

# Syllabus for Plant Animal Interactions (Biology 360-02)

Pacific University, Fall 2016

Professor Stacey Halpern

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Welcome to Plant-Animal Interactions! Plant-animal interactions is a dynamic branch of biology that addresses questions across a wide range of disciplines—ecology, evolution, behavior, plant and animal anatomy and physiology, and biochemistry among them. These interactions shape most natural communities, and are also critical in the human endeavor of agriculture. We will move back and forth across these disciplines, and from basic to fundamental science, throughout the course.

This course will not always run as a standard lecture course. There will be many in-class activities, problems, group work, and discussions, and I may assign video lectures to view before some classes. I've designed the course this way because I'm committed to creating a class that facilitates your learning and helps you practice skills you'll use in life and in your career as a biologist—whether that's in health care, teaching, research, farming, environmental advocacy, public policy, or any other application of biology. **For you and the class to succeed, you must come to each class, and you must come prepared to participate.** Preparation may include completing assignments and readings ahead of time.

**Course catalog description:** Plant-animal interactions are fundamentally important to the ecology and evolution of natural ecosystems, to conservation (e.g., management of invasive species), and to agriculture and food production. In this class, we will study the major antagonistic and mutualistic plant-animal interactions, including pollination, herbivory, fruit and seed dispersal, and plant protection mutualisms. Using these topics, we will explore basic and applied concepts related to ecology and plant biology. Readings from the primary literature will be an integral component of the course. Lab will involve authentic investigations of topics such as plant defenses, associational effects, and seed dispersal.

## Basic course information

- We meet in Marsh 201 MWF 9:15 – 10:20 am for lecture.
- We meet 1 – 4 p.m. on Tuesdays for lab, sometimes in Strain 319 and sometimes elsewhere. For field labs, come prepared to work outside in any weather.
- course website: on Moodle. Check to be sure you're enrolled.
- course Perusall site, with access code HALPERN-4120. Articles for class will be posted to this site, and there will be some graded assignments through it, so you must join the course. visit <https://perusall.com>.

## How to reach me

I enjoy talking with students and forward to interacting with you this semester! Visit with any questions.

Office location: **Strain 210**

Office hours: **W 2 - 3 pm, TTh by appointment, Fri 1:15 – 2:15 pm** If my office hours don't work for you, please make an appointment!

e-mail: **shalpern@pacificu.edu**. I check e-mail frequently during the day and will respond as soon as I can.

Mail: I have a mailbox in the natural sciences office, **Strain 102**.

Telephone: **503-352-3109** (extension 3109 if you're calling from campus). Although you can leave a voice-mail any time, e-mail is a more reliable way to reach me.

**How I will reach you** I will use your Pacific e-mail address to send out occasional but important course information, so check this account regularly or arrange to have messages forwarded to an account you use.

## Student Learning Objectives

I have designed this course to help each student achieve specific learning objectives. **After successfully completing the course, students should be able to:**

1. Explain how coevolution works, and evaluate evidence to determine whether it has occurred.
2. Characterize several plant families (e.g., Solanaceae, Brassicaceae, etc.) and insect orders (e.g., Lepidoptera, Hymenoptera, etc.), and describe their importance in the study of plant-animal interactions.
3. Diagram angiosperm anatomy and explain how anatomical traits (vegetative and reproductive) influence plant-animal interactions.
4. Explain the evolutionary ecology of characteristics related to plant-animal interactions (such as plant chemistry, animal behavior, etc.) using an evolutionary or cost-benefit framework.
5. Predict the pollinator for a flower, and explain why your prediction might be wrong.
6. Compare different plant defenses and the ways that herbivores have evolved to overcome them.
7. Predict the outcome of multiple plant-animal interactions, using real examples.
8. Explain when and how pollination, herbivory, and dispersal strongly influence ecological communities.
9. Critically read primary literature in the field of plant-animal interactions, including thoughtfully interpreting results and relating new results to prior knowledge.
10. Evaluate a realistic scenario to determine how changes in plant-animal interactions could influence a natural or agricultural system.
11. Present a persuasive, scientifically-sound argument to a lay person about practices or policy proposals plant-animal interactions, such as biological control, climate change, or pesticide use.

