

Insect Symbioses Syllabus

ENTMLGY 3100, SP 2023

Course Information

- **Course times and location:** Tuesdays and Thursdays, 10:05 – 11:25 AM. Location Howlett Hall 116
- **Credit hours:** 3
- **Mode of delivery:** In-Person

Instructor

- **Name:** Joe Raczkowski
- **Email:** raczkowski.2@osu.edu
- **Phone Number:** 614-688-1054
- **Office location:** 257B Howlett Hall
- **Office hours:** Email instructor to arrange an appointment
- **Preferred means of communication:**
 - My preferred method of communication for questions is **email**.
 - My class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your [notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Teaching Assistant

- **Name:** TBD
- **Email:** TBD

Course Prerequisites/Co-Requisites

Biology 1113, 1113H, 1114, or 1114 H



Course Description

This course focuses on insect symbioses, the intimate associations among insect species and other organisms that are commonplace in nature. Lectures introduce the biology of the symbiotic species (arthropods, vertebrates, plants, fungi, bacteria), the details of the symbiotic interactions (parasitism, commensalism, mutualism), and theory regarding the ecology and evolution of symbioses as applied to insect systems. Several lectures are devoted to the Orders Coleoptera (beetles) and Hymenoptera (ants, bees, and wasps) as these two groups represent ~ 500,000 species of insects and provide many examples of symbiotic relationships. Other lectures are devoted to the symbiotic relationships in the Orders Diptera (flies), Hemiptera (true bugs), Lepidoptera (moths and butterflies), and Strepsiptera (twisted-wing parasites).

Learning Outcomes

By the end of this course, students should successfully be able to:

- Define the three categories of symbioses (parasitism, commensalism, mutualism).
- Describe the basic biology of insects and their symbionts (plants, animals, fungi, microorganisms).
- Compare/contrast symbioses in the Orders Coleoptera, Hymenoptera, Diptera, Hemiptera, Lepidoptera, and Strepsiptera.
- Locate and synthesize information from the primary literature on insect symbioses in a written format.



How This Course Works

Mode of delivery: In-person

Credit hours and work expectations: This is a 3 credit-hour course. According to [Ohio State bylaws on instruction](https://go.osu.edu/credithours) (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (Quiz/Exam preparation, Writing Assignment preparation) to receive a grade of C average.

Attendance and participation requirements: Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- Attendance is mandatory and critical to student success. Ten percent (10%) of the Final Grade is based on attendance.
- Legitimate excused absences include the following: participation in an activity of an official University organization, verifiable illness (see below), verifiable family emergencies, subpoenas, jury duty, military service, and professional development (e.g., grad school visits). It is the student's responsibility to notify the instructor of any expected, excused absence as far in advance as possible. A verifiable illness is an absence due to illness that is accompanied by a note or documentation by a qualified medical individual. The instructor will discuss accommodations for excused absences with students when they submit their excuses.



Course Materials, Fees and Technologies

Required Equipment

- **Computer:** current Mac (MacOS) or PC (Windows 10) with high-speed internet connection.
- **Webcam:** built-in or external webcam, fully installed and tested
- **Microphone:** built-in laptop or tablet mic or external microphone
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for [technology and internet access](https://go.osu.edu/student-tech-access) (go.osu.edu/student-tech-access).

Required Software

Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Visit the [installing Office 365](https://go.osu.edu/office365help) (go.osu.edu/office365help) help article for full instructions.

CarmenCanvas Access

You will need to use [BuckeyePass](https://buckeyepass.osu.edu) (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](https://go.osu.edu/add-device) (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes, good for 365 days, that can each be used once.
- [Install the Duo Mobile application](https://go.osu.edu/install-duo) (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at [614-688-4357 \(HELP\)](tel:614-688-4357) and IT support staff will work out a solution with you.



Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- [Navigating CarmenCanvas](https://go.osu.edu/canvasstudent) (go.osu.edu/canvasstudent)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat:** go.osu.edu/it
- **Phone:** [614-688-4357 \(HELP\)](tel:614-688-4357)
- **Email:** servicedesk@osu.edu



Grading and Faculty Response

How Your Grade is Calculated

Assignment Category	Percentage
Attendance	10
Quizzes (1-4)	20
Writing Assignments (1-3)	20
Exam 1	15
Exam 2	15
Final Exam	20
TOTAL	100

See [Course Schedule](#) for due dates.

Descriptions of Major Course Assignments

Quizzes 1- 4

Description: Quizzes test a student's knowledge of 2-3 weeks of course content. The quizzes may include a mixture of question types, including multiple choice and short answer questions. Details will be provided in class prior to the exam date. Quizzes 1 - 4 are weighted equally for a combined total of 20% of the Final Grade.

