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
Lab Lecture: Friday, 12:40–1:30 pm BPS room 1410
Lectures and lab attendance is mandatory.

Instructors

Dr. Sean Weise weisesea@msu.edu
Dr. Melanie Balbach balbachm@msu.edu
Dr. Erich Grotewold grotewol@msu.edu

Teaching assistants

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Office hours:

Dr. Weise	Monday – Thursday 2 - 4pm Biochemistry Rm 105B
Dr. Balbach	TBD, Biochemistry 402A
Dr. Grotewold	TBD, Biochemistry 310A

Course Description:

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 proteins, and nucleic acids. These experiments and their analysis provide a foundation for all biochemistry students but particular to those who want to join research labs and apply for internships. Weekly lab lectures cover experimental learning outcomes, 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
- Laptop computer (**not chromebook**) and smart phone will be required in lab each week
- Because of the need for Microsoft Office apps as well as SnapGene Viewer software, a PC or Mac is required. Chromebooks will not work.
- Basic scientific calculator, the Texas Instruments TI-30Xa is recommended. A more complicated graphing calculator is often a hindrance
- Standalone (**not web browser-based)** Microsoft Office apps Excel, Word, and PowerPoint. Instructions for downloading these apps for free can be found here: https://tech.msu.edu/technology/hardware-software/microsoft-licenses/#undergrad

Grading Policies:

Class performance will be evaluated through weekly lab notebooks, weekly D2L homework, two in-class lab practical exams and one final written exam.

Notebooks	40%
D2L homework	5%
2 practical exams	18.3% each
Final written exam	18.3%
Total	**100%**

Grading Scale

%	Grade
90.0 – 100	4.0
85.0 – 89.9	3.5
80.0 – 84.9	3.0
75.0 – 79.9	2.5
70.0 – 74.9	2.0
65.0 – 69.9	1.5
60.0 – 64.9	1.0
0 - 59.9	0

Lecture, lab, and lab lecture are all mandatory.

Homework

- **Due Monday of each week at 11:59 pm**
- Cumulative average homework grade worth 5% of the total course grade
- Homework consists of 10 multiple choice questions on the lecture channel of D2L. The homework is linked from the content tab on D2L for each week's lab.
- The homework is designed as a partial review of Monday's lecture and to prepare you for the weeks lab. Homework questions are often designed to encourage you to read the lab ahead of time.
- For every math problem that you will asked in the lab there is a similar problem in the homework. Help with homework problems can be found in the "Lab Companion" which is under "Important Information" in the lecture channel of D2L.
- The answers to all the homework questions are posted on D2L the day after the homework is due. The answer key has full explanations to the theoretical questions and has all the math problems fully worked out with explanations.
- All homework assignments are available for you on D2L from the first day of class. There will be no extensions of homework due dates.

Lab Notebooks

- **Due the following week of the lab, Tuesday, Wednesday, or Thursday at 8:30 am**
- Lab notebooks are to submitted in PDF format via a dropbox in your section channel of the course on D2L. The dropboxes for each week's notebook are under "Assignments"
- Cumulative average lab notebook grade with 40% of the total course grade
- **Late lab notebook submissions will not be graded.** Each lab notebook is expected to take no more than five hours to complete. Students have seven days to complete the lab notebook before the actual due date, and it is expected that students will be working on the lab notebook well before the deadline. Only extraordinary and verifiable circumstances will be considered as an excuse for missing a deadline. Retroactive requests for accommodations will not be considered. Lab notebooks turned in at 8:31am will be considered late and will not be graded.
- Two points in each lab notebook grade are given for arriving to lab on time, having filled the required tables in the lab instructions ahead of time, and being ready to start the lab promptly at 9:10 am. Filling out tables ahead of time is designed to encourage you to read the lab ahead of time.

- Lab notebook grades will be decreased by 25% for arriving to the lab 0.5 hour late and by 50% for arriving 1 or more hours late.
- Lab notebook requirements are stated at the end of each week's lab instructions. These are under the headers "Data Analysis" and "Conclusions"
- Points will be deducted for incorrect grammar and spelling mistakes on these assignments. Please take the time to proofread your answers before turning them in.
- **DO NOT** turn in the lab instructions for your lab notebook. If you do there will be a 25% penalty. There is a specific "Lab Notebook Template" for the lab notebooks which is posted under "Important Information" on the lecture channel of D2L.
- There is an example lab notebook posted on D2L for the first weeks lab so you can see what a lab notebook should look like.
- An important part of science is professionalism. We will start learning how to present professional looking results in this course. Because of this there are very specific guidelines for all the sections of the lab notebook. These guidelines are specified in the Lab Companion. Failure to adhere to these guidelines will result in point deductions for the lab notebook.
- Lab notebooks cannot be resubmitted once they have been graded.

