

CHEM 343
Spring 2020
Syllabus

CHEM 343.03/04

Biochemistry 1 Laboratory

Dr. Nicole Meyer

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Office: SCI 107

Office Hours: by appointment

Course Information

- Room: SCI 243
- Class meetings:
 - Tuesdays 9:00 – 11:45 AM
 - Thursdays 9:00 – 11:45 AM

Required:

1. Lab coat
2. Safety glasses or goggles
3. Plastic disposable gloves
4. Laboratory notebook (see page 3)
5. Signed safety agreement

Recommended:

1. Scientific calculator
2. Permanent marker for labeling tubes

Course Objective: The objective this course is to introduce and provide training for students in biochemical research methods through a series of training experiments and pursuit of a novel research experience. Some techniques that will be covered include: gel electrophoresis, protein quantitation assays, enzyme activity assays, protein expression, Nickel-affinity chromatography, and protein purification.

Lab Format: The first part of the semester will be an introduction to a variety of biochemical techniques, including: pipetting, SDS-PAGE, protein quantitation assay, and enzyme activity assays. The remainder of the semester will be devoted to a course-based undergraduate research experience (CURE) on malate dehydrogenase (MDH) from watermelon glyoxysome. Each pair of students will purify MDH and then formulate their own hypothesis surrounding MDH protein stability and design a series of experiments to test that hypothesis. Each individual student will present on their hypothesis prior to beginning their experiments, and then again at the end of the semester after carrying out their experiments to test their hypothesis. For an overview of the course schedule, see Table 1. This schedule is tentative and subject to change.

In some experiments you will be working in teams but for other experiments you will be working independently. Since one of the goals of this course is to develop confidence in scientific analysis and writing **it will be assumed that everyone will be responsible for performing all calculations, analysis (this includes constructing tables, figures, graphs) and report writing on their own.** Teamwork is another an essential aspect of the course, so everyone is expected to fully participate in all laboratory activities.

Table 1. Tentative CHEM 343 Spring 2020 Schedule

Week	Tuesday	Thursday
1	1/28	1/30
	Syllabus, Safety, Lab Tour, Data Collection for CUREs	Introduction to MDH, Lab Math Review
2	2/4	2/6
	Buffer Exercise, Pipetting Exercise	Pipetting Exercise Lab Math HW Due
3	2/11	2/13
	SDS-PAGE Experiment	SDS-PAGE Experiment Pipetting Exercise Due, SDB Quiz
4	2/18	2/20
	Protein Quantitation Experiment	Protein Quantitation Experiment SDS-PAGE Report Due
5	2/25	2/27
	Enzyme Assays Experiment	Enzyme Assays Experiment Protein Quantitation Report Due
6	3/3	3/5
	Scientific Literature Searching, MDH Paper Mapping	Hypothesis Development Enzyme Assay Report, Paper Mapping Due
7	3/10	3/12
	MDH Purification: Freeze/thaw cells	Hypothesis Presentations MDH Proposal Due
8	3/17	3/19
	MDH Purification: FPLC Introduction	EXAM I
9	3/23 - 3/27	
	Spring Break - No Class	
10	3/31	4/2
	Cesar Chavez Day - No Class	MDH Purification: FPLC and Dialysis
11	4/7	4/9
	MDH Purification: FPLC and Dialysis	MDH Analysis: SDS-PAGE and Bradford
12	4/14	4/16
	MDH Analysis: MDH Kinetics Assays	MDH Analysis: MDH Kinetics Assays and Solution Prep
13	4/21	4/23
	MDH Stability Tests	MDH Stability Tests MDH Purification Summary Due
14	4/28	4/30
	MDH Stability Tests	MDH Stability Tests Poster Draft Due (Intro, Methods)
15	5/5	5/7
	MDH Stability Tests, Poster Preparation	Checkout, Poster Preparation, Data Collection for CUREs
16	5/12	5/14
	Poster Presentations Final Poster Due	Poster Presentations
Finals	Thursday 5/21	
	EXAM II: 10:15 AM - 12:15 PM	

Discussion Format: On Tuesdays there is a one-hour lecture scheduled from 8 - 8:50 AM. However, this class will have pre-lab discussions at the beginning of most lab periods and this "lecture" block will be used for lab time as needed. We will start lab at 9 AM on both Tuesdays and Thursdays, but may start class early on some Tuesdays as needed. You are welcome to take breaks to go to the bathroom or have a snack throughout the lab period.

Course Website: The course iLearn page will have course materials such as exam practice problems, articles, and report guides. Your grade book will also be at this site. You will turn in many of your written assignments through Turnitin assignments on the iLearn page.

Laboratory Notebooks: Laboratory notebooks are required and must be brought to lab each time. Failure to bring your lab notebook to class will result in a three-point penalty. For each lab activity or experiment your notebook should have two sections: a pre-lab section and a lab section. For details on notebook layout and requirements see the "Laboratory Notebook Guidelines" document, available on the iLearn page. Notebook checks will be performed at random and up to 30 extra credit points will be given out for adequately complete notebooks.

