

**PLB 856: Plant Molecular and Omic Biology**  
**Syllabus - Spring 2022**

**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 course (equivalent to PLB/IBIO/ZOL 341) 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](mailto: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/loginh/>)  
Use your MSU NetID and password (case-sensitive) to log in.

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

**\*Zoom Meeting:** <https://msu.zoom.us/j/94908021145>  
Meeting ID: 949 0802 1145  
Passcode: omics856

\*The Zoom option will be used to accommodate students who will need to quarantine after COVID-19 exposure or in case we need to change the course modality to online learning during the semester.

### **COVID-Related Accommodations:**

- The course will be administered by following MSU COVID directives (<https://msu.edu/together-we-will/directives.html>). To slow the spread of COVID-19, Michigan State University is directing everyone to take personal responsibility to protect their own health and safety, as well as the health and safety of MSU faculty, staff, students, visitors and loved ones. Please review the appendix of the syllabus (pages 6-8).
- ***Do not come to class if you test positive for COVID or experience COVID symptoms.*** Class will change to an in-person/online hybrid format (Zoom option) to accommodate students who need to stay at home and quarantine.
- The course instruction may change to online learning (Zoom option) should there be a surge in COVID-19 cases in the community. We will follow the university directives and public health guidance in case we need to change the course modality during the semester. Relevant information will be posted on D2L or through email communications to students.

### **Course Grade:**

The course grade is based on two exams (50% of grade total; split between the midterm and the final), writing and presentation of a research proposal (25% of grade total for writing and 10% for presentation), and in-class quizzes and out-of-class homework assignments (15% 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 four 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.

### **In-Class Quizzes and Homework:**

Short quizzes (10 minutes) are scheduled in the beginning of the class eight times during the semester. Homework assignments are scheduled twice during the semester. Homework will be made available to students through D2L and will be due the next day as indicated on the schedule.

## 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
<b>Midterm Exam</b>	February 24, 5:00 PM	February 26, 5:00 PM
<b>Final Exam</b>	April 28, 5:00 PM	April 30, 5:00 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 NOT be directly related to the research project you are conducting for your graduate degree, are likely to perform as a student, or were involved in the past. For instance, if you would happen to be working on regulation of gene expression in response to low temperature, you should not write a proposal on that same or similar topic. You could, however, write a proposal on ABA-regulated gene expression and signaling or, of course, any of the other topics.
- The proposal should be original and creative. Students may not use a paper written for another course, nor conceptualized by someone else.
- You are strongly encouraged to start researching your topic as soon as the course begins, including discussions with Drs. Last and Takahashi 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 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 only 3-4 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.

- Your research proposal should be submitted in three phases.

<b>Phase I</b>	Title, Summary and Specific Aims (1 page) are due on <b>February 15</b> . You will choose a time to have detailed discussions about your choice of topic and your abstract with both instructors on February 22 or 24.
<b>Phase II</b>	Background and Significance (2 pages) are due on <b>March 22</b> . Include the edited version of Title, Summary and Specific Aims.
<b>Phase III</b>	Full proposal is due at 9:00 AM on <b>April 19</b> . Submit the <u>final version</u> of your proposal including the sections for Phase I and II fully edited.

- Upload your documents to your assignment folder in Google Drive.

**Oral Presentation of Research Proposal:**

Class periods (currently planned on April 26<sup>th</sup> and 28<sup>th</sup>) 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 26<sup>th</sup>. The quality of both the oral presentation and the written report will be considered in assigning a grade to the research proposal.

- Each student to give a 10-minute presentation describing the research proposal.
- Electronic slides (PowerPoint) should be used to aid the presentations.
- We recommend no more than 10 slides for a 10-minute presentation.

**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.

## Appendix

The text below was excerpted from the [COVID directives website](#). Visit the [Together We Will website](#) and [FAQs](#) for the most up-to-date information.

### **Face Coverings**

Individuals with COVID-19 are highly infectious for up to two days before the onset of symptoms. Thus, face coverings are a crucial public health measure and help protect others by reducing exposure to droplets if someone is unknowingly infected with COVID-19. Wearing a face covering, whether you feel ill or have been diagnosed with COVID-19, is critical to maintaining everyone's health and safety.

**Face coverings must be worn by everyone indoors** (including all faculty, staff, students, vendors and visitors) while you are on property owned or governed by MSU or while participating in MSU-related or MSU-sponsored activities. If you have a medical condition that may prevent you from safely wearing a face covering, you should contact MSU's Resource Center for Persons with Disabilities to begin the accommodation process.