Practical Exams

- The average of each practical exam is worth 18.3% of the total course grade
- Practical exams are exams where you preform lab methods almost identical to what we did in class and prepare a short exam report to be turned in on D2L before the end of the exam period.
- Tables, graphs, and answers to questions should follow the same guidelines as the lab notebook.
- The methods you will be asked to do for the exams are posted on D2L under "Exams".
- There will also be a few short answer questions covering the theory part of the course on each practical exam. The subject matter of those questions is also contained in the practical exams posted on D2L.
- Practical exam 1 is open note. Practical exam 2 is open note and computer. Cell phone use, except to post pictures of calculations on exam 2, is not permitted. Even with the open note policy a thorough understanding of the theory and methods are required to do well on the exam.
- Practical exams are due at the end of the exam period at 12:00 pm. There will be a 1% deduction for every minute late.
- Practical exams are to be submitted on paper for exam 1 and in PDF format via a dropbox in your section channel of the course on D2L for exam 2. The dropbox for the practical exam is under "Assignments"
- Points may be deducted for excessive grammar and spelling mistakes on exams. Please review your answers before turning them in.

Final Exam

- The average final exam score is worth 18.3% of the total course grade
- A study guide and example exam from a previous year are posted on D2L under "Exams"
- The final exam is a written short answer exam administered during exam week. Usually for this course it is Monday at 7:45 am in the same room in which we have lectures.
- The exam is 2 hours long. Extra time on the exam will not be permitted without RCPD accommodation.
- The exam is not open book but you are allowed to bring a 5' x 8' notecard filled with whatever you can fit on the card. The card can be filled out front and back. Cards larger than 5' x 8' will be cut to

5’ x 8’ at the instructor’s discretion prior to the start of the exam. Even with the notecard a thorough understanding of the theory, methods, and calculations are required to do well on the exam.

- Bring a calculator to the exam. It will be needed.
- Cell phone use, even for a calculator, is prohibited on exams. Cell phone use will result in a 0 for the exam.
- The final exam is not cumulative and will cover the molecular biology and recombinant protein purification labs that were not covered on the practical exams.
- Points may be deducted for excessive grammar and spelling mistakes on exams. Please review your answers before turning them in.

Lab and Exam Attendance Policies:

- No more than two excused absences are allowed. After this an absence will be considered an unexcused absence.
- No more than two unexcused absences are allowed. The third unexcused absence will result in a 0 for the course.
- The maximum number of absences allowed is 2 excused absences and 2 unexcused absences. A fifth absence will result in a 0 for the course.
- Students must provide adequate documentation to the instructor preferably before, but no later than 48 hours after the absence for an absence to be excused. It is the student's responsibility to contact Dr. Weise regarding excusable absences. Absences will not be excused retroactively (after 48 hr). Excusable absences include academic absences (e.g., conference attendance), attending a funeral, or illness. In the case of medical absences students are welcomed 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 time period that prevented attendance. Participation in sports (MSU or other), weddings, and leisure/family travel or family obligations do not constitute excusable absences.
- For an absence to excused for a funeral a grief absence must be obtained from the College of Natural Science. https://natsci.msu.edu/undergraduate/current-students/undergraduate-academic-student-affairs/index.aspx
- Make-up labs and exams will be offered for excused absences only. All make-up labs and exams must be completed within one week of the missed lab. A missed make-up lab will default to the unexcused absence policy of 50% credit using data provided by Dr. Weise and will be due at the original date with an additional 10% off for each day late. A missed make-up exam will result in a 0 for that exam.
- Lab notebooks for the first absence (excused or unexcused) can be turned in by the original due date for 100% credit using data provided by Dr. Weise. It is the responsibility of the student to contact Dr. Weise to request data.
- Lab notebooks for excused absences can be turned in for 100% credit. Except under unusual circumstances the lab notebook will still due by the original due date and time.
- Lab notebooks for unexcused absences can be turned by the original due date and time for 50% credit using data provided by Dr. Weise. It is the responsibility of the student to contact Dr. Weise to request data.
- There are no make-ups for unexcused exam absences. An unexcused exam absence will result in a 0 for that exam.