## Texts & Required Readings

You are not required to purchase a textbook for this class. All readings will be available through Perusall, Moodle, or on reserve in the library. Many are e-books through the library, and there should be enough availability for all of you to access them simultaneously. There will be one or two physical books on reserve in the library. You may choose to purchase a copy of the main one. It's a nice overview (but not worth the \$80 that the bookstore would charge...):

Howe, HF and LC Westerly. 1988 (other editions fine). *Ecological relationships of plants and animals*. Oxford University Press: New York, NY. (*We will read several chapters from this book. Available from Amazon for \$65 new, or ~\$5 used*)

## My expectations for you in this course

- I assume that all students enrolled in this class are adults who take responsibility for their education. I will work hard to facilitate your learning, but ultimately only you can actually learn the material through focused time and effort. As a reminder, Pacific guidelines state that to pass a class, students should expect to put in 2-3 hours outside of class for every credit; that means you should expect to work at least 8-12 hours/week on this course outside of class and lab time.
- I also assume that all students in this course are interested in the topic, either because they're biology majors or because they are already interested in ecology. I always strive to encourage your enthusiasm for biology, and for ecology in particular. It's Ok if you don't love ecology, but I will show my love for it every day!
- For each class and lab, I expect you to come prepared; to participate cheerfully in activities; and to act in a respectful, professional, and responsible manner. In turn, you can expect the same from me. If you feel uncomfortable in class for any reason, please let me know—I'm always available for these conversations.
- Please be on time for class and lab. Our time is valuable, and I will start both promptly.
- If you know you will miss class (e.g., for an approved, scheduled event), please let me know ahead of time. College notices are not sufficient—you must discuss these absences with me before hand.
- As part of respectful behavior in class, please be certain to turn off all cell phones during class and lab. Do not text during class or lab. Also, do not leave class or lab to answer a cell phone call. If you have a valid reason to have your cell phone on—e.g., a family emergency in progress—please let me know and I will accommodate that situation.

## Assessment of learning and grades

I will assess your learning in this course in a variety of ways, including written reports and papers, in-class exams, problem sets, other homework, in-class graded activities, and active participation in class and lab.

**Important note:** You must save all returned assignments until the end of the course. If I request to see a graded assignment or exam again and you cannot return it to me, you may receive a zero for that assignment or exam.

Assessments: Total of 640 points for the course

**Exams** (300 points, 46%)

- 2 quizzes (20-30 minutes, 35 points each)
- 2 exams (65 minutes, 80 points each)
- Grand Finale (2.5 hours, 70 points)

*Note: I assume you retain knowledge from prior exams; thus, all exams are cumulative, and there will always be one or more questions about old material. These questions will focus on key information and concepts, and should be related to new topics from that unit (e.g., questions about a plant family for an example we studied in that unit).*

**Class assignments** (135 points, 21%)

- Perusall comments on journal articles (5 points each on 7 articles, 35 points)
- In-class quizzes and analyses related to journal articles (9 points each on 7 articles, 63 points)
- Other periodic in-class or class prep assignments (scaled to 37 points total)

**Lab assignments** (215 points, 33%)

Lab assignments will give you practice in communicating about study design, data analysis, and scientific results. These assignments, along with due dates, are described in more detail in the lab syllabus.

Important information on assignment grading:

Following directions (e.g., formatting for reports) and meeting deadlines are important to me; assignments that do not meet these requirements will be penalized. Assignments are due at the time noted in the syllabus or on the assignment handout. Some assignments may be submitted via e-mail, Perusall, or Moodle. They must be submitted by the time deadline associated with the due date. Printed assignments must be turned in at the beginning of class; if you are late to class, the assignment will be considered late and will receive a penalty. I will accept late assignments with an automatic penalty of 10% per day (24 hour periods, weekends included). **I will not accept assignments more than three days late without prior approval.**

Obviously I can make accommodations for extraordinary situations (e.g., hospitalization, family emergency, etc.). Please let me know about emergencies in a reasonable time frame; college policy usually requires you to document these circumstances with the Dean of Students. If you have a planned, approved absence (e.g., off-campus athletic competition, performance, interview, etc.), please let me know ahead of time.

