Z 365 Biology of Insects: Syllabus

Course description: Introduction to the study of insects, focusing on the biological attributes responsible for the success and dominance of insects. Emphasis on taxonomy, morphology, behavior, ecology, and co-evolutionary interrelationships. Lec/lab, 4 credits.

Lectures T Th 12:00-13:20 Cord 3121; Lab F 14:00-15:50 Cord 3058
Instructors: Dr. Jaga Giebultowicz: giebultj@science.oregonstate.edu
TA: TBA

Prerequisites: (BI 211 or 211H) and (BI 212 or 212H) and (BI 213 or 213H).

Course Content: This course introduces principles of insect biology with emphasis on diversity and regulatory mechanisms. We start with the overview of insect external and internal anatomy and then learn about growth cycles, reproduction and their regulation. We will also learn about nutrition, metabolism, circulation, and discuss examples of truly remarkable insect behavior. Throughout the course, we will learn about experimental methods used in entomology, and discuss examples how basic research contributes to eco-friendly pest control and provides insights into biomedical questions. In the lab portion of the course, there are a few short but exciting field trips.

Course Specific Measurable Student Learning Outcomes:

Learning outcomes from lecture portion: After completing the course students should be able to:
1. Acquire and use specialized language relevant to insect science.
2. Analyze and integrate information pertaining to insect anatomy, physiology and ecology.
3. Characterize different orders of insects based on structure/function relationships.
4. Communicate (through writing) understanding of principles of insect biology and systematics.
5. Apply knowledge acquired from assigned reading and lectures to laboratory activities
6. Prepare and give short class presentation based on research papers related to insect biology

Additional learning outcomes from laboratory portion:
1. Acquire skills in insect collecting, specimen preparation, and identification.
2. Understand the rationale for maintaining biological specimen collections at research institutions, and be able to explain the scope of information that can be obtained from the study of museum specimens.
3. Practice and refine knowledge of the system of taxonomic nomenclature, and realize the dual importance of our hierarchical ranking system, both in the conceptual organization of biological knowledge, and the physical organization of specimens in museum collections.
4. Conduct hypothesis-driven experiment, analyze data for statistical significance and present in graphical form.
5. Write laboratory reports based on experiments performed in class.

ASSESSMENT OF STUDENT LEARNING

Participation 15 points
Midterm exam 90 points
Insect collection 100 points
Quiz    (2x10 points)                        20 points
Lab and field trip reports        40 points
Class presentation                          35 points
Final exam                                                      100 points
Total points possible                        400

Participation points will be given for working on class problem in groups.
Three extra bonus points can be earned by contributing something interesting to current or previous lecture: video, picture, joke, unusual fact about insects.

More information about assignments and testing will be given at first lecture and as separate set of instructions and study guides.

Grading will be as follows: A>360 points, B>320, C>280, D>240 points

Lecture schedules, activities and requirements:

