

# Bi 306 Pollination Biology

## Information Sheet and Syllabus for Spring Quarter 2019

### Instructor

Peter Wetherwax  
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office hours: after class and by appointment

### GE

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office hours: by appointment

### Course Goals

The content of this course covers fundamental ecological and evolutionary concepts related to pollination including: coevolution, mutualism, foraging behavior of the animals, breeding systems in the plants, biodiversity and conservation issues associated with endangered species and introduced species. Students gain a better sense of how science is conducted by (1) reading and analyzing original research papers, (2) designing and conducting two field investigations and (3) teaching about bees to undergraduates in a lower-division biology course.

The activities will be a combination of lecture, discussion (particularly of research papers), lab and field work. Lab/field activities include examining the structure and function of flowers, working with an observation hive of honey bees, learning laboratory and field techniques used by pollination biologists, and learning some simple statistical techniques needed for data analysis of field studies. A significant amount of time (both in and outside of class) will be spent in the field conducting two independent, original research studies.

**Concepts-based goals:** Students will be able to

- describe the structure and function of flowers, including details related to alternation of generation and reproduction.
- describe and analyze various breeding systems that have evolved in flowering plants, including the advantages and disadvantages of various strategies.
- understand the role of natural selection, sexual selection, coevolution, and mutualism in the shaping of plant-pollinator systems.
- understand the diversity and characteristics of many types of pollinators, particularly the most important group of pollinations: bees.
- describe fundamental questions related to pollinator behavior, including both ultimate and proximate explanations for their behavior.
- understand the importance of pollination systems in conservation biology, particularly as it relates to loss of diversity of both pollinators and their plants, as well as the impact of non-native plants and pollinators on native pollinators and their plants.

**Skill-based goals:** Students will be able to

- analyze floral structures and their role in promoting pollination and fertilization.
- determine the sexual state of flowers using techniques designed to measure pollen viability, stigma receptivity and pollen tube growth.
- conduct field research related to pollination biology. This includes
  - asking interesting questions that can be studied
  - formulating hypotheses
  - designing experiments
  - analyzing data
  - effectively communicating research findings both orally and in writing.
- teach about bees and pollination to undergraduates in other courses (Bi213 students).

## Course Format

- Lectures Mondays 1:00-2:20 and Wednesdays from 1:00 to approximately 2:20 in 112 Huestis. The first couple weeks there will be lectures during some of the lab time on Wednesday. In exchange, the last couple weeks, lecture time will be used for field work.
- Lab/Field Work Wednesdays from 2:20-4:50 in 112 Huestis
- Outside lab and fieldwork to be arranged by students (this will be several hours per week, especially during the last few weeks of the term)

## Prerequisites

One of the following: Bi213 or Bi283H

## Place in curriculum for biology majors:

- upper division biology credits
- major laboratory or field component
- Ecology and Evolution emphasis area

## Readings

The readings will all be posted on the course Canvas site. They will mostly be original research papers and review articles from the primary literature.

## Evaluation

- Participation in Class Discussions, especially about research papers (10%)
- Flower Structure Study (5%)
- Flower Mechanics Study (15%)
- Field Study Paper and Presentation (30%)
- Quizzes - (10%)
- Exam (30%)

**Participation** You will be evaluated on the quality of your comments during lecture, particularly discussions about the research papers that we will all read. The instructor may call on individuals to explain aspects of the readings. Attendance in lectures and labs is mandatory and will be factored into your participation grade.

**Flower Structure Study** During the first lab we will be looking at a variety of flowers and fruits. The lab is open during the week and materials will be made available to you. A report with your drawings/photos and comments will be due the second week of class. You will receive an additional handout that explains this assignment in more detail.

**Flower Mechanics Study** During the first two weeks, you will learn some basics about floral morphology as well as some simple techniques used by pollination biologists. You will spend the next three weeks, both in and outside of lab, making some general observations and measurements of a plant (of your choosing) whose flowers contain both male and female structures, but those structures mature at different times (i.e. a dichogamous plant). There will be an additional handout that explains this assignment in more detail.

**Field Study** You will conduct a group field study on a question or questions related to pollination. Your group will design and conduct the study, analyze the results and write up the study in a format similar to those used by pollination biologists. Each group will give an oral presentation of their study during the last Wednesday meeting. The final paper is due by Monday of finals' week. You will receive an additional handout that explains this assignment in more detail.

**Quizzes** There will be several quizzes given during the quarter. They may or may not be announced. There will be a variety of formats: short answer or essay, open-notes or closed-notes. The quizzes will be on basic concepts of pollination biology as well as analysis of some of the papers that will be posted on Canvas. You will be able to drop your lowest quiz. If you miss a quiz, for any reason, that will be the one that you drop.