Grades Final grades will be assigned based on the percentage of the total points you earn, following this breakdown:

<b>Final grade</b>	<b>Percentage</b>	<b>Final grade</b>	<b>Percentage</b>	<b>Final grade</b>	<b>Percentage</b>
A	91% and higher	B-	79-80%	D+	67-69%
A-	89-90%	C+	76-78%	D+	66-68%
B+	86-88%	C	71-75%	D	60-65%
B	81-85%	C-	68-70%	F	less than 60%

## Academic Honesty

Pacific University has no tolerance for academic misconduct/dishonesty. It is university policy that all acts of misconduct and dishonesty be reported to the Associate Dean for Student Academic Affairs. Sanctions that may be imposed for such misconduct range from an "F" for the assignment, an "F" for the course, and suspension or dismissal from the university. Forms of academic misconduct include but are not limited to plagiarism, fabrication,

cheating, tampering with grades, forging signatures, and using electronic information resources in violation of acceptable use policies.

For this course, the Academic Code of Conduct includes proper attribution of ideas and information in written assignments and completing all individual work on your own. Academic honesty does not preclude discussing ideas with other students, studying together for exams, working on problem sets together, or providing feedback on lab write-ups **as long as all text is in your own words.** **Follow directions when making figures for lab carefully—sometimes you may share them, and sometimes you must make your own. I will provide guidelines for figure sharing guidelines with each assignment.**

Please talk to me before you turn in assignments if you have a question about what constitutes dishonesty.

### **College resources**

There are many services available at Pacific to help you succeed in your courses. I encourage you to take advantage of them! I can help connect you with these resources, including academic and non-academic support services. Some of these services include:

- **Tutoring and Learning Center (TLC)** The TLC is located in Scott Hall. The center focuses on delivering one-on-one and group tutoring services for math and science courses and writing skills in all subjects. Students should consult with the center's director for information on tutoring available for other subjects. Day and evening hours; walk-ins welcome!
- **Student Counseling Center** The counseling center offers individual counseling, crisis services, referrals, and workshops. They also have information on-line or in their office about issues such as stress management and sleep. 503-352-2191, Mon-Fri 9 a.m. – 5 p.m., <http://www.pacificu.edu/studentlife/counselingcenter/>

### **Reasonable accommodations for students with disabilities**

If you have documented challenges that will impede your learning in any way, please contact our LSS office in Clark Hall (ext.2107). The Director or Assistant Director will meet with students, review the documentation of their disabilities, and discuss the services that Pacific offers and any appropriate ADA accommodations for specific courses.

To receive accommodation, you must make arrangements with me at least 1 week prior to the due date or exam.

### **Creating an effective learning environment**

I strive to create a comfortable, interesting learning environment for everyone, and I welcome feedback on my teaching or the course.

## Schedule of Topics and Readings

The schedule below summarizes topics and major assignments for the course. It is subject to change as the course unfolds. Readings will be announced for each unit, and will be posted to Moodle (at the top of that unit's section) as Word documents with hyperlinks to on-line resources. You should download the resources to have easier access to these hyperlinks. I will announce any adjustments to assignments in class, so bring your schedule with you to record these changes. If you are absent from class for any reason, you are responsible for checking with other students or me to get information announced that day.

### Some information about how class will run

- Most Mondays we will analyze an article from the primary literature. These class periods will start with a group quiz on the article (I will assign groups, which will change once during the semester). Following that will be analysis problems and discussion questions, most of which you will complete in small groups.
- Unless otherwise noted, you will need to read material carefully before class. I design class activities (and quizzes) with this expectation, and you will struggle if you don't complete the work ahead of time.

Wks	Dates	Topics	Important dates
<b>Foundations</b>			
1-2	Aug 29- Sept 12	Overview, including classifying interactions  Evolution & coevolution: primer  Plant and animal diversity	Wed Sept 1 Turn in signed form for course  <b>No class Mon Sept 5 (Labor Day)</b>  Paper #1: Fri Sept 9  <b>Mon Sept 12: QUIZ 1 (30 min)</b>

