

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 117

Recitation: Friday, 12:40–1:30 pm BPS room 1410

Course website address

<https://d2l.msu.edu/d2l/home/1673719>

Instructors

Dr. Peter Lundquist

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Dr. Claire Vieille

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Dr. Sean Weise

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Teaching assistants

Febri Susanto

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Harrison Nabors

naborsha@msu.edu

Office hours:

Peter Lundquist	Until February 27th	Monday, 12:50 pm to 1:50 pm, Plant & Soil Science Building, Rm A494E
Claire Vieille	Starting March 13th	Monday, 4:00 pm to 6:00 pm, BPS Rm 6172
Sean Weise	Entire semester	Monday – Thursday, 12:00 pm to 4:30 pm, Biochemistry Rm 105
Febri Susanto	Entire semester	TBD
Harrison Nabors	Entire semester	TBD

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 (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: 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 (deadline Tuesday 8:45 am)
- 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	50%
Three practical exams	3 x 10%
D2L homework	10%
Final written exam	10%
Total	100%

The lowest lab notebook score and the lowest homework score will be dropped to account for events such as illness.

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 students are welcome and encouraged to redact as much information from the "doctor's note" as they would like, that still conveys the evidence of illness during the relevant time-period that prevents attendance. Weddings and leisure/family travel do not constitute excusable absences.

You will have one (1) week to complete your lab notebook for each week's laboratory exercises. Because of the ample time provided, lab notebooks turned in late due to last minute computer problems, unanticipated illness, or other life events will not be excused and will be graded as late. Please do not leave lab notebook completion to the last minute. 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.

If you have an unexcused absence from a lab, you can still turn in the notebook for that lab but will receive 50% credit.

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

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. 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>).

Syllabus SS23 BMB 370 – Introductory Biochemistry Lab

Important dates to remember

Classes Begin:	Monday Jan 9 th
University Closed:	Monday Jan 16 th
Last day to drop with no grade reported:	Wednesday Mar 1 st , 4:00 pm
Spring break:	Monday Mar 6 th – Friday Mar 10 th
Classes End:	Friday Apr 28 th
Final Exam:	May 1 st , 7:45 am – 9:45 am

Course Schedule

CV: Claire Vieille; PL: Peter Lundquist; SW: Sean Weise					
Date	Instructor	Session name	topics	Homeworks	Notebooks
Mon Jan 9	PL	Lecture 1	Introduction to the course - Measuring devices	Due Tues at 8:45 am	Due lab day at 9:00 am
Tues-Thurs Jan 10-12	PL	Lab 1		Homework 1	
Fri Jan 13	PL	Recitation 1			
Mon Jan 16		MLK day	pH, pKa	Homework 2	Notebook 1
Tues-Thurs Jan 17-19	SW	Lab 2			
Fri Jan 20	PL	Recitation 2			
Mon Jan 23	PL	Lecture 3	Introduction to the spectrophotometer	Homework 3	Notebook 2
Tues-Thurs Jan 24-26	SW	Lab 3			
Fri Jan 27	PL	Recitation 3			
Mon Jan 30	PL	Review session	Exam 1: labs 1-3		Notebook 3
Tues-Thurs Jan 31-Feb 2	SW-CV	Practical exam 1			
Fri Feb 3					
Mon Feb 6	PL	Lecture 4	Enzyme assays and effect of pH on enzyme activity	Homework 4	
Tues-Thurs Feb 7-9	SW	Lab 4			
Fri Feb 10	PL	Recitation 4			
Mon Feb 13	PL	Lecture 5	G6P and glucose concentration assays	Homework 5	Notebook 4
Tues-Thurs Feb 14-16	SW	Lab 5			
Fri Feb 17	PL	Recitation 5			
Mon Feb 20	PL	Lecture 6	Total protein determination	Homework 6	Notebook 5
Tues-Thurs Feb 21-23	SW	Lab 6			
Fri Feb 24	PL	Recitation 6			
Mon Feb 27	PL	Review session	Exam 2: labs 4-6		Notebook 6
Tue-Thurs Feb 28-Mar 2	SW-PL-CV	Practical exam 2			
Fri Mar 3					
Mon-Fri Mar 6-10	CV	Spring Break			
Mon Mar 13	CV	Lecture 7	Plasmid transformation	Homework 7	
Tues-Thurs Mar 14-16	CV	Lab 7			
Fri Mar 17	SW	Recitation 7			
Mon Mar 20	CV	Lecture 8	Plasmid DNA purification	Homework 8	Notebook 7
Tues-Thurs Mar 21-23	SW-CV	Lab 8			
Fri Mar 24	CV	Recitation 8			
Mon Mar 27	CV	Lecture 9	Restriction enzymes	Homework 9	Notebook 8
Tues-Thurs Mar 28-30	SW	Lab 9			
Fri Mar 31	CV	Recitation 9			
Mon Apr 3	CV	Review session	Exam 3: labs 7-9		Notebook 9
Tue-Thurs Apr 4-6	SW-PL-CV	Practical exam 3			
Fri Apr 7					
Mon Apr 10	CV	Lecture 10	PCR	Homework 10	
Tues-Thurs Apr 11-13	SW	Lab 10			
Fri Apr 14	CV	Recitation 10			
Mon Apr 17	CV	Lecture 11	Affinity column protein purification	Homework 11	Notebook 10
Tues-Thurs Apr 18-20	SW	Lab 11			
Fri Apr 21	CV	Recitation 11			
Mon Apr 24	CV	Lecture 12	Electrophoresis of purified protein	Homework 12	Notebook 11
Tue-Thurs Apr 25-27	SW	Lab 12			
Fri Apr 28	CV	Recitation 12			
Mon May 1, 7:45-9:45 AM	CV	Written exam	On labs 10-12		Notebook 12