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Topic</th>
<th>Reading</th>
<th>Who</th>
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<tbody>
<tr>
<td>L1</td>
<td>Oct 1  Introduction to the course  Introduction to collecting insects</td>
<td>CH 1, Peterson Guide</td>
<td>Jaga Phil</td>
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<tr>
<td>L2</td>
<td>Oct 3  External anatomy</td>
<td>CH 2</td>
<td>Phil</td>
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<tr>
<td>L3</td>
<td>Oct 8  Insect systematics and classification; Guest presentation by Dr. Katy Prudic</td>
<td>CH 7: Sec. 1-2</td>
<td>Phil</td>
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<tr>
<td>L4</td>
<td>Oct 10 Insect Societies; Guest talk on bees by Dr. Ramesh Sagili</td>
<td>CH 12</td>
<td>Jaga</td>
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<tr>
<td>L5</td>
<td>Oct 15 Diversity of insects. Quiz 1 (covers L1-4)</td>
<td>CH 7: Sec. 3-4; pp461-497</td>
<td>Phil</td>
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<tr>
<td>L6</td>
<td>Oct 17 Internal anatomy and physiology</td>
<td>CH 3</td>
<td>Jaga</td>
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<tr>
<td>L7</td>
<td>Oct 22 Internal anatomy and physiology, cont.</td>
<td>Chapter 3, 4</td>
<td>Jaga</td>
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<tr>
<td>L8</td>
<td>Oct 24 Sensory system and behavior</td>
<td>Chapter 4</td>
<td>Jaga</td>
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<tr>
<td>L9</td>
<td>Oct 29 Special topics in Insect Biology Quiz 2 (covers L5-8)</td>
<td>TBA</td>
<td>Phil</td>
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<td>L10</td>
<td>Oct 31 Reproduction</td>
<td>CH 5</td>
<td>Jaga</td>
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<td>L11</td>
<td>Nov 5  Midterm</td>
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<td>L12</td>
<td>Nov 7  Insect development and life histories</td>
<td>CH 6</td>
<td>Jaga</td>
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<tr>
<td>L13</td>
<td>Nov 12 Ground dwelling insects</td>
<td>CH 9</td>
<td>Jaga</td>
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<tr>
<td>L14</td>
<td>Nov 14 Aquatic Insects; Guest talk by Dr. Kate Boersma</td>
<td>CH 10</td>
<td>Jaga</td>
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<tr>
<td>L15</td>
<td>Nov 19 Insects and plants</td>
<td>CH 11</td>
<td>Jaga</td>
</tr>
<tr>
<td>L16  Nov 21</td>
<td>Insect-human relations; Guest talk by Dr. Sujaya Rao</td>
<td>CH 16</td>
<td>Jaga</td>
</tr>
<tr>
<td>L17  Nov 26</td>
<td>Parasitism in insects and by insects</td>
<td>CH 13, 15</td>
<td>Jaga</td>
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<tr>
<td>L18  Dec 3</td>
<td>Insect defenses</td>
<td>CH 14</td>
<td>Jaga</td>
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<tr>
<td>L19  Dec 5</td>
<td>Review</td>
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<td>Jaga</td>
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<td>Dec 9</td>
<td>FINAL EXAM in class 14:00-16:00</td>
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**Laboratory schedules, activities and requirements:**

<table>
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<tr>
<th>Week #</th>
<th>Activities</th>
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<tbody>
<tr>
<td>1 - Oct -4</td>
<td><strong>Field trip 1</strong> to Martin Luther King Park Insect observation and collection</td>
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<tr>
<td>2 - Oct-11</td>
<td><strong>Field trip 2</strong> - visit to Oak Creek Apiary Observe social insects and learn about casts and their behavior</td>
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<tr>
<td>3 - Oct-18</td>
<td><strong>Fieldtrip 3</strong> to Blueberry Meadow Learn about pest insects, monitoring and control. Continue insect collection</td>
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<tr>
<td>4 - Oct 25</td>
<td>Insect identification and display Work on your insect collection</td>
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<tr>
<td>5 - Nov 1</td>
<td>Internal anatomy and physiology Dissect insects examine and compare internal organs.</td>
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<tr>
<td>6 - Nov 8</td>
<td>Insect identification and display Work on your insect collection Study effects of temperature on development (30 min)</td>
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<tr>
<td>7 - Nov 15</td>
<td>Reproduction, development and life histories Observe courtship. Study effects of diet on reproduction. Study feeding preferences</td>
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<tr>
<td>8 - Nov 22</td>
<td>Sensory system and behavior Finish reproduction exp. Study metamorphosis. Study nervous system and muscles. Finish temperature experiment.</td>
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<tr>
<td>9 - Dec 6</td>
<td>Wrap-up Finish and analyze experimental data Finish your insect collection.</td>
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**IMPORTANT:** Midterm cannot be made up unless very special circumstances occurred that are properly proven. Field trips, labs and final cannot be made up.

**Learning resources:**

1. Textbook “The Insects: an Outline of Entomology” by Gullan and Cranston 4th edition 2010. **Full text is available online via library to OSU students.** Assigned chapters (CH) are from this book.
2. Peterson Field Guides “A field Guide to Insects” by Borror and White

TBA research articles posted on BB or selected by students

Required Materials (all are available from OSU bookstore):

- Rite in the Rain notebook.
- Forceps
- Insect Pins

The Insect Collection:

Biological specimen collections, both at the institutional and private level, comprise the most basic set of data for our knowledge of the world’s biodiversity. Collections are especially important in the study of insects, where only a fraction of the world’s species have been discovered and many rare species, even in Oregon, are only known from one or several pinned specimens held at a museum.

