

BMB 370 Introductory Biochemistry lab, FS22 syllabus

Course format

Credit hours: 3

Course modality: In person

Lecture: Monday, 8:00-8:50 am, BPS room 1420

Laboratory: Tuesday (section 001), Wednesday (section 002), and Thursday (section 003), 9:00-11:30 am, Biochemistry 117

Recitation: Friday, 12:40-1:30 pm BPS room 1420

Course website address <https://d2l.msu.edu/d2l/home/1543227>

Instructors

Dr. Erich Grotewold grotewol@msu.edu
Dr. Claire Vieille vieille@msu.edu
Dr. Sean Weise weisesea@msu.edu

Teaching assistants

Rees Rillema rillemar@msu.edu
Bianca Serda serdabia@msu.edu

Office hours:

Erich Grotewold	After November 3rd	By request
Claire Vieille	Until November 3rd	Monday, 4:00 pm to 6:00 pm
Sean Weise	Entire semester	Monday through Thursday, 12:00 pm to 4:30 pm
Rees Rillema	Entire semester	By request
Bianca Serda	Entire semester	By request

Description: This introductory laboratory course emphasizes basic quantitative laboratory skills and data analysis using biochemical methods and principles for the study of sugars, proteins, and nucleic acids.

Course Overview: BMB 370 provides an introduction to biochemical and molecular concepts, techniques, and data analysis tools commonly used in basic research and in industrial labs. The course has a course pack that contains the objectives, requirements, and procedures to be carried out in each of the laboratory periods. Weekly lectures introduce students to the concepts and methods involved in the corresponding lab period. Weekly lab periods familiarize students with basic biochemistry techniques using experiments with carbohydrates, proteins, and nucleic acids. These experiments and their analysis will provide a foundation for students who want to join research labs and apply for internships. Weekly recitations will cover experimental learning outcome debrief, data analysis, and general Q&A.

Required Course Materials and technology:

- Students must supply protective eye wear (splash-proof safety goggles)
- No shorts, sandals, or open-toed shoes are allowed in the laboratory
- Strongly suggested to bring your laptop computer (to directly collect data) and your phone (to take pictures of your work) in the lab
- Strongly suggested: use a scientific calculator for your homework and in the lab. We recommend the TI-30XA (\$10.82 on Amazon)
- No textbook is required for this course.
- The course will use **D2L** (accessed at <http://d2l.msu.edu>) and **Google Docs**.

- The D2L quiz feature (homework) works better in Google Chrome than in other browsers, so we strongly encourage you to use Chrome for your homework.

Desired course learning outcomes

After completing this course, students should be able to

1. Pipet accurately and reproducibly
2. Prepare simple pH buffers, solutions, and media
3. Prepare serial dilutions
4. Choose an appropriate buffer for a given pH
5. Quantify protein concentration in a sample
6. Perform simple enzyme assays and calculate enzyme activity
7. Determine solute concentrations in a sample using enzyme assays
8. Isolate plasmid DNA and understand the isolation process
9. Set up DNA restriction digests and run agarose gels
10. Set up a PCR reaction and understand conceptually what is taking place
11. Determine the size of a DNA fragment or a protein based on their migration in a gel
12. Represent experimental data using graphs and other visualization tools

Strategies to succeed in the course

- Attending the lectures and recitations is mandatory; taking notes of important concepts
- After missing a class, watching the recording of the lecture, or getting another student's notes
- Going over the slides of a lecture *before attending the lecture* to get familiar with the topic and to note any question that might come up during class
- Reviewing the lecture material and the course appendix before doing the homework and trying a first homework attempt without looking at course notes. Not relying on other students' answers as it defeats the learning process and does not prepare students for the exams and for working in a research lab
- Completing the for-credit D2L homework every week
- Reviewing the Monday lectures before coming to the lab session to help with understanding and navigating the lab experiments
- Actively contributing to team work in the lab to gain as many laboratory skills as possible, to test your understanding of the material, and benefit from peer learning
- Reading the homework feedback posted weekly on D2L to better learn how to set up calculations correctly
- Following the instructions to complete notebooks and turn in notebooks on time
- **ASKING QUESTIONS** during/immediately after lectures, during office hours, by making an appointment outside of office hours, during the lab periods, during recitations, or by e-mail
- Being proactive and not waiting until after the second exam to seek help on how to improve your grade