- Individuals “must receive documents attesting to their exemption from the mask mandate before entering an MSU building without a mask.” (from the Associate Provost for Undergraduate Education (APUE))
- Students should “refrain from eating or drinking during class to avoid having to remove their masks. If they do consume food or drinks inside, they should remove the mask only to take a sip of beverage or a bite to eat, and they must replace the mask properly between each bite and sip.” (from the APUE)

Face coverings should:

1. be non-medical grade to maintain supplies for health care use,
2. fit snugly against the side of your face,
3. cover your nose and mouth,
4. be secured with ties or ear loops, and
5. allow for breathing without restriction.

Cloth face coverings should only be worn for one day at a time, and they must be properly hand washed or laundered with soap/detergent before subsequent use. Face coverings may vary (for example, disposable non-medical masks are acceptable).

### **Mandatory COVID-19 Vaccine**

All faculty, staff, and students are required to be fully vaccinated or have an approved exemption. FDA-authorized and WHO-approved vaccines will meet MSU's vaccine requirement.

Exemption process. In the interest of the health and safety of the entire MSU community, exemptions to the vaccine requirement will be limited. The exemptions are: (1) Religious exemptions. Persons requesting an exemption due to a sincerely held religious belief that precludes them from receiving the COVID-19 vaccine may submit a request for a religious exemption. A religious exemption is not

the same as a philosophical, moral, or conscientious exemption; (2) Medical exemptions. Persons requesting an exemption due to a medical condition that precludes them from receiving the COVID-19 vaccine may submit a request for a medical exemption. Documentation from a medical provider is required. The exemption will be provided only for CDC-recognized contraindications and for individuals with disabilities under the ADA.

### **Personal Hygiene**

Practice good personal hygiene, including washing hands frequently with soap and water for at least 20 seconds, especially after going to the bathroom, blowing your nose, coughing and before eating. If soap and water is not available, use hand sanitizer with at least 60% alcohol. Avoid touching your eyes, nose or mouth with unwashed hands. Clean and disinfect frequently touched objects, such as doorknobs, tables, light switches, phones, keyboards and faucets. Clean your personal spaces and workspaces regularly with soap followed by using an approved household disinfectant.

### **Self-Monitoring**

Symptoms may appear 2-14 days after exposure to the virus. Using whichever tools and processes are made available by the university, pay attention for the appearance of possible flu-like symptoms, including:

- Fever or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue
- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

This list may not include all possible symptoms. Public health officials, including the CDC, will continue to update the list as they learn more about COVID-19. If you begin exhibiting symptoms, stay home and contact the Olin Health Center's 24-hour nurse line at (517) 353-5557 or your personal health care provider.

### **Exposure to COVID-19**

The best way to prevent illness is to avoid being exposed to the virus. If you test positive for COVID-19, you must isolate yourself, whether you are vaccinated or not. Isolation space for on-campus students is being provided. Students should contact MSU's COVID-19 hotline at 855-958-2678 or contact their health care provider. Faculty and staff should contact their primary care physician.

Close contacts who have been fully vaccinated and have been free of COVID-19 symptoms since their exposure will be asked to monitor for symptoms, have themselves tested 3-5 days after exposure, and wear a mask in all public indoor settings for 14 days or until they receive a negative test result.

Students experiencing COVID-19 symptoms can request a medical appointment at Olin Health Center, where a Student Health Services provider will administer a COVID-19 test if medically needed. Asymptomatic students or students with very mild symptoms should use the Early Detection Program for a PCR test. Results are typically returned within 24–36 hours. Faculty and staff can use EDP or contact their doctor for a test.

You may also get tested through the State of Michigan Coronavirus Testing Hotline. Call (888) 535-6136 from 8 a.m. to 5 p.m., Monday through Friday, and press 1 to be connected to an operator who can help you find a nearby location and schedule an appointment. Or, visit [Michigan.gov/CoronavirusTest](https://Michigan.gov/CoronavirusTest) to find locations near you. There are many locations where you can get tested at no cost.

- “Anyone diagnosed with COVID-19 should isolate from others for at least 10 days after symptoms first appear and for 24 hours after fever has subsided without the use of fever-reducing medications and other related symptoms are improving. If you tested positive for COVID-19 but showed no symptoms, you should isolate for 10 days after your positive COVID-19 test.” (from the APUE)

### **Adherence to Public Health Guidance and Cooperation with Public Health Authorities**

For the protection of the entire community, MSU expects all faculty, staff, and students to follow all applicable state and public health guidance and cooperate with public health authorities, including, but not limited to, participating in contact tracing efforts.

### **Adherence to Signage and Instructions**

To protect yourself and others, faculty, staff, and students must (a) look for instructional signs posted by MSU or public health authorities, (b) observe instructions from MSU or public health authorities that are emailed to your “msu.edu” account, and (c) follow those instructions.