

**PLB/BMB 856: Plant Molecular and Omic Biology
Syllabus - Spring 2024**

Instructors:

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Brief Description of Course:

The intention of the course is to provide a survey of plant molecular biology, molecular genetics, genomics and cell biology, emphasizing recent research advancement and technology development in these disciplinary areas.

Prerequisite:

College-level genetics and/or biochemistry courses and an understanding of molecular biology and gene expression are ***essential***. Please do not enroll in the course if you do not have this background. Please contact Hideki Takahashi (htakaha@msu.edu) if you have any doubts about the suitability of your preparation.

Credits: 3-0

Class Session: 3:00-4:20 PM on every Tuesday/Thursday
Room 247, Plant Biology Building

Course Materials: D2L (<https://d2l.msu.edu/d2l/login/>)
Use your MSU NetID and password (case-sensitive) to log in.

Uploading Assignment: Google Drive (<https://googleapps.msu.edu/>)
Use your MSU NetID and password (case-sensitive) to log in.

Course Grade:

The course grade is based on two exams (45% of grade total; split between the midterm and the final), writing of a research proposal (35% of grade total: 5% for the one-page summary; 25% for the final proposal; 5% for the oral presentation), and homework assignments (20% of grade total).

Class Format/Daily Preparation:

Sessions of the class typically will consist of lectures by the instructors combined with a discussion of reading materials. For each week, two to three key articles will be posted as pdf files at the D2L web site, by the previous Friday. ***Please read these articles before joining class sessions.*** These articles are designated for thorough understanding and in-depth discussion of lecture topics.

Students should prepare by making sure that they can answer the following key questions:

- What was the goal of the research, including the problem being addressed?
- Which figure(s) or table(s) presents the most critical data in the study? Why?
- What were the strengths and weaknesses of the paper?
- What would *you* do next?

The instructors will provide lecture notes by or soon after lecture time through D2L. These notes will provide copies of some of the figures and tables that may be mentioned from the articles other than the assigned reading materials.

Homework:

Short homework assignments are scheduled 10 times during the semester. Homework will be made available through D2L. Upload your response to your assignment folder in Google Drive by due dates indicated in the course D2L calendar.

Exams:

The two exams will have an open-book, take-home format.

- Notes, books, articles, and online information may be consulted, but students are expected to complete their exams independently, without discussion with others until after all exams are turned in.
- The exams will be made available to students through D2L as indicated on the schedule.
- Upload your complete exam response to your assignment folder in Google Drive.

	Available on D2L	Due in Google Drive
Midterm Exam	February 22 nd , 5:00 PM	February 23rd, 11:59 PM
Final Exam	April 23 rd , 5:00 PM	April 24th, 11:59 PM

Research Proposal:

The assignment is to write an original research project proposal on a specific topic in plant molecular biology, molecular genetics and genomics.

- ***The proposal should include the molecular genetics and genomics aspects of the problems you choose to address*** (as opposed to being focused only on the biochemistry, quantitative genetics, molecular breeding or physiology aspects of the problem). It should be related to a topic pertinent to the course. However, it does not have to be on a topic specifically covered in class.
- You should focus on a basic biology problem, though you may extend it with a perspective on translational possibilities. For instance, you could write a proposal in relation to mechanisms of plant disease resistance; molecular genetics of plant development; molecular and physiological responses to the environment (e.g., light, temperature, water, UV); etc.
- The proposal should be original and creative. Students may not use a paper written for another course, nor conceptualized by someone else.

- You are encouraged to start researching your topic as soon as the course begins, including discussions with course instructors before or after class times.
- Your proposal should be written using a 11-12 point standard 'with serif' font (Times New Roman 12 point is a good choice) and single line spacing, numbering all pages.
- The general format of the proposal should be as follows:
 - A. Summary with Specific Aims** (1 page max.). State the broad, long-term objectives of the proposed line of research and the hypothesis. Describe concisely and realistically what the specific research described in the proposal is intended to accomplish. Specific aims should be listed as a short list (typically 3 specific aims total).
 - B. Background and Significance** (2 pages max.). Summarize what is known about the chosen area of research critically evaluating the existing knowledge and specifically identifying the gaps the project is intended to fill. State concisely the importance of the research and relate the specific aims to the broad, long-term objectives of the project. Please cite key references in this and the next section, preferably in a “first author, date” style.
 - C. Experimental Design and Methods** (4 pages max.). Outline the experimental design and the procedures to be used to accomplish the specific aims of the project. Include discussion on how you will interpret the data. Discuss the potential difficulties and limitation of the proposed procedures and present alternative approaches to achieve the aims where appropriate. On a separate page (not included in the 4 page max count), give a tentative sequence or timetable for the investigation.
 - D. References.** List the literature cited in the text, including titles and full list of authors.
 - E. Graduate and Past Research Projects** (1 paragraph). Briefly summarize the research you are conducting for your graduate degree.
- Timeline:
 - 1) First draft of your one-page summary statement due on **January 26th**
 - 2) Individual discussion (ca. 15') about your choice of topic and summary statement with the instructors on January 30th or February 1st
 - 3) Second draft of your one-page summary statement due on **February 9th**
 - 4) Full proposal due on **April 19th**
- Upload your documents to your assignment folder in Google Drive.

Oral Presentation of Research Proposal:

Class periods (currently planned on April 16th and 18th) are reserved for students to give 10-minute presentations describing their research proposals to the rest of the class. The order of the presentations will be randomly selected and announced by only one day prior to the first session; thus all students should be prepared to speak on April 16th.

- Each student to give a 12-minute presentation (including 2 minutes for Q&A) about your research proposal.

- Electronic slides (PowerPoint) should be used to aid the presentations.
- We recommend no more than 10 slides.

Other Recommended Activities:

Throughout the semester, several seminar series will be hosting scientists who will present lectures on pertinent topics. Some may be mentioned in class, and posted on the D2L site or provided by email. We encourage you to mention seminars in class so that other students may learn of them.

If you are a BMB student in the Molecular Plant Sciences (MPS) Program and would like to obtain more information on topics in molecular genetics and genomics that are not covered in PLB 856, you may consider attending lectures in BMB 801 “Molecular Biology”. The course is offered in Fall semesters. Please contact the course instructors David Arnosti (arnosti@msu.edu) and Bill Henry (henryrw@msu.edu) for details or advice.

Course Assessment:

Michigan State University and the instructors take seriously the opinion of students in the evaluation of the effectiveness of instruction, and MSU has implemented the SIRS (Student Instructional Rating System) process to gather student feedback. This course utilizes the “online SIRS” system. You will receive an e-mail sometime during the last two weeks of class asking you to fill out the SIRS online form at your convenience. Please note the final grade for this course will not be accessible on STUINFO during the week following the submission of grades for this course unless the SIRS online form has been filled out. You will have the option on the online SIRS form to decline to participate in the evaluation of the course – we hope, however, that you will be willing to give us your frank and constructive feedback so that we may instruct students better in the future.