

**Colorado State University Department of Biochemistry
BC 404 Comprehensive Biochemistry Lab (BC-404-L01)
Fall Semester 2020**

Instructor: Grant Schauer, Ph.D.
Office: BMB 231
E-mail: Grant.Schauer@colostate.edu
Office Hours: Monday 12:00 – 2:00PM via Zoom

Join Zoom Meeting:

<https://us04web.zoom.us/j/5072678303?pwd=bWxIamZic3Y5dDBod1NkbmdHS0pMdz09>

Meeting ID: 507 267 8303
Passcode: 8BMSUg

Teaching Assistant: Derek Anderson
E-mail: Derek.Anderson@colostate.edu
Office Hours: TBD

Schedule: 307 and 308 Yates, TR 2:00 – 4:50 PM

Textbook: none

Important information for Students related to COVID19 from the University:

All students should fill out a student-specific symptom checker each day before coming to class (<https://covidrecovery.colostate.edu/daily-symptom-checker/>). In addition, please utilize the symptom checker to report symptoms, if you have a positive test, or exposed to a known COVID contact.

If you know or believe you have been exposed or are symptomatic, it is important for the health of yourself and others that you report it through this checker. You will not be in trouble or penalized in any way for reporting. If you report symptoms or a positive test, you will receive immediate instructions on what to do and CSU's Public Health Office will be notified. Once notified, that office will contact you and most likely conduct contact tracing, initiate any necessary public health requirements and/or recommendations and notify you if you need to take any steps.

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

COVID-specific lab safety: This semester there are special COVID-related safety requirements.

We will be working at reduced capacity, ~50% of normal. This means that each member of a lab pair will be working on alternate days (one person Tuesday and one person Thursday). Occasionally, we may have you switch days, so please keep yourself available for both days.

By necessity, this lab requires activities that make optimal social distancing difficult. To address this, we have a high requirement for PPE. In addition to face masks, we also are required to wear eye protection in the form of face shields (provided) or goggles.

Course goal:

Learning goal #1: *Students will be able to plan, execute, and problem solve common molecular biology and protein chemistry techniques including: PCR, agarose and polyacrylamide electrophoresis, bacterial transformation, vector and PCR restriction digestion, protein expression, protein purification, enzymatic characterization, and site-directed mutagenesis.*

Learning goal #2: *Students will understand the underpinning theory and experimental design for the experimental techniques listed above leading to the transfer of such knowledge in future research that the student may perform.*

Learning goal #3: *Students will demonstrate proficiency in working with a partner to plan and direct a “mini” research project.*

Learning goal #4: *Students will learn to carry-out “hypothesis-driven” research. From their project students will present data and argue for whether their data supports or refutes their hypothesis.*

Canvas:

I will use this site to post all the protocols and procedures you will be using to successfully execute the biochemical techniques. Each week, there will be a small quiz, due Monday, to demonstrate that you have gone through and understand the material. I will try to post the appropriate protocols and videos by the end of the preceding week. I will also post your grades on Canvas.

Benchling
online notebook:

This semester we will be using [Benchling](#) as a solution for on-line lab notebooks. This will allow you to share information with your lab partner and remove the need to turn in a physical lab notebook. Please note that in addition to hosting the relevant Protocols on Canvas, Protocols will also be provided in the form of Templates in Benchling to facilitate entering info into your electronic notebook. Benchling also has some nice molecular biology tools that we should be able to use.

We will post more detailed Benchling instructions on Canvas.

Assessment:

Your grade will be derived from a number of places some of which is wrapped up in your ability to perform the experiments.

1. Primer Design- 10 points

- a. In order to mutate LDH you will need to design a point mutagenesis primer. This will be done in class and your design will be handed in and graded.

2. Weekly quizzes - 90 points

- a. Weekly quizzes are designed to test your (1) preparation for the upcoming week's labs, and (2) knowledge of theory for particular techniques as well as your skill in working with data.

3. Notebooks- 100 points

- a. 50 of these points will be given for your final ONLINE Benchling notebook at the end of the semester. Points will be given for:
 - i. Whether it is complete or not including, written objectives, methods ("a diagram of the setup with sufficient detail for reproducibility"), results (data including graphs, gel images, etc.), and conclusions for each day in lab.
 - ii. Legibility and organization.
 - iii. Accuracy of calculations.
 - iv. Line of reasoning for your conclusions based on results.
 - v. Dates consistent with the course layout. In other words, it was being completed as you worked, not at the end of the semester.
- b. 50 of these points will be given in at least two ONLINE Benchling notebook checks. KEEP THEM UPDATED and you won't lose points. The following criteria will be assessed when the notebooks are collected.
 - i. 5 points for written objectives of all the labs from the last check up to the current lab (that day).
 - ii. 5 points for written methods of all the labs from the last check up to the current lab (that day).
 - iii. 5 points for written results of all the labs from the last check up to the last lab fully executed.
 - iv. 5 points for written conclusion of all the labs from the last check up to the last lab fully executed.
 - v. 5 points for legibility and organization.
 - vi. There will not be any partial credit for these points. Either you get the 5 points, or you don't. For example, if you have all the purposes for the labs written except one then you lose 5 points.