In the lab portion of this class, you will learn how to prepare a scientifically useful insect specimen collection. You will then use your own collection to study the anatomy and diversity of insects, and you will practice using a dichotomous key to identify your specimens to order.

Students are encouraged to begin collecting insects immediately and on their own time! (see separate handout on how to collect and preserve insects)

You can earn 100 points or 25% of the grade for your specimen collection.

1. 40 total species mounted and labeled. (25 pts.)
2. Minimum of 12 orders identified (25 pts.)
3. Field notebook (10 pts.)
4. Neatness (10 pts.)
5. Database (10 pts.)
6. Illustration with anatomy labeled. (20 pts.)

Field Notebooks: Maintenance of field notebook will be discussed in class.

Database: All specimens should be pinned with a unique barcode label. Students will turn in a spreadsheet documenting each specimen in his or her final collection, the order-level identification, and the date and locality where it was collected. Locality should include a name or short description of the place, followed by GPS coordinates, GPS error (e.g., “+- 10m”), and geo-referencing method. For students without GPS devices, localities can be geo-referenced using Google Earth (downloadable for free on the Internet).

Illustration: Guidelines and expectations for insect illustration will be given out in a separate handout in class.

FIELD TRIPS
Participation at field trips is required. On all field trips, students should bring field notebook, pencil, collecting vials. Jaga and Phil can help provide transportation to a few students lacking vehicles. As the weather can be unpredictable, PLEASE, CHECK YOUR E-MAIL FRIDAY MORNING ON THE FIELD TRIP DAY FOR ALTERNATIVE PLAN.

**October 4th** – Insect observation and collection at Dr. Martin Luther King Jr. Park, Corvallis.


Please meet at 2:15pm at the parking lot of MLK Park, off of NW Walnut Boulevard. MLK Park is about a 15 minute bike ride from Cordley Hall. Head west on Campus Way from Cordley and turn right at the bike path on 53rd street. Head north a little over a mile and the park will be on your left.

**October 11th** – Oak Creek Center for Urban Horticulture (Apiary tour with Ellen Topitzhofer)

*Coordinates*: 44.559953°N, -123.289103°W

Meet at Oak Creek building at 2:05pm. The Oak Creek Center is on the southwest corner of campus. See [http://horticulture.oregonstate.edu/occuh](http://horticulture.oregonstate.edu/occuh) for map and information.

**October 18th** – Insect observation and collection at Blueberry Meadows with Dr. Amy Dreves

*Coordinates*: 44.599525°N, -123.223734°W  [https://www.google.com/#q=blueberry+meadows+corvallis](https://www.google.com/#q=blueberry+meadows+corvallis)

Meet at 2:15pm at the parking lot of Blueberry Meadows, on Hwy 20 a couple blocks north of Circle Blvd. Blueberry Meadows is 4.0 miles, about a 25 minute bike ride from Cordley Hall.

**Expectations for behavior in class:**

- Some basic courtesies include arriving on time and not leaving or preparing to leave until lecture is finished.
- If you bring laptop to class, please, use it exclusively for purpose of taking notes!
- Please, do not use cell phones in class with ONE exception: Bring your phones

**Student conduct:**

*What you should know about academic dishonesty:*

Cheating includes using study materials during an exam, copying from another student, or using any other unauthorized aid to obtain the answer to a question. Submitting an altered exam for re-grading is academic dishonesty. Given evidence of cheating, the Instructor may impose any academic penalty including an "F" grade in the course.

Further, the incident will be reported to the student's academic dean for possible disciplinary action, and a copy of the report will be filed by the Student Conduct Program. Link to Statement of Expectations for Student Conduct [http://oregonstate.edu/studentconduct/offenses-0](http://oregonstate.edu/studentconduct/offenses-0)

**Statement Regarding Students with Disabilities**
"Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098."