Academic integrity and collaboration:

Quizzes are meant to assess individual student learning. Quizzes are closed book, in-person, and timed. Quizzes must be completed on your own without use of any external sources.

Exam 1

Description: Exam 1 tests a student's knowledge of course content covered up to the date of the exam. The exam may include a mixture of question types, including multiple choice, short answer questions or essay. Details will be provided in class prior to the exam date.

Academic integrity and collaboration: Exam 1 is meant to assess individual student learning. Exam 1 is closed book, in-person, and timed. Exam 1 must be completed on your own without use of any external sources.

Exam 2

Description: Exam 2 tests a student's knowledge of course content delivered after Exam 1, up to the date of Exam 2. The exam may include a mixture of question types, including multiple choice, short answer questions or essay. Details will be provided in class prior to the exam date.

Academic integrity and collaboration: Exam 2 is meant to assess individual student learning. Exam 2 is closed book, in-person, and timed. Exam 2 must be completed on your own without use of any external sources.

Final Exam

Description: The Final Exam tests a student's knowledge of 14 weeks of content. The exam may include a mixture of question types, including multiple choice, short answer questions or essay. Details will be provided in class prior to the exam date. The Final Exam will be administered during the scheduled Final Exam period for the course.

Academic integrity and collaboration: The Final Exam is meant to assess individual student learning. Exams are closed book, in-person, and timed. The Final Exam must be completed on your own without use of any external sources.

Writing Assignment 1

Description: Writing Assignment 1 is designed to expose students to primary literature on symbioses found in the **Order Coleoptera (beetles)**. Students will locate at least two primary literature sources on Coleopteran symbioses and synthesize the information in a written format including citations using the APA Citation Style. The process of locating, reading, and reporting on peer-reviewed literature will be reviewed by the instructor. Writing Assignments 1 - 3 are weighted equally for a combined total of 20% of the Final Grade.

The OSU Writing Center offers free help with writing at any stage of the writing process for any member of the university of community. To learn more visit: <https://cstw.osu.edu/our-programs/writing-center>

Academic integrity and collaboration: Writing Assignment 1 must be a student's own original work. Proofreading by a trusted source is permitted.

Writing Assignment 2

Description: Writing Assignment 1 is designed to expose students to primary literature on symbioses found in the **Order Hymenoptera (ants, bees, wasps)**. Students will locate at least two primary literature sources on Hymenopteran symbioses and synthesize the information in a written format including citations using the APA Citation Style. The process of locating, reading, and reporting on peer-reviewed literature will be reviewed by the instructor. Writing Assignments 1 - 3 are weighted equally for a combined total of 20% of the Final Grade.

The OSU Writing Center offers free help with writing at any stage of the writing process for any member of the university of community. To learn more visit: <https://cstw.osu.edu/our-programs/writing-center>

Academic integrity and collaboration: Writing Assignment 2 must be a student's own original work. Proofreading by a trusted source is permitted.

Writing Assignment 3

Description: Writing Assignment 3 is designed to expose students to primary literature on symbioses found in one of the following Orders of insects: **Diptera (flies), Hemiptera (true bugs), Lepidoptera (moths and butterflies), or Strepsiptera (twisted-wing parasites)**. Students will locate at least two primary literature sources on symbioses in one of the Orders listed above and synthesize the information in a written format including citations using the APA Citation Style. The process of locating, reading, and reporting on peer-reviewed literature will be reviewed by the instructor. Writing Assignments 1 - 3 are weighted equally for a combined total of 20% of the Final Grade.

The OSU Writing Center offers free help with writing at any stage of the writing process for any member of the university of community. To learn more visit: <https://cstw.osu.edu/our-programs/writing-center>

Academic integrity and collaboration: Writing Assignment 3 must be a student's own original work. Proofreading by a trusted source is permitted.

Attendance

Description: Ten percent (10%) of the Final Grade is based on mandatory attendance. The instructor will take attendance at each lecture and record this via the Attendance function in Carmen Canvas. Excused absences will count as attended lectures. Please refer to the Attendance and Participation requirements on page 3 of this syllabus for a description of acceptable excused absences.

Late Assignments

Please refer to Carmen for due dates. Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments.

Late assignments are subject to a 10% reduction per 24-hour period they are late, without an excused absence. Students must contact the instructor in the case of illness, emergency or other excused absence to discuss alternative arrangements or due dates to be made at the discretion of the instructor. Students must provide documentation for the excused absence (e.g.; physicians note).