**Exam** There will be a comprehensive exam on **Wednesday May 29th**. The exam will cover material from all aspects of the course including: lectures, labs and readings. The exam will test your ability to communicate about the concepts and to apply the concepts to novel situations, rather than a memorization of detail. A large part of the exam will test your ability to analyze research papers on pollination biology.

### Tentative Schedule

Week	Lecture Topics Mondays and Wednesdays 1:00-2:20		Lab Activities Wednesdays 2:20-4:50
1	4/1 4/3	Asking Interesting Questions/Flower Structure Flowering Plant Life Cycle	Flowers structure
2	4/8 4/10	Plant Breeding Systems Plant Breeding Systems <b>Flowers Structure Report due</b>	Lecture: Plant Breeding System Start Flower mechanics project
3	4/15 4/17	Adaptations, Natural Selection, Coevolution and Mutualism Incompatibility; Floral Enticements and Rewards	Lecture: Floral Signals & Rewards
4	4/22 4/24	Diversity of Pollinators Honey Bees	Bee Lab
5	4/29 5/1	Bees (other than honey bees) Teach about bees to Bi213 labs Wed- Thurs <b>Flower Mechanics Report due 5PM on Fri</b>	Wed-Fri Teach about bees to Bi213 labs
6	5/6 5/9	Pollinator Behavior Pollination Community Ecology	Introduce Field Study
7	5/13 5/15	Conservation Biology Sexual Selection in Plants <b>Field Study Proposal due 5PM on Friday</b>	Work on Field Study
8	5/20 5/22	TBA Statistics and data analysis	Work on Field Study
9	5/27 5/29	peer discussion of exam papers <b>Exam</b>	Work on Field Study
10	6/3 6/5	No lecture: work on project <b>Presentations of Field Study</b>	<b>Presentations of Field Study</b>
Final	6/11	<b>Field Study Paper due by Tuesday June 11<sup>th</sup> 8AM</b>	

**Professional conduct** Please arrive to lab and lecture on time and stay until class is over. Late arrivals and early departures make unnecessary noise and disruption that distracts your classmates.

Please do not chat during lectures except when asked to discuss problems with other students. This is disruptive to those around you and inhibits their chance to learn; it's not fair to your classmates. Likewise, using your cell phone, tablet, or computer to check email, Facebook, surf the web etc. is disruptive to those around you. Extraneous images on computer screens can be a great distraction for those behind you and simply is not fair to them. So please put away all electronics unless you have specific been given permission by your instructor. This is true for both lecture and labs.

Cheating devalues the reputation of our institution, its faculty, its students, and the significance and value of your academic degree. Academic misconduct is particularly unfair for students who do their work with integrity and honor. The University Student Conduct Code defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. For example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments, quizzes or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only sources and resources authorized by the instructor. If you have any question about whether an act constitutes academic misconduct, it is your obligation to clarify the question with the instructor before committing or attempting to commit the act.

We want you to learn and to do well in the course, but we will not tolerate academic dishonesty. Sanctions for academic dishonesty can include lowering of the final grade or failure. If you find yourself in trouble, or if you are aware of academic dishonesty occurring, please talk to one of the instructors.

Personal crises do happen. If you are having difficulties that are interfering with your ability to do well in the class, please tell an instructor as soon as possible. We may be able to refer you to someone for help or to make special arrangements if the need is real and if you have done your best to deal with the situation in a timely manner. Don't hesitate to call the campus crisis center (541 346-3227) if you or a friend need assistance. Finally, we promise to respect you as students and as individuals, and ask that you return that respect to us and to your fellow classmates.

Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the quarter (or before) so that I may address you properly.

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities. Classroom courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Our classroom is a learning environment, and as such should be a safe, inclusive and respectful place. Being respectful also includes using preferred pronouns for your classmates. Disrespecting fellow students as well as combative approaches, tones and/or actions are not acceptable. Please make me aware if there are classroom dynamics that impede your (or someone else's) full engagement.

We support Title IX and have a duty to report relevant information. The UO is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment, including sexual assault, domestic and dating violence and gender-based stalking. Any UO employee who becomes aware that such behavior is occurring has a duty to report that information to their supervisor or the Office of Affirmative Action and Equal Opportunity. The University Health Center and University Counseling and Testing Center can provide assistance and have a greater ability to work confidentially with students.

### **Campus resources to support your learning**

*Tutoring and Academic Engagement Center* (<https://engage.uoregon.edu/services/>) Drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. Located in the 4<sup>th</sup> Floor Knight Library (541) 346-3226, [engage@uoregon.edu](mailto:engage@uoregon.edu).

