

BICD120 (W23)

Molecular Basis of Plant Development

SYLLABUS

1. COURSE AND INSTRUCTOR DETAILS

Instructor

Dr. Mark Estelle

Department of Cell and Developmental Biology

Office: Muir Biology 4212

Email: mestelle@ucsd.edu

Office hours: Fridays 12:00 to 1:00. <https://ucsd.zoom.us/j/98931968652>

Please use my email to make an appointment or to address confidential issues.

1.2 Teaching Assistant

Cindy Tran (cht010@ucsd.edu)

Office hours: Wednesdays 10:00 to 11:00. <https://ucsd.zoom.us/j/97728818264>

1.3 Lectures

Lectures: Tuesdays and Thursdays. 12:30 to 1:50 Tata Hall 3201. Recordings of the lectures will be provided asynchronously on Canvas.

1.4 Discussion Groups

Section	Day	Time	Room	Instructor
A01	W	8:00a - 8:50a	WLH 2209	Cindy Tran cht010@ucsd.edu
A02	W	9:00a - 9:50a	WLH 2209	Cindy Tran cht010@ucsd.edu

2. LEARNING OBJECTIVES AND COURSE OUTLINE

The course is divided into six modules that explore the main physiological and developmental changes that take place during the life cycle of a flowering plant.

2.1 Learning Objectives

- To obtain an understanding of concepts, processes, and experimental approaches related to the physiology of plant growth and development.
- To understand how the scientific process can be used to answer questions concerning the control of plant development.
- To understand how to use the various biological approaches (genetic, biochemical and physiological) to study the control of plant growth and development.
- To appreciate the practical importance of understanding plant physiology and development for agriculture and food production.

2.3 Optional Recommended Textbook

Taiz, L., Zeiger, E, Moller, I.M., and Murphy, A. Plant Physiology and Development, sixth edition (2015).

The textbook complements and expands the information provided during the lectures. Free access to a digital version of this book is available for the first two weeks of class to all enrolled via Redshelf. More details will be forthcoming.

EVALUATION CRITERIA

3.1 Grading Breakdown

10% Homework (online submission).
30% Midterm 1 covering lectures 1-6.
30% Midterm 2 covering lectures 7-13.
30% Final exam covering lectures 15-20.

“Hard work pays off” policy for exams: If the grade of the final exam is higher than the grade of Midterm 1 or Midterm 2, the midterm grade will be dropped and its weight will be transferred to the Final. If both Midterm grades, are lower than the Final, the lowest Midterm will qualify for this treatment.

3.2 Homework Problems on Canvas

Each Friday (starting Friday January 13th) you will be assigned a set of homework questions pertaining to the topics that will be covered during the week. The assignment will be posted by 5:00 pm and will include questions that are similar to those that will appear on the exams. You will receive full credit if you submit the assignment with answers to all of the questions. It will not be graded but the answers will be posted. **The homework answers must be submitted to Canvas by Friday at midnight.**

3.3 iClicker

Questions will be asked in class, with the expectation that you will respond using an iClicker*. New iClickers are available at the UCSD Bookstore and used ones from many sources (I am told). All vintages of iClicker are fine.

*You can use the iClicker app on your phone instead of a standard iClicker.

4. COURSE AND EXAMINATION POLICIES

4.1 Examination Policies

Exams are written in person during regular class time.

The midterms and final exam will contain a combination of multiple choice and short answer questions. Answers can be in point form, and may include diagrams.

The exams are closed book. One hand-written double-sided page of notes (8 ½ x 11in), is allowed. This memory aid may contain diagrams.

Students caught with memory aids that do not conform to these criteria will have their memory aid taken. Depending on the severity of the infringement, there may be further penalties.

4.2. Missing an Exam

Exams will be in person and you should make every effort to write the midterms and final exam at the scheduled exam times.

If you are sick on a midterm exam day, do not attend the exam. The weight of the midterm exam will be automatically transferred to the final.

There will be no make-up tests. If you miss a midterm exam for any reason, the weight of that midterm will be transferred to the final exam.

4.3 Academic integrity

The aim of your instructor and TA is to foster all students' ability to excel with integrity. Policies are outlined above for each exam regarding what aids are authorized. You may not give or receive help from an unauthorized source (e.g. another student) on exams. If Prof. Estelle has a good reason to think you have used unauthorized aids on an exam, a report will be filed with the UCSD Academic Integrity Office (AIO). A student confirmed to have engaged in academic dishonesty will have grade penalty, in addition to the disciplinary actions determined as appropriate by the AIO.

LECTURE SCHEDULE

Plant hormones and signals

- Lecture 1.** (Jan 10). Introduction to plants and hormones.
- Lecture 2.** (Jan 12). Hormonal regulatory levels.
- Lecture 3.** (Jan 17). Hormonal signal transduction.
- Lecture 4.** (Jan 19). Experimental Techniques in hormonal regulation.

Fertilization, embryogenesis and tissue specification

- Lecture 5.** (Jan 24). Pollination and fertilization in flowering plants.
- Lecture 6.** (Jan 26). Embryogenesis.
- Lecture 7.** (Jan 31). Tissue specification.
- Lecture 8.** (Feb 2). **In class - Midterm 1 covering Lectures 1-6**

Seed germination and seedling development

- Lecture 9.** (Feb 7). Cell fate determination
- Lecture 10.** (Feb 9). Germination.
- Lecture 11.** (Feb 14). Regulation of germination
- Lecture 12.** (Feb 16). Plant tropisms.
- Lecture 13.** (Feb 21). Polar auxin transport.
- Lecture 14.** (Feb 23). **In class - Midterm 2 covering Lectures 7-13**

Vegetative growth

Lecture 15. (Feb 28). Regulation of auxin activity.

Lecture 16. (Mar 2). SAM regulation, phase transitions, and phyllotaxis

Making flowers and fruits

Lecture 17. (Mar 7). Apical dominance and root architecture.

Lecture 18. (Mar 9). Floral Meristem and floral organ specification

Lecture 19. (Mar 14). Environmental and hormonal regulation of flowering.

Lecture 20. (Mar 16). Fruit development and ripening.