**Biology 359**
**Plant Biology**
**Winter 2016**

**Instructor: Matt Streisfeld**
Office: 267A Onyx Bridge
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**Meeting Times and Locations:**
**Lecture:** M/W 4:00-5:20 Pacific 30
**Discussion:** Fri: 12:00-12:50
Fri: 1:00-1:50
Huestis 130

**GTF: Madeline Chase**
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Office hours: Wednesday, 12:00-1:00

**Course Description:** Plants play an integral, yet often overlooked role for the health of our environment, the global economy, and our ability to live on earth. Plants fix carbon and provide oxygen to the atmosphere; plants are a critical piece to the food chain; and plants are amazingly diverse. Moreover, because of their sessile nature, plants are intimately connected to changes in their environment; much more so than animals. Therefore, a comprehensive understanding of the biology of plants and how they respond to changes in their environments is critical for any undergraduate biology major. The main goal of this course will be to provide you with an overview of the unique biology of plants. The topics we will cover include the ecology, physiology, developmental genetics, and evolutionary biology of land plants, focusing primarily on the angiosperms (or flowering plants). I plan to integrate these areas to provide you with a detailed view of how land plants overcome many of the challenges they experience on a daily basis. By the end of the term, you should have an appreciation for why biologists study plants and how they do it.

**Learning Outcomes:**

- Provide a broad-based knowledge of physiology, development, ecology, and evolution of land plants
- Evaluate the unique aspects of the biology of plants relative to animals
- Analyze and interpret quantitative datasets from the primary literature
- Develop verbal and written communication skills through in-class discussion and assignments

**Lectures:** My lectures will be posted on Canvas prior to class time. I would like to stress that attendance in lecture is essential for your success in this course.

**Readings and supplements:** To supplement my lectures, you will be responsible for completing reading assignments on each topic that we cover. Readings should be completed by the time of the class meeting in which they will be discussed. Because there is no one book that includes all of these topics, I have chosen appropriate chapters from different sources. In addition to the readings, there will also be occasional videos of public lectures from some influential plant biologists that cover some of the topics that we will discuss. These lectures will be an excellent way for you to supplement what we discuss in class, and I encourage you to watch and study them. These will be available on Canvas.

**Discussion:** You will each attend a 50 minute discussion section per week that will be run by your GTF (beginning in Week 1). During this period, you will read and discuss selected papers from the primary literature on plant biology. In addition, you will have three review periods prior to the exams that will give you an opportunity to work in a group setting to answer practice problems that I will provide for you (see below).

As for the papers, all of the information that we will talk about in lecture comes originally from experimental data collected by researchers and published in scientific journals. I have chosen these papers because they represent recent highlights of the evolutionary biology, ecology, and genetics of plants relevant to the topics that we will

discuss in lecture. An important skill as a scientist is being able to read and critically evaluate papers from the primary literature. The main goal of the discussion sections is for you to have open discussions about the papers you read with your classmates and GTF. The papers will be available on Canvas for download.

Many of the papers will contain lots of technical information. It is OK if you don't understand everything when you read the paper, but I stress that you must allocate enough time to reading the paper in order to become comfortable with the material contained in it. The purpose of the discussion is for the entire class to work through the papers to gain a better understanding of the material. You should come to class prepared with questions about what you didn't understand. Some questions to ask yourself when you read each paper:

- What is the purpose of this paper?
- What is the main question that the authors ask?
- What are the main findings? Can I explain what each figure represents?
- Do the findings support the conclusions that the authors draw?

**Quizzes:** With the exception of week 1, you will have a short quiz on each of the remaining papers. These quizzes will be administered at the beginning of your discussion section period. The quizzes will test your careful reading of the papers assigned for section. Their purpose is to ensure that you come prepared to section each week and have critically read and evaluated the papers. If you read the papers carefully and come to section each week, the quizzes should be easy. Each quiz should take no more than 5 minutes to complete. I will drop the lowest score from your final grade. **Because the quizzes are administered at the beginning of the class, you must be on time to section.** There will be no make-up quizzes without medical justification.

