:* this section should be written before class. The title of each experiment should be descriptive yet concise. Record the date (and what time, if applicable) the experiment was carried out.
3. *Introduction:* This section should be written with your own wording before the lab period. Cutting and pasting from handouts' material is NOT allowed. The introduction must contain
  - **the theory or background** behind the experiment (not more than 2 to 3 sentences)
  - **the question** to be investigated based upon the background (one sentence)
  - **the hypothesis** which includes the predicted results (one to two sentences maximum)
  - **the objectives** of the experiment (one to two sentences).
4. *Materials and Methods:* This section should be written before the lab period and then modified as needed during the execution of the experiment. You are required to write this section as a **Flow Chart** of the protocol to avoid lengthy write-ups. You should be able to follow the flow chart steps easily and allow others to repeat the experiment using only the protocol you have charted in your notebook.
5. *Lab Report: Results and discussion:* Students document their experimental data and analyze it by filling Lab Report forms designated by the instructor. Reports are due on Mondays after the experiment is done, They are usually graded and handed back to students the following week. Graded lab reports are then stapled to the notebook to serve as a "Results and Discussion" section. In research labs, and for legal reasons such as patents of experimental results, the raw data should go **directly** into the notebook.



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**Course Syllabus**

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6. *Graphs*: Students must use graphing software such as Excel to generate graphs. Keep e-copies of your graphs. Hand drawn graphs on regular paper are unacceptable.
7. *Conclusions* This section is written right after each experiment is completed. The conclusion must include:
  - A brief summary of the results of the experiment
  - A brief interpretation of the results
  - Significance of the findings
  - What you learned from this experiment
  - Future Directions: suggest would you do next! (“different” organism is NOT an option)
  - Answer the question: “did I achieve my objective/s?”

*Be critical in evaluating your data.* Just because you may have followed the protocol does not mean that your experiment succeeded. Analyze your results and comment on why an experiment failed, state what you might do differently to derive a successful or improved outcome.

8. *Instructors and/or TAs* signatures for signing in and out of the lab.

### Small projects/Poster Presentations<sup>23</sup>

Small Projects in Bioinformatics will be chosen by assigned groups of students. Students will work in groups during the second half of the semester under the mentorship of the instructors. Parts of the project will be submitted as small write-ups in stages that will be made available in a schedule on CANVAS. Small projects will culminate in a poster presentation at the end of the semester. Detailed instructions for the project assignments and the poster will be announced and posted on CANVAS.