Learning Continuity

If you are unable to attend class for an extended period of time:

- Contact the instructors as soon as possible with a justification for your absence

- As much as the timing in the semester allows it, instructors will do their best to provide you with a timeline for completing the assignments.
- If you are absent for over a week, instructors will do their best to allow you to catch up with the learning experience as allowed by time and resource limits

Assessments: Class performance will be evaluated predominantly through weekly lab notebooks, weekly D2L homework, two in-class lab practicals and one final written exam. Students will receive problem sets to train/practice data analysis with step-by-step instructions for calculations one week prior to experiment time. Lab notebooks will be graded on critical analysis and interpretations as indicated by student-written conclusions.

Grades in BMB 370

Notebooks	55%
Two practical exams	20% (10% each)
D2L homework	15%
Final written exam	10%
Total	100%

You will be allowed to drop the homework with the lowest grade, as well as the notebook with the lowest grade. There is no possibility for late homework submissions.

Attending Monday lectures and Friday recitations is mandatory. Students will be allowed one unexcused missed Monday lecture and one missed unexcused Friday recitation without grade penalty. Each additional missed lecture or recitation will decrease grade by 0.5%.

The late penalty for notebooks is 25% of the points for the assignment per day (including weekends). All grades will be communicated through the D2L gradebook.

Challenging Grades

From the time an assignment's grade is posted, students have **2 weeks to challenge their grade** by contacting Dr. Weise with a list of items from the grading rubric they believe were graded incorrectly and noting where in the assignment they satisfactorily covered that content.

Honors option

Not finalized yet. Open to student suggestions.

Diversity, Equity, and Inclusion Policy

Inclusion and diversity are core values of MSU, the College of Natural Science, and the Department of Biochemistry & Molecular Biology. Drs. Grotewold, Vieille, and Weise are committed to creating and maintaining an inclusive classroom in which students can work together in an atmosphere free from all forms of discrimination and harassment. Along with the expectations for coursework, we expect that we will all treat each other with respect and collegiality, and that we will be open to conversations and perspectives that challenge our perspectives.

All people have the right to be addressed and referred to in accordance with their personal identity. Student should please let us know if they would like to use a name or pronouns different from those used for by the University.

Mandatory Reporting Policy

As professors, one of our responsibilities is to help create a safe learning environment for our students and for the campus as a whole. As members of the university community, we are

required to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination. If a student has a need to report about any such event(s), but would rather share information with a confidential employee who does not have this reporting responsibility, a list of those individuals can be found here <https://caps.msu.edu/>.

Policy on religious observance

It is the policy of MSU to permit students to observe holidays set aside by their chosen religious faith. If a student needs to be absent from class on a religious holiday, please make arrangements with instructors in advance.

Grief Policy

Please read the Grief Absence Policy at <https://reg.msu.edu/ROInfo/Notices/GriefAbsence.aspx>. Instructors will do their best to provide students with a timeline for completing homeworks and group worksheets compatible with students' absence.

Student Integrity and Academic Honesty Statement

Article 2.3.3 of the Academic Freedom Report states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the BMB Department adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide and/or the MSU Web site: www.msu.edu.)

Therefore, unless authorized by the instructor, students are expected to complete all course assignments, including homework, lab work, and exams, without assistance from any source. Students are expected to develop original work for this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. The instructor should be contacted if a student is unsure about the appropriateness of the course work (See also <http://www.msu.edu/unit/ombud/dishonestyFAQ.html>).