Cheating and Academic Dishonesty Policies:

- While most lab work is done in pairs, students are expected to do their own work on lab notebook submissions. Duplicated lab notebooks, whole or in part, will result in a 0 for that lab notebook for all students involved.
- A second incidence of cheating will result in a 0 for the course and reporting to the university.
- AI may be used to assist in the understanding of material for the completion of lab notebooks. This is viewed no differently than conducting a web search for information.
- Direct answers to questions, calculations, graphs, or figures generated by AI may not be submitted (cited or uncited) in lab notebooks or exams. This is considered plagiarism and defeats the learning process.
- Work generated by AI will result in a 0 for that lab notebook. A second incidence will result in a 0 for the course and reporting to the university.
- Cheating or submission of work generated by AI on exams will result in a 0 for that exam and reporting to the university.
- Leaving the exam room prior to the submission of the exam without the consent of the instructor may constitute cheating and result in a 0 for the exam
- Students are expected to develop original work for this course. (See also http://www.msu.edu/unit/ombud/dishonestyFAQ.html).
- Falsified documentation for an absence will result in a 0 for the lab notebook or exam involved and reporting to the university.

RCPD Accommodation:

- It is the responsibility of students with RCPD accommodation letters, to present these to the instructors during the first week of the semester, or as soon as the accommodation is granted (even if you do not intend to use the accommodation). RCPD accommodations will not be granted retroactively.
- It is the responsibility of students with RCPD accommodation to contact and meet with the instructor during office hours so we are aware of the students preferred implementation of the accommodation. This ensures that in lab or on exam day things go smoothly and predictably. This can also help avoid disclosure of accommodation to other students.

Challenging Grades:

From the time an assignment's grade is posted, students have **1 week to challenge their grade** by contacting Dr. Weise, **not the TA**. This is best done during Dr. Weise's office hours. Grading challenges will not be considered during class or lab time. Grading challenges will not be considered after 5 pm on the Friday of finals week regardless of when the grade was posted.

Strategies to succeed in the course:

- Attendance to lectures (Mon and Fri) and lab is mandatory. You will be expected to know everything mentioned during class or lab time. **Take notes.**
- If you miss a class or a lab, get notes from another student and contact Dr. Weise for data to submit a lab notebook. 50% credit is better than 0 credit.
- If you missed a lab that will be covered on the first or second lab practical, contact Dr. Weise to arrange a time to familiarize yourself with the lab protocol you missed.
- Complete the required tables and familiarize yourself with the protocol before coming to lab. Students are expected to read the lab before coming lab.

- Students often find that working from a printed copy of the lab instructions works better than reading it from a laptop or tablet in lab. If you have access to a printer print out each weeks lab instructions.
- Download and use the Lab Companion posted on D2L to help solve homework and lab problems. Understand what you are doing, do not blindly follow formulas.
- Do not rely on online answers or other students' answers for homework. It defeats the learning process, does not prepare you for the exams, or for working in a research lab.
- Be an active participant in the lab. Do not let your lab partner do all the work. If you do, you will not be prepared for the practical and final exams.
- Read the homework answer keys posted weekly on D2L to better learn how to set up calculations correctly. The homework answer keys are also a great way to study.
- Use the lab notebook template posted on D2L and follow the directions in the lab instructions to complete your notebooks. Turn in lab notebooks on time.
- Lab notebooks should be submitted in **PDF format** to prevent formatting errors by D2L.
- After posting your lab notebook on D2L, double-check that your turned in the correct lab notebook, that all calculations, tables, graphs, figures, and conclusions are included, and that your document is formatted correctly. You can always resubmit the corrected notebook if a mistake is found (as long as it is before the due date and time).
- Read the weekly feedback on graded lab notebooks to understand what you did incorrectly so you can improve in your next submissions.
- **ASK QUESTIONS** during/immediately after lectures, during office hours, during appointments outside of office hours, during the lab periods, and during recitations.
- Be proactive and do not wait until after the second exam to seek help on how to improve your grade. By this point is difficult to improve your grade. We are here to help you. Make use of office hours.

Honors option

An honors option will not be offered for the fall 2026 semester.

Student Integrity and Academic Honesty

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.)

Access, Opportunity, and Excellence

The instructors of BMB370 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.

Please let us know if you would like to use a name or nickname different from that used by the University and we will accommodate you

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 any such event(s), but would rather share information confidentially with a employee who does not have this reporting responsibility, a list of those individuals can be found here https://caps.msu.edu/.

