

CHM 4300L – Laboratory in Biochemistry and Molecular Biology

Instructor

Alix Rexford

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Dr. Rexford's Office hours:

Monday, Tuesday, Thursday 2:00 – 3:00 PM in LEI 302

Or by appointment

Laboratory Manual (available at Target Copy)

Characterization of TEM1 β -Lactamase and Discovery of Antibacterial Metabolites from Streptomyces

Class Meetings

Pre-laboratory lecture:	Tuesday	9:30 AM – 10:45 AM	LEI 242
Laboratory:	Thursday	9:00 AM – 12:15 PM	LEI 200

Course Description

This course provides a practical, hands-on understanding of modern, fundamental techniques relevant to molecular biology and biochemistry. The laboratory covers topics including DNA cloning and manipulation, protein overexpression and purification, and enzyme kinetic measurements as well as the discovery of enzyme inhibitors and antibiotics from natural sources.

Additionally, this course provides instruction and feedback to help students improve their scientific writing. At the conclusion of this course students will have composed a journal-quality manuscript regarding their experimental findings in the laboratory.

Laboratory Attire

Students should wear safety glasses, gloves, and closed toe shoes with hair pulled back at all times while in the laboratory. Shorts, loose clothing, or jewelry are prohibited. Failure to follow safety precautions and proper use of PPE will result in your removal from the laboratory.

Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. [Find more information in the university attendance policies](#).

Honor Code

I expect each of you to follow the Student Honor Code, available on the web (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>)

You are expected to:

- uphold the highest standards of academic integrity in the student's own work,
- refuse to tolerate violations of academic integrity in the University community
- foster a high sense of integrity and social responsibility on the part of the University community.

Violations of the Honor Code will be reported to the Dean of Students, and may result in failure of the assignment in question and/or the course.

Laboratory Participation

Attendance is required for all lab sessions. **Please be on time!** Your performance grade depends on coming to lab on time, with proper safety attire, and having *read the experiment thoroughly in advanced*. All students will begin the semester with 50 laboratory participation points. Five (5) points will be deducted any time a student fails to clean up their station at the end of each laboratory. Five (5) points will be deducted for each tardy of ten minutes or more. Points may also be deducted for gross negligence in the lab or major errors in following protocols, at the discretion of the instructor.

There will be 1 – 4 short, pre-recorded lectures followed by questions to check your understanding which **MUST** be completed prior to attending lab for your own safety, as well as to ensure that everyone understands proper procedure. Proper preparation will allow you to work quickly to complete the lab in a timely manner.

Due to the continuity of the labs in the course, missed labs cannot be made up. If you miss a lab due to **an approved absence with appropriate documentation**, accommodations will be made. Missing a lab without an approved absence will result in a 10 point deduction from your course grade for the first absence, 40 point deduction for the second absence, and 100 point deduction for the third absence. Regardless of whether or not the absence is excused, you are still responsible for completing pre-lab quizzes and lab notebooks (using lab partner's data) by applicable deadlines.

Lecture Quizzes & Participation

Attendance is required for all lecture meetings on Tuesdays, 9:30 – 10:45 am. During the **lecture period** we will review concepts from the previous week and discuss theoretical concepts and results, as well as potential problems that may arise in the following week. After a short class discussion, students will work together on editing their manuscripts, complete problem sets, and/or data analyses. Your active participation in these small group sessions will determine your lecture participation score.

All students will begin the semester with 50 lecture participation points. Three (3) points will be deducted for each tardy of five minutes or more. Five (5) points will be deducted for each unexcused absence after the first unexcused absence. Points may also be deducted for lack of participation and discussion with your group, at the discretion of the instructor.

Assignments

OneNote will be utilized for E- lab notebooks, which will be graded for accuracy and completeness. Set up your notebook by navigating to the Class Notebook tab and opening the OneNote notebook. Each lab will have a dedicated page with an included grading rubric. You **MUST** use these pages to submit all lab notebooks. The lab notebook grading rubric provides an overview of how to complete each page and upload a document to OneNote, if desired. Do not copy and paste any text or figures into OneNote.