4. Oral Report – 50 points

- a. At the end of the semester each group will present the results of their research in a short 10-minute (max) presentation. Details on the aspects of the report will be given later in the semester.

5. Lab participation – 20 points

- a. Attendance is necessary to ensure that your project progresses on schedule. **If you are unable to attend due to an excused absence or health-related concerns you need to email Professor Nishimura before missing class.** You should also contact your lab partner separately.
- b. Poor effort resulting in “lousy” data or slow progress will result in points being lost.
- c. Poor organization resulting in loss of samples will result in points being lost.

To be Successful: Here are some ways to be successful:

1. Come prepared knowing exactly what you are going to do and have your notebook prepared to take down data.
 - a. Watch the Online lectures to understand what will happen in each class.
 - b. LISTEN at the beginning of class for changes and additional instructions.
 - c. Read the protocol in advance.
2. Be careful in the way you proceed, do not rush through experiments.
 - a. Rushed science is usually bad science.
3. Carefully label your reagents and your products. Make sure you know where you have stored them.
 - a. Never throw away something unless you are sure you don't need it. Each lab procedure will tell you what to keep and what to throw away upon the completion of the lab.
4. Talk to your fellow classmates about things you are confused about.

Grades: The following is a complete breakdown of point accumulation:

<u>Assignment</u>	<u>Points</u>
Primer Design	10
Quizzes	90 (6 x 15 points)
Notebooks	60
Reports	50
<u>Lab participation</u>	<u>20</u>
Total	230

<u>Grade</u>	<u>Percentage</u>
A+	97 - 100%
A	93 - < 97%
A-	90 - < 93%
B+	87 - < 90%
B	83 - < 87%
B-	80 - < 83%
C+	77 - < 80%
C	73 - < 77%
C-	70 - < 73%
D	60 - < 70%
F	below 60%

Attendance: Attendance to every assigned class (you will be assigned alternate days) is mandatory for each experiment and the lectures. You must perform the experiments with your partner or you will start to lose points. There are obvious exceptions to this rule like a death in the family, extreme illness or a University excused absence. If you need to miss a class talk to me and we can talk about whether it is a valid reason and how we can arrange to make it right. In the case of an emergency or a tragedy deal with it first and then come see me.

Lab Safety: Some general policies regarding lab safety:

- 1) No open toed shoes (shorts are fine).
- 2) No "horse-play" in the lab.
- 3) No eating or drinking in the lab.
- 4) Place Backpacks on racks.

Academic Integrity: This course will adhere to the Academic Integrity Policy found in the Colorado State University [General Catalog](#).

End of the Semester: **I WILL NOT NEGOTIATE GRADES AT THE END OF THE SEMESTER.** It is my expectation that you will accept the grade assigned to you and take responsibility for YOUR work throughout the semester. Grade negotiation always leads to someone receiving special treatment and is a policy that I cannot abide as I desire to maintain an atmosphere of academic honesty and integrity. If you are concerned about your grade please come and talk to me **DURING** the semester when something **can be done** about it.

The Class Schedule: Below is a class schedule detailing each day and the experiment we will be running on that particular day. BC404 is an “authentic research experience” some weeks will require short visits to the lab outside of T/Th hours. We will work with you to get this done.

BC404-FA19 Daily Schedule – Subject to change	
Date	Experiment/Schedule
Day One - 8/25	Introduction (virtual)
Day Two - 8/27	(Pymol) and Primer Design (split day; Teams 1-5 2:-3:20, Teams 6-10 3:30-4:50)
Day Three – 9/1 (Monday Quiz 1)	PCR Experiment and Pouring an Agarose gel, DpnI reaction
Day Four – 9/3	Agarose Gel, and Transformation
Day Five – 9/8 (Monday Quiz 2)	Plasmid Isolation and DNA sequencing
Day Six - 9/10	(Sequence analysis - virtual) BL21 transformation
Day Seven – 9/15 (Monday Quiz 3)	Expression of Control (T/W/Th)
Day Eight - 9/17	Expression of Mutant (W/Th/F)
Day Nine - 9/22 (Monday quiz 4)	Purification of Control

Day Ten - 9/24	Purification of Mutant
Day Eleven – 9/29 (Monday quiz 5)	Enzyme Kinetics
Day Twelve – 10/1	Enzyme Kinetics
Day Thirteen - 10/6 (Monday quiz 6)	Protein quantification and SDS-PAGE
Day Fourteen - 10/8	Protein Quantitation and SDS-PAGE
Day Fifteen - 10/13	Lab Group presentation (Remote)
Day Sixteen – 10/15	Lab Group presentation (Remote)