*Counseling Center* Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2<sup>nd</sup> Floor of the Health Center(541)346-3227

*Accessible Education Center* The University of Oregon is working to create inclusive learning environments. The instructor believes strongly in creating inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify us as soon as possible. You are also encouraged to contact the Accessible Education Center. If you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit during office hours so that we can strategize how you can get the most out of this course. Located on the 1<sup>st</sup> Floor of Oregon Hall (541) 346-1155, [uoaec@uoregon.edu](mailto:uoaec@uoregon.edu)

*Center for Multicultural Academic Excellence (CMAE)* mission is to promote student retention and persistence for historically underrepresented and underserved populations. We develop and implement programs and services that support retention, academic excellence, and success at the UO and beyond. We reaffirm our commitment to all students, including undocumented and tuition equity students. Located on the 1<sup>st</sup> Floor of Oregon Hall (541) 346-3479, [cmae@uoregon.edu](mailto:cmae@uoregon.edu)

The *UO Access Shuttle* is an on-campus ride service provided at no cost to students with conditions that limit mobility. More information and a sign-up form can be found on the parking & transportation department website: <https://parking.uoregon.edu/content/access-shuttle>.

### **Discrimination and Harassment**

#### *Prohibited Discrimination and Harassment*

Any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment may seek resources and help at [safe.uoregon.edu](http://safe.uoregon.edu). To get help by phone, a student can also call either the UO's 24-hour hotline at 541-346-7244 [SAFE], or the non-confidential Title IX Coordinator at 541-346-8136. From the SAFE website, students may also connect to Callisto, a confidential, third-party reporting site that is not a part of the university.

Students experiencing any other form of prohibited discrimination or harassment can find information at [respect.uoregon.edu](https://respect.uoregon.edu) or [aaeo.uoregon.edu](https://aaeo.uoregon.edu) or contact the non-confidential AAEO office at 541-346-3123 or the Dean of Students Office at 541-346-3216 for help. As UO policy has different reporting requirements based on the nature of the reported harassment or discrimination, additional information about reporting requirements for discrimination or harassment unrelated to sexual assault, relationship violence, sex or gender based bullying, stalking, and/or sexual harassment is available at [Discrimination & Harassment](#).

### *Reporting*

The instructor of this class is a Student-Directed Employee. As such, **if you disclose to me, I will respond to you with respect and kindness. I will listen to you, and will be sensitive to your needs and desires. I will not judge you. I will support you.** As part of that support, I will direct students who disclose sexual harassment or sexual violence to resources that can help. **I will only report the information shared to the university administration when you as the student requests that the information be reported** (unless someone is in imminent risk of serious harm or is a minor). Please note the difference between 'privacy' and 'confidentiality.' As a Student-Directed Employee I can offer privacy because I am not required to report certain information to the university. However, I cannot be bound by confidentiality in the same way that a counselor or attorney is. Confidential resources such as these means that information shared is protected by federal and state laws. Any information that I as a student-directed employee receive may still be accessed by university or court proceedings. This means, for example, that I could still be called as a witness or required to turn over any related documents or notes that I keep.

Please note also that I am required to report all other forms of prohibited discrimination or harassment to the university administration. Specific details about confidentiality of information and reporting obligations of employees can be found at [titleix.uoregon.edu](https://titleix.uoregon.edu).

### *Mandatory Reporting of Child Abuse*

UO employees, including faculty, staff, and GEs, are mandatory reporters of child abuse. Child abuse pertains to individuals who are under the age of 18. This statement is to advise you that your disclosure of information about child abuse to the instructor may trigger my duty to report that information to the designated authorities. Please refer to the following links for detailed information about mandatory reporting: [Mandatory Reporting of Child Abuse and Neglect](#).

### Safe Ride

**541-346-7433 ext 2**

[pages.uoregon.edu/saferide](https://pages.uoregon.edu/saferide)

Safe Ride is an **assault prevention shuttle** that works to provide free, inclusive, and accessible alternatives to traveling alone at night for **UO students, faculty, and staff**.

We are a schedule-ahead service and riders can (1) call once we open to schedule a ride with a dispatcher or (2) leave a voicemail on the day of their ride request. We do not call riders ahead of time to confirm due to capacity constraints, but riders are always welcome to call us to double-check that their ride was scheduled. We are a feminist, 'for-the-students/by-the-students' organization and operate out of the Women's Center in EMU 12F.

Operating hours: **Spring term**                      Sunday - Thursday | 7p - midnight, Friday + Saturday | 7p - 2a

### Policy and rules:

1. We are a **schedule-ahead service**, we **do not call ahead**, and we can only wait for riders for 5 minutes at their pick-up time and location.
2. We only give rides to groups of **3 or fewer** to prioritize groups that are at higher risk.
3. We are a **free service** and do not accept tips.