

BMB 370 – Introductory Biochemistry Lab

Course format

Credit hours: 3
 Course modality: In person
Lecture: Monday, 8:00–8:50 am, BPS room 1410
Laboratory: Tuesday (section 001), Wednesday (section 002), and Thursday (section 003), 9:10–12:00 am, Biochemistry 113 and 117
Recitation: Friday, 12:40–1:30 pm BPS room 1410

Course website addresses

<https://d2l.msu.edu/d2l/home/1859320> (Lecture)
<https://d2l.msu.edu/d2l/home/1859336> (section 001)
<https://d2l.msu.edu/d2l/home/1859331> (section 002)
<https://d2l.msu.edu/d2l/home/1859325> (section 003)

Instructors

Dr. Peter Lundquist pklundqu@msu.edu
 Dr. Claire Vieille vieille@msu.edu
 Dr. Sean Weise weisesea@msu.edu

Teaching assistants

Peixuan Yu yupeixua@msu.edu
 Connor Powers powersco@msu.edu
 Alex Jutila jutilaal@msu.edu

Office hours

Claire Vieille	Monday, 4:00 pm to 6:00 pm, BPS Rm 6172, after March 11th only
Sean Weise	Monday – Thursday, 12:00 pm to 4:30 pm, Biochemistry Rm 105

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. 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. Students are provided with written and oral instructions on how to complete the lab. The experiments and their analysis provide a foundation for students who want to join research labs and apply for internships. Weekly recitations cover experimental learning outcome debrief, data analysis, and general Q&A.

Required Course Materials and technology

- Students must supply protective eye wear (safety glasses)
- 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 to use a scientific calculator for your homework and in the lab.
- 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 and other molecules in a sample
6. Perform simple enzyme assays and calculate enzyme activity
7. Isolate plasmid DNA and understand the isolation process
8. Set up DNA restriction digests and run agarose gels
9. Set up a PCR reaction and understand conceptually what is taking place
10. Determine the size of a DNA fragment or a protein based on their migration in a gel
11. 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 lab companion 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 you for the exams and for working in a research lab
- Completing the for-credit D2L homework every week (deadline Friday 11:59 pm)
- 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, turning in notebooks on time, and reading the feedback associated with the weekly lab notebook grading
- **ASKING QUESTIONS** during/immediately after lectures, during office hours, during appointments 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

Grading policies

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.

Tentative grading scale	
%	Grade
≥ 90	4
≥ 85	3.5
≥ 80	3
≥ 75	2.5
≥ 70	2
≥ 65	1.5
≥ 60	1
≤ 60	0

Grades in BMB 370

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

- You will receive 2 points in your lab notebook grade for arriving on time and being ready to start the lab promptly at 9:10 am.
- Unless excused, you will lose 25% of your notebook grade for arriving in the lab after 10:10 am (one hour late)
- Your first lab missed will be dropped with no questions asked. If you do not miss any lab during the semester, your lowest notebook score will be dropped.
- If you miss a second lab, you need to provide justification and arrange a make-up time with Dr. Weise. Please let Dr. Weise know as soon as you can to make arrangements. If you miss an arranged make-up time without a 24 h advance notification, you will not receive credit for that lab.
- For any further lab you miss, you can still turn in your lab notebook for 50% credit using data from your lab partner or requesting data from Dr. Weise.
- You have one week to complete each lab notebook. Because of the ample time provided, lab notebooks turned in late due to last minute computer problems, unanticipated illness, or other life events will be graded as late. Please do not leave lab notebook completion to the last minute. The late penalty for notebooks is 10% of the points for the assignment per day (including weekends), up to a maximum of 50% off.
- No notebooks will be accepted past two weeks after the deadline. All grades will be communicated through the D2L gradebook.
- Your lowest homework score will be dropped to accommodate events such as illnesses.

You must provide adequate documentation to the instructor for an absence to be excused. Excusable absences include academic absences (e.g., conference attendance), attending a funeral, or illness. In the case of medical absences you are welcome and encouraged to redact as much information from the "doctor's note" as you would like, as long as the note still conveys the evidence of illness during the relevant time-period that prevents attendance. Weddings and leisure/family travel do not constitute excusable absences.

