

## Department: Biochemistry and Molecular Biology

### Course Title: Advanced Molecular Biology Lab, Fall 2023 Syllabus

Course Number: BMB 470  
Credit Hours: 4  
Course location: BCH 101, BCH 113, BCH 117, Zoom, D2L, LON-CAPA  
Course webpage: <https://d2l.msu.edu/d2l/home/2002491>  
Course Modality: In person

#### Instructors:

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#### Teaching Assistants:

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**Course Objective:** To train students in modern molecular biological research.

**Course Description:** Methods of molecular biology and the underlying principles on which these methods are based.

**Course Overview:** BMB 470 is a laboratory course that provides an introduction into the scientific method in molecular biology, focusing on recombinant DNA technology and protein biochemistry. Students learn to implement and apply basic principles of molecular biology that are commonly used in basic research and in industrial processes. The course has a *textbook* that contains the objectives, requirements, and procedures to be carried out in each of the laboratory periods. *Weekly lectures* introduce students to the concepts underlying the corresponding lab period. *Weekly lab periods* familiarize students with methods of recombinant DNA technology, including properties of different strains, antibiotic selection, nutritional markers, transduction of genes from bacteriophage  $\lambda$  into *E. coli*, DNA digestion, ligation, PCR, and more. Experiments are successive, *i.e.*, they build on one another to reflect a real-world laboratory workflow. These experiments will provide a sound foundation for critical thinking, hypothesis driven experimentation, and a future in science research. *Weekly recitations* will assist students with data analysis and experimental design. *Biweekly quizzes* following the Friday recitation will test knowledge from the preceding periods as noted.

#### Required Textbook & Course Materials

Textbook: Experiments in Molecular Biology: Biochemical Applications, by Drs. Zachary Burton and Jon Kaguni. The textbook and lab manual (coursepack) will be available online (D2L)

## **Course Meeting days and times**

Lectures: Monday, 12:40 to 1:30 p.m., 101 Biochemistry.

Laboratory Periods: Tuesday - Thursday (Sections 1-3): 12:40 to 4:40 p.m.

Recitations: Friday, 12:40 to 1:30 p.m., 101 Biochemistry.

Quizzes: Friday, 1:10 to 1:30 p.m., online, as noted on the course schedule

Lectures: In-person lectures will be held Mondays from 12:40 to 1:30 p.m. EDT in Room BCH 101. Lectures will provide scientific and technical content for the corresponding lab period.

Laboratory Periods: Lab periods are Tuesday (Section 1), Wednesday (Section 2), or Thursday (Section 3) from 12:40 to 4:40 p.m in BCH 113 or 117. Laboratory experiment videos will be posted online. Students are encouraged to view these videos before attending lab and performing the experiments. Some data obtained from experiments will be distributed via D2L modules.

Dress code: While in the lab, students must wear lab appropriate attire. This includes safety glasses (unless informed chemical splash goggles are required; will be informed ahead of time), close-toed shoes, full-length shirts (no bare mid-drifts), and long pants (no torn pantlegs). Put simply, no skin may be exposed beneath the waist.

Recitations: Recitations will be held on Friday from 12:40 to 1:30 p.m. EDT in Room BCH 101. Recitations will cover experimental learning outcome debrief, data analysis, and general Q&A.

Quizzes: Six short quizzes will take place between 1:10 and 1:30 p.m. EDT on Fridays as noted in the course schedule.

## **Office Hours**

Office hours are a great way to interact directly with instructors to clarify questions and concerns you may have about the course material. This semester, we will host in-person office hours. We have some standing weekly times that are open for students to drop into. You can find the times for each instructor listed below. If the times listed there do not work for you, please feel free to email any of the instructors to set up an individual appointment either in person or via zoom video conferencing software. This software is compatible with most internet browsers, and if you are unfamiliar with Zoom, please visit <https://msu.zoom.us> for technical help. Please allow 24 hours for a reply.

- Dr. TerBush: Monday 10:30 am-12:20 pm (BCH116A)
- Dr. Kim: Wednesday 11 am-12 pm (BCH513A)
- Dr. Hovde: Friday 11:30 am-12:30 pm (BCH409)
- Dr. Martinez-Hackert: Friday 1:30-2:30 pm (BCH509A)

## **Grades in BMB 470**

- Notebooks 40%
  - Quizzes 25%
  - Lab Report 25%
  - Problem Sets (LON-CAPA) 10%
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- Laboratory notebooks are due at 12:30 p.m. EDT before the lab period for each section as noted in the course schedule.
  - Problem Set answers are due on Mondays at 11:30 p.m. EDT as noted in the course schedule.
  - Quizzes will be given roughly every other Friday from 1:10-1:30 p.m. EDT as noted in the course schedule.

Students earning approximately 85% or more of the total points will receive a grade of 4.0. The dividing line between 2.5 and 2.0 grades will be approximately 70% of the total points. The range between 70% and 85% will be divided into approximately equal parts for assigning grades of 2.5, 3.0, and 3.5. The dividing line between 1.0 and 0.0 grades will be about 50%.