Select **data analyses** will be turned in via Canvas and graded on a PASS/FAIL basis. You will have at least one (1) chance to correct your data analyses before grades are final, however, you **MUST** turn in completed data analyses on the initial due date. Failure to attempt ALL parts of the assignment will result in a score of zero (0).

To make the most of our class time, you will have 10-30 minutes of pre-lab **videos to watch prior to lab**, followed by a short **quiz to check your understanding**. During the **lecture** we will review concepts from the previous week and discuss issues and results, as well as potential problems that may arise in the following week. After a short class discussion, students will work together on editing their manuscripts.

Throughout the semester you will be preparing a **publication-quality manuscript** encompassing the semester's project. During lecture I will introduce a single section of a research paper and assign journal articles to each student. The following week, you will present the journal article to your lab partners and discuss components of that section of the paper. You will also prepare a rough draft of each section of your paper and submit it to Canvas by the due date indicated in the table below.

<i>Manuscript Section</i>	Labs to be included	Rough Draft Due Date	Peer Reviews Due Date	Final Draft Due Date
Introduction	N/A	May 23	May 27	May 30
Methods	Labs 1-4	June 6	June 13	June 20
Results	Labs 1-6	July 7	July 8 (in class)	July 11
Discussion	Labs 1-8	July 18	July 22 (in class)	July 25
Final Poster	All Labs	---	---	August 7

Labs listed in the table above are **REQUIRED** to be included in your *final draft of the specified section*, although the most recent lab(s) may be excluded in the rough draft as you won't have completed it prior to the rough draft due date.

After submitting your rough draft on Canvas, you will be randomly assigned two (2) anonymous **peer reviews**. Instructors do not grade rough drafts. You must complete the peer reviews using the supplied rubric **AND** make a comment on the overall paper no later than the due date listed above to earn credit on rough drafts. If peer reviews are not completed, a score of zero (0) will be assigned for the rough draft. A copy of your lab notebook will earn zero (0) points regardless of completion of peer reviews.

After completing peer reviews and discussion with your lab partners, you should edit your paper section according to your class discussions and turn in a **final draft** by the due date listed above. These will be graded according to the provided rubric. Turning in an identical copy of the rough draft will result in zero (0) points on the final draft.

You are expected to make the recommended alterations to each report section on future submissions. Each lab group will collaborate on a final poster which contains highlights from each report section and is **due August 7, 2025**. A participation survey will be utilized to determine effort put into the final group project and scores will be determined accordingly.

Tentative lecture schedule:

<i>Date</i>	<i>Discussion Topics</i>	<i>Assignment</i>	<i>Due Date</i>
May 13	Project overview	Syllabus Quiz	May 16 @ 11:59 pm
	Introduction Section PowerPoint	Lab Overview Quiz	
May 20	Jigsaw: Introduction section	---	N/A
May 27	---	Problem Set: PCR primers	Pre-lab 3
		Data Analysis: PCR product quantitation	May 27 @ 11:59 pm

June 3	Method Section PowerPoint	Problem Set: Restriction digest 1	N/A
June 10	Jigsaw: Methods section	Problem Set: Restriction digest 2	Pre-lab 5
June 17	NO CLASS		
June 24	NO CLASS		
July 1	Results Section PowerPoint	Problem Set: Protein expression	Pre-lab 6
July 8	Results Section: In class peer reviews	Data Analysis: Expression Conditions	July 8 @ 11:59 pm
July 15	Discussion Section PowerPoint	Data Analysis: Linear regions	July 21 @ 7:00 pm
July 22	Discussion Section: In class peer reviews	Data Analysis: TEM1 Purification	July 22 @ 7:00 pm*
July 29	Poster Presentations PowerPoint	Data Analysis: Kinetics of TEM1	July 29 @ 11:59 pm
August 5	Optional: Poster Presentations		

Late Assignments

Laboratory notebooks will be kept on OneNote and locked no earlier than the Saturday one (1) week following the lab. Since it is not “turned in” it cannot be turned in late. Please keep up with your notebook weekly.