Instructor Feedback and Response Time

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call [614-688-4357 \(HELP\)](tel:614-688-4357) at any time if you have a technical problem.

- **Preferred contact method:** My preferred contact method is via my Ohio State email account, raczkowski.2@osu.edu. If you have a question, please contact me first through my Ohio State email address. I will reply to emails within **24 hours on days when class is in session at the university**.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check [your notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For assignments submitted before the due date, I will try to provide feedback and grades within **seven days**. Assignments submitted after the due date may have reduced feedback and grades may take longer to be posted.

Grading Scale

93–100: A
 90–92.9: A-
 87–89.9: B+
 83–86.9: B
 80–82.9: B-
 77–79.9: C+
 73–76.9: C
 70–72.9: C-
 67–69.9: D+
 60–66.9: D
 Below 60: E



Other Course Policies

Academic Integrity Policy

See [Descriptions of Major Course Assignments](#) for specific guidelines about collaboration and academic integrity in the context of this online class.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's [Code of Student Conduct](http://studentconduct.osu.edu) (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- [Committee on Academic Misconduct](http://go.osu.edu/coam) (go.osu.edu/coam)
- [Ten Suggestions for Preserving Academic Integrity](http://go.osu.edu/ten-suggestions) (go.osu.edu/ten-suggestions)
- [Eight Cardinal Rules of Academic Integrity](http://go.osu.edu/cardinal-rules) (go.osu.edu/cardinal-rules)

Copyright for Instructional Materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at equity.osu.edu,
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or Email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member."



Diversity

The Ohio State University affirms the importance and value of diversity of people and ideas. We believe in creating equitable research opportunities for all students and to providing programs and curricula that allow our students to understand critical societal challenges from diverse perspectives and aspire to use research to promote sustainable solutions for all. We are committed to maintaining an inclusive community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among all members; and encourages each individual to strive to reach their own potential. The Ohio State University does not discriminate on the basis of age, ancestry, color, disability, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, race, religion, sex, gender, sexual orientation, pregnancy, protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment.

To learn more about diversity, equity, and inclusion and for opportunities to get involved, please visit:

- <https://odi.osu.edu/>
- <https://odi.osu.edu/racial-justice-resources>
- <https://odi.osu.edu/focus-on-racial-justice>
- <http://mcc.osu.edu/>

In addition, this course adheres to **The Principles of Community** adopted by the College of Food, Agricultural, and Environmental Sciences. These principles are located on the Carmen site for this course; and can also be found at <https://go.osu.edu/principlesofcommunity>. For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (<https://equityandinclusion.cfaes.ohio-state.edu/>). If you have been a victim of or a witness to a bias incident, you can report it online and anonymously (if you choose) at <https://equity.osu.edu/>.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life Counseling and Consultation Services (CCS) by visiting ccs.osu.edu or calling (614) 292- 5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at (614) 292-5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

For students in the College of Food, Agricultural, and Environmental Sciences, David Wirt, wirt.9@osu.edu, is the CFAES embedded mental health counselor. To contact David, please call 614-292-5766. Students should mention their affiliation with CFAES if interested in speaking directly with David.

Requesting Accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with [Student Life Disability Services \(SLDS\)](#). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's [request process](#), managed by Student Life Disability Services.

Disability Services Contact Information

- Phone: [614-292-3307](tel:614-292-3307)
- Website: slds.osu.edu
- Email: slds@osu.edu
- In person: [Baker Hall 098, 113 W. 12th Avenue](#)



Accessibility of Course Technology

This course requires use of CarmenCanvas (Ohio State's learning management system). If you need additional services to use these technologies, please request accommodations as early as possible.

- [CarmenCanvas accessibility](https://go.osu.edu/canvas-accessibility) (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- [CarmenZoom accessibility](https://go.osu.edu/zoom-accessibility) (go.osu.edu/zoom-accessibility)



Course Schedule

Refer to the CarmenCanvas course for up-to-date due dates.



