MCB 170L: Molecular and Cell Biology Lab (4 units)

Summer 2023 (Session A)
Lecture: M-Fri 11am-12pm in 120 LKS
Lab: Tue-Fri 1-4:30pm in 120 LKS

Instructor

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Course Overview

This laboratory course for majors in Chemical Biology, Cell Biology, and Biochemistry & Molecular Biology is designed to have students learn the theory and practicality of modern laboratory science.

The first third of the course will focus on Molecular Biology by creating plasmids and strains, learning common lab techniques, and gaining background information about Cin8. In the middle Cell Biology portion of the course you will learn about cell structure and the cytoskeleton with an emphasis on microscopy techniques. In the final Biochemistry portion you will be investigating properties of the kinesin Cin8 from the budding yeast *Saccharomyces cerevisiae* and its thermostable homolog from the filamentous yeast *Chaetonium thermophilum*, with a special emphasis on protein biochemistry: protein expression, purification, assays, and kinetics.

Data that you produce in the course will be shared with your classmates on bCourses for analysis and interpretation. You will be expected to interpret data from primary literature (Journal Club), analyze data (Worksheets, quizzes, class discussions), and present results orally (presentations of data). Upon completion of the course, the students should be able to evaluate data collected by laboratory experimentation, develop hypotheses to explain results, and design experiments to test the hypotheses.

Class time

There is one-hour lecture Monday to Friday starting at 11am and ending at 12pm.
The laboratory part of the class is from 1:00 to 4:30 Tuesday to Friday.
You are expected to be present in class and in lab throughout the 6 weeks.

Class preparation

You should purchase a lab manual and a lab notebook. Before each class period, you need to have read the portion of the lab manual corresponding to the day's work and come to class each day with a prepared experimental protocol written in the lab notebook. All the results and conclusions for each experiment have to be recorded. The quality of the lab notebook will be graded each week.

Expectations

Your success in this course depends on your readiness for each class, your participation in lab and your understanding of the material that will be evaluated regularly. The GSI and the instructors will be there to answer questions about experimental approaches and/or understanding of the experiment's principles and/or troubleshooting mistakes in experiments.

Prerequisites: MCB102, 104, 110, or 140

Grading:

- 20% Lab Citizenship:
  - Participation in team and class discussions of results
  - Journal club presentation
  - Preparedness, time management
  - Completeness of lab notebook
  - Attitude, willingness to learn, and attentiveness
- 20% Worksheets
- 35% Quizzes (take-home and microscope practical)
- 25% Final presentations

Attendance and Late Assignments

In-person class attendance in lecture and lab is required for this course, and the expectation is that you will complete the necessary work on time. If for reasons beyond your control you are unable to complete an assignment by the deadlines, you must contact the instructor ahead of time to make an alternative arrangement. Points will be deducted for late assignments.

Statement in Support of Students with Disabilities

If you require course accommodations due to a physical, emotional, or learning disability, contact UC Berkeley's Disabled Students' Program (DSP). Notify the instructor and GSI through course email of the accommodations you would like to use. You must have a Letter of Accommodation on file with UC Berkeley to have accommodations made in the course.

UC Berkeley is committed to providing robust educational experiences for all learners. With this goal in mind, we have activated the ALLY tool for this course. You will now be able to download reading materials in a format that best fits your learning preference (i.e., PDF, HTML, EPUB, and MP3). For more information visit the alternative formats link or watch the video entitled, "Ally in bCourses."

Statement in Support of Diverse Learning Communities

Consistent with UC Berkeley's Principles of Community, we are all responsible for creating an inclusive learning environment where diverse perspectives—expressed through race and ethnicity, culture, gender identities and sexual orientations, political and social views, religious and spiritual beliefs, learning and physical abilities, language and geographic characteristics, age, veteran status, and social or economic classes—are recognized, respected, and seen as a source of strength. We welcome your unique perspective as an individual. In the same manner, we expect you to treat every other individual in this course with respect and dignity. We encourage your suggestions on how to incorporate diversity in this course in a meaningful way.

Statement on Student Wellness

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep, and taking time to recharge your mental health. Taking time to care for yourself, and avoiding academic burnout, will help you achieve your academic, professional, and personal goals.

Support Resources include emotional, physical, safety, social, and other basic wellbeing resources for students. Academic resources can be found at the Student Learning Center and English Language Resource sites. Berkeley's Office of Emergency Management has resources to prepare for emergencies.