Religious Observance Policy:

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 labs compatible with students' absence.

Course Schedule

Day	Event	Person	Homework due Monday at 11:59pm Lab Notebook due at 8:30am the day of lab
Mon Aug 31	Introduction and Volume and Density Lecture	Dr. Weise	
Tues - Thurs	Measuring Volume and Density Lab	Dr. Weise	Volume and Density Homework
Fri Sept 4	pH Lecture	Dr. Weise	
Mon Sept 7	Labor Day		pH Homework
Tues-Thurs	pH Lab	Dr. Weise	Volume and Density Lab Notebook
Fri Sept 11	pH Lab Lecture	Dr. Weise	
Mon Sept 14	Dilutions and Spec Intro Lecture	Dr. Weise	Dilutions and Spec Intro Homework
Tues-Thurs	Dilutions and Spec Intro Lab	Dr. Weise	pH Lab Notebook
Fri Sept 18	Dilutions and Spec Intro Lab Lecture	Dr. Weise	
Mon Sept 21	Protein Assay Lecture	Dr. Balbach	Protein Assay Homework
Tues-Thurs	Protein Assay Lab	Dr. Weise	Dilutions and Spec Intro Lab Notebook
Fri Sept 25	Protein Assay Lab Lecture	Dr. Weise	
Mon Sept 28	Exam 1 Review Lecture	Dr. Weise	
Tues-Thurs	Practical Exam 1	Dr. Weise	Protein Assay Lab Notebook
Fri Oct 2	Review of Practical Exam 1	Dr. Weise	
Mon Oct 5	Enzyme Assay Lecture	Dr. Balbach	Enzyme Assay Homework
Tues-Thurs	Enzyme Assay Lab	Dr. Weise	
Fri Oct 9	Enzyme Assay Lab Lecture	Dr. Weise	
Mon Oct 12	Carbohydrate Assay Lecture	Dr. Weise	Carbohydrate Assay Homework
Tues-Thurs	Carbohydrate Assay Lab	Dr. Weise	Enzyme Assay Lab Notebook
Fri Oct 16	Carbohydrate Assay Lab Lecture	Dr. Weise	
Mon Oct 19	Exam 2 Review Lecture	Dr. Balbach	
Tues-Thurs	Practical Exam 2	Dr. Weise	Carbohydrate Assay Lab Notebook
Fri Oct 23	ELISA Lecture	Dr. Balbach	
Mon Oct 26	Fall Break		
Wed-Thus	ELISA Lab	Dr. Weise	
Fri Oct 30	CRISPR lecture	Dr. Balbach	
Mon Nov 2	Plasmid Prep & Transformation Lecture	Dr. Grotewold	Plasmid Prep & Transformation Homework
Tues-Thurs	Plasmid Prep & Transformation Lab	Dr. Weise	
Fri Nov 6	Plasmid Prep & Transformation Lab Lecture	Dr. Weise	
Mon Nov 9	Screening and PCR Lecture	Dr. Grotewold	Screening and PCR Homework
Tues-Thurs	Screening and PCR Lab	Dr. Weise	Plasmid Prep & Transformation Lab Notebook
Fri Nov 13	Screening and PCR Lab Lecture	Dr. Weise	
Mon Nov 16	DNA Gel Lecture	Dr. Grotewold	DNA Gel Homework
Tues-Thurs	DNA Gel Lab	Dr. Weise	Screening and PCR Lab Notebook
Fri Nov 20	DNA Gel Lab Lecture	Dr. Weise	
Mon Nov 23	Controls Lecture	Dr. Grotewold	
Tues	ELISA Lab	Dr. Weise	DNA Gel Lab Notebook
Fri Nov 27	Thanksgiving Break		
Mon Nov 30	Protein Purification Lecture	Dr. Balbach	Protein Purification Homework
Tue-Thurs	Protein Purification Lab	Dr. Weise	
Fri Dec 4	Protein Purification Lab Lecture		
Mon Dec 7	SDS-PAGE Lecture	Dr. Balbach	SDS-PAGE Homework
Tues - Thurs	SDS-PAGE Lab	Dr. Weise	Protein Purification Lab Notebook
Fri Dec 11	SDS-PAGE Lab Lecture	Dr. Weise	SDS-PAGE Lab Notebook
Mon Dec 14	Final Exam 7:45am	Dr. Weise	