Learning continuity

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

- Contact the instructors as soon as possible with a documented justification for your absence
- If you have a justified absence 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

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 believed to be graded incorrectly and noting where in the assignment they satisfactorily covered that content.

Honors option

TBA

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. 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 own perspectives.

All people have the right to be addressed and referred to in accordance with their personal identity. Students should please let us know if they would like to use a name or pronouns different from those used for you 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:	Monday Jan 8th
Martin Luther King day:	Monday Jan 15th
Classes not held:	Tuesday Feb 13th
Spring break:	Monday Feb 26th – March Mar 1st
Middle of semester	Monday Mar 4th
Classes End:	Sunday Apr 21th
Final Exam:	Monday Apr 22th, 7:45 am – 9:45 am (tentative)

Course Schedule

CV: Claire Vieille; PL: Peter Lundquist; SW: Sean Weise					
Date	Instruct	Session	topics	Homeworks	Notebooks
Mon Jan 8	PL	Intro course		Due Fri at 8:45 am	Due lab day at 9:00 am
Tues-Thurs Jan 9-11		No lab			
Fri Jan 12	PL	Lecture 1		Homework 0	
Mon Jan 15		MLK day			
Tues-Thurs Jan 16-18	SW-PL	Lab 1	Measuring devices		
Fri Jan 19	SW	Recitation 1		Homework 1	
Mon Jan 22	CV	Lecture 2	pH, pKa		
Tues-Thurs Jan 23-25	SW-CV	Lab 2			Notebook 1
Fri Jan 26	SW	Recitation 2		Homework 2	
Mon Jan 29	PL	Lecture 3	Introduction to the spectrophotometer		
Tues-Thurs Jan 30-Feb 1	SW-PL	Lab 3			Notebook 2
Fri Feb 2	SW	Recitation 3		Homework 3	
Mon Feb 5	PL	Lecture 4	Enzyme assays and effect of pH on enzyme activity		
Tues-Thurs Feb 6-8	SW-PL	Lab 4			Notebook 3
Fri Feb 9	SW	Recitation 4		Homework 4	
Mon Feb 12	PL	AI Lecture	Using ChatJPT		
Tues-Thurs Feb 13-15		No lab			Notebook 4
Fri Feb 16		No recitation			
Mon Feb 19	PL	Review session	Exam 1: labs 1-3		
Tues-Thurs Feb 20-22	SW-PL	Practical exam 1			
Fri Feb 23	SW	No recitation			
Mon-Fri Feb 26-Mar 1		Spring Break			
Mon Mar 4	PL	Lecture 5	Total protein determination		
Tue-Thurs Mar 5-Mar 7	SW-PL	Lab 5			
Fri Mar 8	SW	Recitation 5		Homework 5	
Mon Mar 11	CV	Lecture 6	Plasmid DNA purification		
Tues-Thurs Mar 12-14	SW-CV	Lab 6			Notebook 5
Fri Mar 15	SW	Recitation 6		Homework 6	
Mon Mar 18	CV	Review session	Exam 2: labs 4-5		
Tues-Thurs Mar 19-21	SW	Practical exam 2			
Fri Mar 22		No recitation			
Mon Mar 25	CV	Lecture 7	Restriction enzymes		
Tues-Thurs Mar 26-28	SW-CV	Lab 7			Notebook 6
Fri Mar 29	SW	Recitation 7		Homework 7	
Mon Apr 1	CV	Lecture 8	PCR		
Tue-Thurs Apr 2-4	SW-CV	Lab 8			Notebook 7
Fri Apr 5	SW	Recitation 8		Homework 8	
Mon Apr 8	CV	Lecture 9	Affinity column protein purification		
Tues-Thurs Apr 9-11	SW-CV	Lab 9			Notebook 8
Fri Apr 12	SW	Recitation 9		Homework 9	
Mon Apr 15	CV	Lecture 10	Electrophoresis of purified protein		
Tues-Thurs Apr 16-18	SW-CV	Lab 10			Notebook 9
Fri Apr 19	CV	Recitation 10			Homework 10
Mon Apr 22, 7:45-9:45 AI	SW-CV	Written exam	On labs 6-10		Notebook 10