Week beginning	Percent earned	Topics, Assignments, Due Dates
1/9		Introduction to Insects Anatomy/Physiology/Diversity Introduction to Symbioses: Mutualism, Commensalism, Parasitism Finding, reading, and reporting on Primary Literature
1/16	5%	Symbioses between Coleoptera (beetles) and Plants <i>Magnolia ovata</i> (Magnoliaceae) pollination by <i>Cyclocephala literata</i> (Scarabaeidae, Dynastinae) <i>Ceratandra gradiflora</i> (Orchidaceae) pollination by <i>Lepethrix hiliaris</i> (Scarabaeidae, Hopliini) Quiz 1 on 1/19
1/23		Symbioses between Coleoptera (beetles) and Fungi Ambrosia beetles (Curculionidae, Scolytinae) cultivation of <i>Ambrosiella</i> and <i>Raffaelea</i> fungi as an obligate food source. Bark beetles (Curculionidae, Scolytinae) and <i>Dryadomyces</i> fungi effect on larval survival and growth. Finding, reading, and reporting on Primary Literature
1/30	5%	Symbioses between Coleoptera (beetles) and Bacteria Leaf beetles (Chrysomelidae, Cassidinae) and pectinolytic symbiont proteobacteria <i>Canidatus</i> <i>Stammera</i> capleta. Reed beetles (Chrysomelidae, Donaciinae) and gut symbiont of adult folivores and larval sap-feeders, <i>Canidatus</i> <i>Macroleicola</i> muticae Quiz 2 on 2/2
2/6		Symbioses between Coleoptera (beetles) and other Arthropods Carrion beetles (Silphidae, <i>Necrophorus</i>) and the phoretic mite, <i>Poecilochirus necrophori</i> Rove beetles (Staphylinidae, <i>Dinarda</i>) and ants (Formicidae, <i>Formica</i>)



2/13	6.67%	<p>Symbioses between Hymenoptera (ants, bees, wasps) and Plants</p> <p>Gall wasps (Cynipidae, Cynipinae) and oak trees (<i>Quercus</i>)</p> <p>Acacia ants (Formicidae, <i>Pseudomyrmex</i>) and bullhorn acacia (Fabaceae, <i>Vachellia</i>)</p> <p>Writing Assignment 1 due 2/17</p>
2/20	15%	<p>Symbioses between Hymenoptera (ants, bees, wasps) and Fungi</p> <p>The role of ascomycete fungi in ant (Formicidae, <i>Dendrolasius</i> and <i>Chtonolasius</i>) nest architecture.</p> <p>The role of the Basidiomycete fungus, <i>Amylostereum</i>, on wood wasp (Siricidae, <i>Sirex</i>) larval development.</p> <p>Exam 1 on 3/23</p>
2/27		<p>Symbioses between Hymenoptera (ants, bees, wasps) and Bacteria</p> <p>Beewolves (Crabronidae, <i>Philanthus</i> and <i>Trachyphus</i>) and bacterial (Streptomyces) symbionts.</p> <p>Fungi inhibiting bacteria <i>Bombella apis</i> and the honey bee (Apidae, <i>Apis</i>)</p>
3/6	5%	<p>Symbioses between Hymenoptera (ants, bees, wasps) and Vertebrates</p> <p>Red-cheeked Cordonbleu finch (Estrildidae) nesting with wasps (Vespidae, <i>Ropalidia</i>)</p> <p>Swifts (Apodidae) nesting associations with wasps (Vespidae, <i>Polybia</i>)</p> <p>Quiz 3 on 3/9</p>
3/13		SPRING BREAK!
3/20	6.67%	<p>Symbioses between Hymenoptera (ants, bees, wasps) and Arthropods</p> <p>Gall-forming mite (<i>Aceria</i>) predation by parasitoid wasp (Braconidae, <i>Bracon</i>)</p> <p>Potter wasp (Vespidae, <i>Allodynerus</i>) and parasitic mite (Astigmata: Winterschmidtidae, <i>Ensliniella</i>)</p> <p>Writing Assignment 2 due 3/24</p>



3/27		Symbioses in Diptera (flies) Gall midge (Cecidomyiidae, <i>Mayetiola</i>) and wheat (Poaceae, <i>Triticum</i>) Parasitoids (Tachinidae) of Lepidoptera and Hemiptera
4/3	5%	Symbioses in Hemiptera (true bugs) Sap-feeding insects (Auchenorrhyncha) and the gut-symbiont <i>Bacteroidetes</i> Blueberry mealybugs (<i>Dysmicoccus vaccinii</i>) and ants (Formicidae, <i>Lasius</i>) Quiz 4 on 4/6
4/10	6.67%	Symbioses in Lepidoptera (moths and butterflies) Alcon-blue butterfly (<i>Maculinea alcon</i>) and ants (Formicidae, <i>Myrmica</i>) Proteobacterial gut-symbionts in Lepidoptera Writing Assignment 3 due 4/14
4/17	15%	Symbioses in Strepsiptera (twisted-wing parasite) Relationships between Strepsiptera, <i>Wolbachia</i> bacteria, and flies (Tephretidae) Exam 2 on 4/20
Finals	20%	Final Exam 5/2, 8-9:45 AM