<b>Mutualisms, especially pollination</b>			
Wks	Dates	Topics	Assignments due
3-7	Sept 12- Oct 17	Introduction to mutualisms  Pollination <ul style="list-style-type: none"> <li>• Angiosperm life cycle &amp; breeding systems</li> <li>• Floral rewards, attractants, and evolution</li> <li>• Pollinators and pollination syndromes</li> <li>• "Cheaters" and pollinating seed predators</li> <li>• Application: pollinator declines</li> </ul> Fruit and seed dispersal  Ant-plant mutualisms	Fri Sept 30: mid-term self assessment log  <b>No class Fri, Oct 7 (Fall break)</b>  <b>Mon Oct 17: EXAM 1 (65 min)</b>

<b>Herbivory</b>			
Wks	Dates	Topics	Assignments due
8-12	Oct 19 – Nov 16	Introduction to herbivory  Plant defenses  Herbivore offenses  Effects of herbivory on plants <ul style="list-style-type: none"> <li>• plant fitness and population regulation</li> <li>• community structure</li> </ul> Effects of plants on herbivores <ul style="list-style-type: none"> <li>• resource concentration</li> <li>• natural enemies and tri-trophic interactions</li> </ul>	Fri Nov. 11: mid-term self assessment log  <b>Wed, Nov 16: EXAM 2 (65 min)</b>

<b>Wks</b>	<b>Dates</b>	<b>Topics</b>	<b>Important dates</b>
<b>Synthesis</b>			
<b>Wks</b>	<b>Dates</b>	<b>Topics</b>	<b>Assignments due</b>
<b>13 –</b>	<b>Nov 28 –</b>	<b>Toxins in nectar and fruit</b>	<b>in-class assignments TBA</b>
<b>15</b>	<b>Dec 5</b>	<b>Net effects of multiple interactions</b>	<b>Fri Dec 2: final self assessment log</b>
		<b>GM crops and plant-animal interactions</b>	<b>Mon, Dec 5: Quiz 2</b>
		<b>Grand Finale (during final exam period)</b>	<b>Tues, Dec 13, 3-5:30 pm</b>

**Plant Animal Interactions Contract of Understanding, Fall 2016** Turn in Aug 31

I have read the syllabus completely and understand course requirements. I also understand the course policies, including those regarding academic honesty, late assignments, and keeping all graded work. I recognize that it is my responsibility to seek clarification regarding any aspect of the syllabus, the course requirements, or the grading policies if they are unclear to me.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name (printed): \_\_\_\_\_ +

**Student Information** This information helps me tailor the course to your background.

e-mail address: \_\_\_\_\_ Year So Jr Sr

Major: \_\_\_\_\_ Minor (if you have one): \_\_\_\_\_

Other courses this semester (names, please)

**Previous upper division biology courses and science courses—check ones you've taken**

- |  |  |  |   |
|--|--|--|---|
| <input type="checkbox"/> Junior Seminar            | <input type="checkbox"/> Animal Behavior   | <input type="checkbox"/> Marine Biology      | <input type="checkbox"/> Genetics             |
| <input type="checkbox"/> Evolution                 | <input type="checkbox"/> Galapagos         | <input type="checkbox"/> Tropical Rainforest | <input type="checkbox"/> Vertebrate Zoology   |
| <input type="checkbox"/> Principles of Development | <input type="checkbox"/> Animal Physiology | <input type="checkbox"/> Microbiology        | <input type="checkbox"/> Cell Biology         |
| <input type="checkbox"/> Cancer Biology            | <input type="checkbox"/> Molecular Biology | <input type="checkbox"/> Immunology          | <input type="checkbox"/> Conservation Biology |
| <input type="checkbox"/> Organic Chemistry         | <input type="checkbox"/> Biochemistry      | <input type="checkbox"/> Ecology             |   |
| <input type="checkbox"/> Other: list               |  |  |   |

**In which of these biology classes have you written formal lab reports or carried out projects you designed (in part or full)? What other experience do you have with independent research, if any?**

**Previous college quantitative classes—circle the classes you have taken:**

statistics (which one?) \_\_\_\_\_ calculus (what level?) \_\_\_\_\_ software tools (CS 130)

other(s)

**Please circle any of the following library/database tools that you feel comfortable using:**

JStor Biosis Web of Science ILL (interlibrary loan) Summit

**Extracurricular activities this term**

**Career goals or dream job, if known** (or possibilities, if you have several ideas)

(over)

**Do you have any concerns about this course?** If so, how can I help you overcome them?

**Are there any topics you particularly hope to learn about in this class?**