Pre-lab quizzes must be completed prior to the start of lab for your safety. There are no makeups for pre-lab quizzes.

Report section rough drafts are peer reviewed only. Instructors will not grade rough drafts. Full credit is earned on rough drafts by **turning it in on time AND completing peer reviews on time**. Rough drafts must be written in full sentences and follow the guidelines set forth in the powerpoint presentations and lab report grading rubric to earn ANY credit. A copy of your lab notebook will earn zero (0) points regardless of completion of peer reviews. **Failure to complete two (2) peer review grading rubrics prior to the lecture after rough drafts are due will result in zero (0) points for the rough draft.** Late submissions will be accepted with the deductions described below, however, it is the student's responsibility to notify the instructor that the rough draft was late in order to be assigned peer reviews.

Late submissions for report sections and the final manuscript are accepted with the following grade penalties:

10 % deduction: < 24 hours after due date

25 % deduction: 24 – 48 hours after due date

50 % deduction: 48 – 72 hours after due date

Not accepted after 72 hours late

*You almost never make up the points lost from turning it in late. I don't recommend doing it!

Grading

Assignment	Points
Laboratory notebooks	200
Pre-lab quizzes	100 total
Lab performance	50
Lecture quizzes & participation	50
Lab report rough drafts	50 total
Lab report final drafts	100 total
Final manuscript	50

Note that extra credit is built into the course assignments

The following letter grades will be assigned based upon total points accrued for all course work:

A: > 540 pts

B: 539.9 – 480 pts

C: 479.9 – 420 pts

D: 419.9 – 360 pts

E: below 360 pts

Regrades and Grading Errors

Mistakes happen and grading errors can be especially frustrating. I will do my best to make sure that you are always kept up to date with your performance in the course and post your grades in a timely manner. It is your responsibility to make sure that your grade on Canvas reflects the scores you receive on assignments and bring it to my attention ASAP when you notice a discrepancy. If you feel that a grading error was made on a particular assignment, you have ***one week from the date the grade was posted to Canvas*** to request a regrade. Regrades will include a rescore of the entire assignment and may result in a lower score. Scores that have been posted to Canvas for a minimum of one (1) week are final.

Student Responsibilities

You are expected to come to class on time and behave in a manner that is respectful to the instructor and to fellow students. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at a minimum.

Privacy Statement

For information about the privacy policies of the tools used in this course, see the links below:

- Instructure (Canvas)
 - [Instructure Privacy Policy](#)
 - [Instructure Accessibility](#)
- Zoom
 - [Zoom Privacy Policy](#)
 - [Zoom Accessibility](#)

Students with Disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center. See the [Get Started With the DRC](#) webpage on the Disability Resource Center site. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at gatorevals.aa.ufl.edu/public-results/

U Matter, We Care

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our online campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 911.

Tentative Laboratory Schedule (Dates subject to change)

<i>Date</i>	<i>Lab</i>	<i>DNA Molecular Biology/Protein Biochemistry</i>	<i>Streptomyces Microbiology</i>
May 15	1	Polymerase Chain Reaction	Plate Soil Samples
May 22	2	DNA Agarose Gel, PCR Cleanup & Restriction Digest	Select <i>Streptomyces</i>
May 29	3	DNA Agarose Gel & Cleanup, DNA Quantitation	Re-streak <i>Streptomyces</i>
June 5	4	Ligate DNA; Transform TOP10 Cells with Ligation Reactions	Prepare <i>Streptomyces</i> plate for Antibacterial Test
June 12	5	Miniprep Plasmid DNA; Restriction Digestion	Spot Bacterial Test Strains for Antibacterial Test
July 3	6	Restriction Digest Analysis; Pilot-Scale TEM1 Expression Trials	Start <i>Streptomyces</i> Liquid Culture

July 10	7	TEM-1 Purification from BL21(dE3) cells	Isolate Resin from Liquid Culture
July 17	8	Purification tests	Extract Metabolites from Resin
July 24	9	Inhibition assays	Kinetics w/TEM-1 & Antibacterial test
July 31	Virtual	Exploring TEM1 structure with PyMol	N/A