Reports: The goal of this course is provide you with training to work in a research environment. Working in a research environment requires excellent communication skills. Writing scientific articles in peer reviewed journals is the primary method scientists use to convey the results of their research. The reports in this course will be worksheets rather than formal written reports, but the figures and tables in these "reports" should be prepared in a style that would be suitable for publication in a scientific journal. Guidelines for preparation of figures and tables are provided in the separate document, "Preparing Scientific Figures and Tables."

Due dates for each report are indicated in Table 1. Point values and due dates for all reports and other assignments are provided in Table 3. Assignment guides will be posted on the course iLearn page. **Late laboratory exercises/homework assignments/reports/posters will not be accepted and missing material will receive zero points.**

Grading Policy: The total number of points available in the course is 765. The course grade will be determined from reports, in-class exercises, a written proposal, a poster project, two presentations, two exams, and a quiz. Table 2 gives the percentage cutoff for each letter grade.

Attendance and Participation Policy: Attendance and participation are mandatory. If you provide me with a valid excuse for absence, one missed day will be tolerated. Missing subsequent class days or no valid excuse for your absence will result in a 20 point penalty per day that you do not attend. Any pre-lab or assignment points due on the missed day(s) will be given zero points. If you miss four days of class you will receive a **zero** in the course. A similar policy is in place for late arrivals. If you arrive to class late (10 min after class starts) three times 20 pts will be deducted from your final score. For each subsequent late arrival, 20 pts will be deducted.

Table 2. Relation between percent of points earned and grade

Percentage	Letter Grade	Percentage	Letter Grade
≥90	A	66-69	C
86-89	A-	62-65	C-
82-85	B+	58-61	D+
78-81	B	54-57	D
76-77	B-	52-53	D-
70-75	C+	<49	F

Table 3. Grade point distribution

Assignments	Points	Due Date
Lab Solutions WS	15	2/6
Pipetting Exercise	25	2/13
SDS-PAGE Experiment	40	2/20
Protein Quantitation Experiment	40	2/27
Enzyme Kinetics Experiment	40	3/5
Summary of MDH Protein Purification and Characterization	40	4/23
MDH Paper Mapping Exercise	15	3/5
MDH Proposal	25	3/12
Poster Drafts	50	4/30 (Draft), 5/12 (Final)
Point Total for Assignments	290	
Presentations		
	Points	Date
Hypothesis/Proposal Presentation	50	3/12
Final Poster Presentation	125	5/12 or 5/14
Point Total for Presentations	175	
Quizzes and Exams		
	Points	Date
Solutions, Dilutions, Buffer Quiz	50	2/13
Exam 1	125	3/19
Exam 2	125	5/21 10:15 AM - 12:15 PM
Point Total for Quizzes and Exams	300	
Course Total	765	
Note: There may be up to 30 extra credit points available for unannounced quizzes or lab notebook checks.		

Course Policy on Plagiarism/ Copying: Plagiarism, copying from a lab partner or anyone and all other unprofessional activity such as falsifying data, using data from someone who has already taken the course (unless permission is given) will not be tolerated. Should plagiarized or copied work be turned in, a score of zero will be given. If this behavior is repeated, a case will be filed with the SFSU Judicial Officer.

Course Goals and Student Learning Objectives

Students will learn a variety of skills and techniques essential for work in a biochemistry laboratory, including: how to prepare buffers, use a micropipette, estimate protein concentration, perform kinetic enzyme assays, estimate protein molecular weight and purity using SDS-PAGE, purify a protein, silver stain a gel, perform Western blots, analyze data, and present their results in both written and oral formats.

Student Learning Outcomes (SLOs)

Upon completion of this course, students should be able to do the following:

- Perform biochemical techniques, including: buffer, solution, and sample preparation, pipetting, protein purification, ion-exchange chromatography using FPLC, SDS-PAGE, silver stain, Western blot, estimation of protein concentration, and kinetic enzyme assays.
- Interpret experimental data and analyze it both quantitatively and qualitatively
- Communicate and present data in written and oral formats
- Maintain a proper and detailed laboratory notebook
- Work individually and as part of a team

IMPORTANT COLLEGE-WIDE INFORMATION:

Last day to add/drop a class without “W” is **Friday 2/14**.

Last day to withdraw from a course with a W is **Monday 4/27**.

The College of Science and Engineering has a policy on withdrawals and incompletes. After the drop deadline, withdrawal from a course is allowed only in the case of major health problems that arose during the semester, an unavoidable change in job hours, or a major family emergency. Incompletes require completion of at least 70% of the course with a grade of C or better. An incomplete automatically becomes an F if course work is not completed by the end of the academic year.

Students with Disabilities. Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. The DPRC is located in the Student Service Building and can be reached by telephone (voice/415-338-2472, video phone/415-335-7210) or by email (dprc@sfsu.edu).

Abuse Resources. SF State fosters a campus free of sexual violence including sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. If you disclose a personal experience as an SF State student, the course instructor is required to notify the Title IX Coordinator by completing the report form available at <http://titleix.sfsu.edu>, emailing vpsaem@sfsu.edu or calling 338-2032. To disclose any such violence confidentially, contact: **The SAFE Place** - (415) 338-2208, http://www.sfsu.edu/~safe_plc/ or the **Counseling and Psychological Services Center** - (415) 338-2208; <http://psyservs.sfsu.edu/>. For more information on your rights and available resources: <http://titleix.sfsu.edu>