Important dates to remember

Classes Begin: Wednesday Aug 31st

University Closed: Monday Sept 5th

Open adds end: Monday Sept 7th, 8:00 pm

Last day to drop with refund: Friday Sept 23th

Last day to drop with no grade reported: Tuesday Oct. 18th, 4:00 pm

Break days: Monday Oct 24th – Tuesday Oct 25th

Thanksgiving, university Closed: Thursday Nov 24th – Friday Nov 25th

Classes End: Friday Dec 9th

Final Exam: Monday, Dec 12th, 7:45 am – 9:45 am

Course Schedule

CV: Claire Vieille; SW: Sean Weise; EG: Erich Grotewold

Date	Instructor	Session name	Lecture and lab topics	Homeworks	Notebooks
				Due on Mondays at 11:59 pm	Due on lab day at 9:00 am
Wed Aug 31	CV	Lecture 0	Introduction to the course		
Fri Sept 2	CV	Lecture 1	Measuring devices		
Mon Sept 5		Labor day		Homework 1	
Tues-Thurs Sept 6-8	SW	Lab 1			
Fri Sept 9	CV	Recitation 1			
Mon Sept 12	CV	Lecture 2		Homework 2	
Tues-Thurs Sept 13-15	SW	Lab 2	pH, pKa		Notebook 1
Fri Sept 16	CV	Recitation 2			
Mon Sept 19	CV	Lecture 3	Introduction to the spectrophotometer	Homework 3	
Tues-Thurs Sept 20-22	SW	Lab 3			Notebook 2
Fri Sept 23	CV	Recitation 3			
Mon Sept 26	CV	Review session			
Tues-Thurs Sept 27-29	SW-CV	Practical exam 1	Exam 1 is on labs 1 to 3		
Fri Sept 30	CV				
Mon Oct 3	CV	Lecture 4	Enzyme assays and effect of pH on enzyme activity	Homework 4	
Tues-Thurs Oct 4-6	SW	Lab 4			Notebook 3
Fri Oct 7	CV	Recitation 4			
Mon Oct 10	CV	Lecture 5	Total protein determination	Homework 5	
Tues-Thurs Oct 11-13	SW	Lab 5			Notebook 4
Fri Oct 14	CV	Recitation 5			
Mon Oct 17	CV	Lecture 6	Plasmid DNA purification	Homework 6	
Tues-Thurs Oct 18-20	SW	Lab 6			Notebook 5
Fri Oct 21	CV	Recitation 6			
Mon Oct 24	CV	Break			
Tue Oct 25	CV	Break			
Wed-Thurs Oct 26-27	SW	Lab 7	G6P and glucose concentration assays		
Fri Oct 28	CV	Recitation 7			
Mon Oct 31	CV	Review session			
Tues-Thurs Nov 1-3	SW-CV	Practical exam 2	Exam 2 is on labs 4 to 6		
Fri Nov 4	CV				
Mon Nov 7	EG	Lecture 8	Restriction enzymes	Homework 8	
Tues-Thurs Nov 8-10	SW	Lab 8			Notebook 6
Fri Nov 11	EG	Recitation 8			
Mon Nov 14	CV	Lecture 9	PCR	Homework 9	
Tues-Thurs Nov 15-17	SW	Lab 9			Notebook 8
Fri Nov 18	CV	Recitation 9			
Mon Nov 21	CV	Review session			
Tue Nov 22	SW	Lab 7	glucose concentration assays		
Wed Nov 23		No lab			
Thu Nov 24		Thanksgiving			
Mon Nov 28	CV	Lecture 10	Affinity column protein purification	Homework 10	
Tues-Thurs Nov 29-Dec 1	SW	Lab 10			Notebook 9
Fri Dec 2	CV	Recitation 10			
Mon Dec 5	EG	Lecture 11	Electrophoresis of purified protein	Homework 11	
Tues-Thurs Dec 6-8	SW	Lab 11			Notebook 10
Fri Dec 9	EG	Recitation 11			
Mon Dec 12, 7:45-9:45 am	EG	Written exam	written exam mostly on labs 8 to 11		