## **Late Penalties and Student Responsibilities**

1. The **late penalty** for Notebooks and Lab Reports is 25% of the points for the assignment per day (including weekends). Assignments turned in more than 4 days late will receive no credit but will be assessed and annotated for student feedback.
2. **Biweekly quizzes** are taken through D2L, while Pre-lab Problem Sets are accessed through LON-CAPA.
  - Quizzes will be given on the Friday of the weeks listed on the course schedule from 1:10-1:30 p.m. EDT. No late quizzes will be accepted, except by special arrangement coordinated with Dr. TerBush before the quiz.
  - The quizzes on D2L will be open for exactly 20 minutes and will test lecture and lab materials from the preceding two weeks.
3. **LON-CAPA Problem Set answers** are due by 11:30 p.m. EDT on Mondays.
  - No late Problem Sets will be accepted.
4. **Absence from a Laboratory Session** must be documented in writing and, if possible, in advance. Medical excuses will be accepted up to 3 days after the missed class period. Other excuses must be authorized in advance by Dr. TerBush.
5. **Request for assignment extensions** must reflect some documentable situation that prevented you from completing your assignment. To request such an extension, email Dr. TerBush with a description and documentation of your situation (no need for sensitive details) before the assignment is due. Proactivity on such circumstances is appreciated.

6. **RCPD VISAs:** If you have an RCPD VISA that details accommodations relevant to BMB470, please email it to Dr. TerBush at the beginning of the semester. Accommodations cannot be applied retroactively.
7. **Unexcused absences** will result in no success of experiment points being awarded for any missed lab period and you will not be entitled to your partner's lab data.
8. Students with **3 or more unexcused absences** from laboratory periods will be assigned a failing grade (0.0) in the course.
9. **Lab reports.** Failure to submit an acceptable laboratory report will result in a **failing grade in the course** (0.0). To receive a grade in the course (above 0.0), laboratory reports must be submitted, even if the report is so late it does not receive a score.
  - Do your own work. Graphs, figures, or text that are equivalent between laboratory partners or others in the class will not be evaluated for either individual (grade of 0.0). No points will be given for such submissions for laboratory notebooks, homework, or laboratory reports. Feel free to work together and collaborate with fellow students, but do not submit the work of others as your own or allow others to directly reproduce your work. It is great to share ideas and discuss course topics but go off on your own when it comes time to analyze data, complete your notebook, or write your report. **A breach in the student's code of conduct for academic integrity will result in mandatory reporting to the university.**

### **Assignments:**

1. **Laboratory Notebooks.** Proper maintenance of a laboratory notebook is essential for a professional career in science. Learning how to keep a laboratory notebook is, therefore, central to the BMB 470 learning experience. For each lab period, read the protocol for each experiment and prepare a detailed pre-lab write-up in your notebook before performing each lab. As soon as your experimental data are available, complete your laboratory write-up. Laboratory notebooks are submitted for grading every two to three weeks to the appropriate D2L assignment dropbox in D2L by 12:30 pm EDT on the day each student has their laboratory section. An example writeup will be available on D2L.
2. **Laboratory Report.** A key component of BMB 470 is the lab report. Lab reports are the most frequent kind of document written in science. They document your findings and communicate their significance. Instructions for preparing the laboratory report are in your textbook/coursepack (pgs. 14-16) and on D2L. Additional information will be provided as the due date approaches, including Q&A opportunities. The lab report is due Monday, November 21 at 12:30 p.m. EST. When preparing your lab report remember that a good lab report is not just a list of findings; it should demonstrate that you understand the concepts underlying these findings.

3. **Quizzes**. Knowledge and comprehension based on the previous two lectures and lab periods will be evaluated in bi-weekly quizzes. The first quiz will be given on September 15. Quizzes will include math problems like those used in the preceding labs and questions pertaining to the experiments and lecture content.
4. **Problem Sets**. Pre-lab Problem Sets are available to test your level of preparation for the lab period and to supplement reading, lectures, and class notes. These modules are accessed through LON-CAPA.
5. **Class data**. When needed, class data will be available on Desire2Learn (D2L). If your research team fails to produce interpretable data for an experiment, use the data from another team to complete your laboratory write up. Give appropriate attribution to your colleagues who prepared the data. Also discuss your own data and explain why they are unsuitable.
6. **Success of Experiments**. Each experiment that results in data that can reasonably be evaluated (assays, plates, gels, etc.) will be graded for the level of “success”. These points will be applied in the Notebook grade category. The instructors will use their discretion in selecting which experiments will be subject to this evaluation. Points will not be awarded to students who miss class with an unexcused absence.
7. **Challenging grades**. If you believe an assignment was graded incorrectly, you have 2 weeks from the time grades and feedback are published to email Dr. TerBush to challenge the grade. You must include a listing of the criteria that you believe were graded incorrectly and a description of where in the assignment you earned those points. Grade challenges after 2 weeks will not be considered.