Statement on Academic Integrity

You're a member of an academic community at one of the world's leading research universities. Berkeley creates knowledge that has a lasting impact in the world of ideas and on the lives of others; such knowledge can come from an undergraduate paper as well as the lab of an internationally known professor. One of the most important values of an academic community is the balance between the free flow of ideas and the respect for the intellectual property of others. Scholars and students always use proper citations in papers; professors may not circulate or publish student papers without the writer's permission; and students may not circulate or post materials (handouts, exams, syllabi—any class materials) from their classes without the written permission of the instructor.

Any test, paper or report submitted by you and that bears your name is presumed to be your own original work that has not previously been submitted for credit in another course unless you obtain prior written approval to do so from your instructor. In all of your assignments, including your homework or drafts of papers, you may use words or ideas written by other individuals in publications, websites, or other sources, but only with proper attribution. If you're unclear about the expectations for completing an assignment or taking a test or examination, be sure to seek clarification from your instructor or GSI beforehand. For additional information on plagiarism and how to avoid it, read the UC Berkeley Library Citation Page, Plagiarism Section.

As a member of the campus community, you're expected to demonstrate integrity in all of your academic endeavors and will be evaluated on your own merits. The consequences of cheating and academic dishonesty—including a formal discipline file, possible loss of future internship, scholarship, or employment opportunities, and denial of admission to graduate school—are simply not worth it. Read more about Berkeley's Honor Code.

Statement on Collaboration

Reviewing lecture and reading materials and studying for exams can be enjoyable and enriching things to do together with one's fellow students. We recommend this. However, homework assignments should be completed independently and materials turned in as homework should be the result of one's own independent work. Some assignments, namely the preparation for the debate arguments, are meant to be done together in a group.

MCB 170L Biochemistry and Molecular Biology Laboratory

Summer 2023 Experiment Schedule

Lab Date	Module 1: Molecular Biology	Module 2: Cell Biology	Module 3: Protein Chemistry	Module 4: Genetics
5/22 LECTURE	**Safety quiz**			
5/23	Check in; Safety **A.** Pipetting practice and lab habits **1.1**: PCR; purification; digest; purify again			
5/24	**1.2**: run gel; ligation; transformation of DH5α		**B.** Exploring Cin8 conservation with genome database and bioinformatics	
5/25	**1.3**: Inoculate minipreps **Worksheet 1 due**			
5/26	**1.4**: miniprep, digest, run gel			
5/29 NO LECTURE	MEMORIAL DAY HOLIDAY			
5/30	**1.5**: Bacterial transformation: pET **Quiz 1 due**			**4.1**: Yeast transformation: ΔGFP
5/31	**1.6**: Pick and inoculate for purification (Exp3) **Worksheet 2 due**		**3.1**: Bradford assay	
6/1			**3.2**: Malachite Green assay	**4.2**: inoc yeast transformants
6/2	**Quiz 2 due**		**3.3**: Pour 7.5% SDS-PAGE gel **3.4**: Harvest bacteria for purification; label tubes for purification **Worksheet 3 due**	
6/5 LECTURE				
6/6		**2.1**: Cytoskeleton drugs treatment	**Worksheet 4 due**	
6/7		**2.2**: Cytoskeleton microscopy		
6/8		**2.3/2.4**: Prep of Chromosomes spreads		

6/9		**2.5**: FISH		
6/12 LECTURE				
6/13		**2.6**: Chromosomes spreads microscopy		
6/14		**2.7**: HeLa cells transfection		
6/15		**MICROSCOPE PRACTICAL (Quiz 3)**		
6/16		**2.7**: Subcellular localization vital stain		
6/19 NO LECTURE	JUNETEENTH HOLIDAY			
6/20		**Data discussion and presentation**		**4.3**: Serial dilution and plating
6/21			**3.5**: Cin8 purification and Bradford assay	
6/22			**3.6**: run SDS-PAGE gels; Coomassie and Western Blot	**4.3 cont**: Analysis of phenotypes
6/23			**3.7**: ATPase assay **3.6 cont:** blot and develop Western	work on figure + conclusions
6/26 LECTURE				
6/27			**3.8**: NADH-coupled ATPase assay	**Quiz 4 due**
6/28			Kinetics discussion and Presentation preparation	
6/29	Presentation preparation			
6/30	**Presentations**			

* Schedule is subject to change.