**Assessment:** There will be two midterms and a comprehensive final examination. Exams will consist of problems and short answer questions to test your conceptual understanding of the material.

**Practice Problems:** My exam questions often require you to synthesize material from multiple lectures – this is the best way to test your conceptual understanding of the material. To ensure that you have adequate practice with these types of questions, I will present practice questions at the end of most lectures that you can work on outside of class. I will go over the answer to the question(s) at the beginning of the following lecture. These questions will only be distributed in lecture – they will not be posted on Canvas. Thus, if you want to have practice at these questions, it is imperative that you come to class each period! In addition, I will distribute practice questions prior to each exam that you will have time to work on on your own and with your peers. As discussed above, prior to each exam, there will be a discussion section dedicated to review of these practice problems as well as other questions that you have.

**Evaluation:** Your final grade will be determined as follows:

| Assignment | % of your Final Grade |
|---|---|
| Midterm 1 | 25 |
| Midterm 2 | 30 |
| Quizzes | 10 |
| Final Exam | 35 |

**Academic Integrity:** I have a zero tolerance policy for cheating, plagiarism, and any other form of academic dishonesty. For this course, that means your assignments must be your work. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures.

**Students with Disabilities:** The University of Oregon is working to create inclusive learning environments. Please notify me during the first week of the term if there are aspects of the instruction or design of this course that result in barriers to your participation. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu.

| Date | Lecture Topic | Readings (paper for discussion section in parentheses) |
|---|---|---|
| 4-Jan (M) | Course introduction; Why study plants?<br>Major lineages of plants I | Plant lineages 1 |
| 6-Jan (W) | Major lineages of plants II;<br>Review of plant structure and growth | Plant Lineages 2<br>Plant structure and growth<br>(100 questions for plant science) |
| 11-Jan (M) | Physiological ecology I: Light | Photosynthesis and light |
| 13-Jan (W) | Physiological ecology II: Water | Water relations<br>(Gowick – C3/C4) |
| 18-Jan (M) | *MLK Holiday - No Class* | --- |
| 20-Jan (W) | Life history strategies | Life history<br>(Wu et al. Mimulus drought.pdf) |
| 25-Jan (M) | Ecological genetics I | Ecological genetics |
| 27-Jan (W) | Ecological genetics II + Review | ----<br>(Practice problems review) |
| 1-Feb (M) | **Midterm 1** | --- |
| 3-Feb (W) | Introduction to angiosperm reproduction and floral biology | Floral biology<br>(Rieseberg.pdf) |
| 8-Feb (M) | Intro to plant developmental genetics;<br>Transition to reproduction: flowering time pathways I | Developmental genetics |
| 10-Feb (W) | Transition to reproduction: Flowering time pathways II | Flowering time<br>(Stinchcombe et al. 2004) |
| 15-Feb (M) | Transition to reproduction: flowering time III and floral development | Flower development<br>Supplemental reading: Flowering<br>Supplemental video: Flower development |
| 17-Feb (W) | Transition to reproduction: conclusion and review | ---<br>(Practice problems review) |
| 22-Feb (M) | **Midterm 2** | --- |
| 24-Feb (W) | Floral Biology I: Pollination ecology | Pollination ecology<br>(Schemske&Bradshaw1999.pdf) |
| 29-Feb (M) | Floral Biology II: Sexual Interference<br>Mating Systems I: Sex or no sex; | Mating_systems1 |
| 2-Mar (W) | Mating systems II: Self-fertilization or outcrossing | Mating_systems2<br>(eckert nature 2002.pdf) |
| 7-Mar (M) | Mating Systems III: Combined vs. separate sexes<br>+ herbivory and GMOs | Herbivory |
| 9-Mar (W) | Plant speciation: patterns and processes;<br>Polyploidy | Speciation and polyploidy<br>(Practice problems review) |
| 17-Mar Final's Week | **Final Exam: 2:45 (Thursday)** | --- |