

# Biology of Insects (Biology 345)

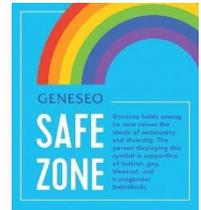
## Fall 2020

### Course overview

Why study insects? The theoretical ecologist Robert May wrote, “To a good approximation, all species are insects.” This claim comes from the fact that of the 1.5 million described species, almost over 900,000 are insects. The number of described species is certainly an underestimate of the actual number, which has recently been estimated to be as many as 5.5 million. Insects are ubiquitous in the earth’s terrestrial ecosystems, occupying practically every possible ecological niche as herbivores, predators, parasites, scavengers, and decomposers. They provide valuable ecosystem services, as pollinators, biological control agents, food sources for other species, and decomposers of plant and animal detritus. While many of their activities benefit humans, an understanding of insect biology is also important to help control their negative impacts as vectors of disease and agricultural and forest pests. The small body size, abundance, short generation time, high reproductive rate, and ability to be experimentally manipulated have made insects valuable model organisms in the study of biology, significantly impacting research in fields such as physiology, genetics, biochemistry, development, ecology, and evolutionary biology. This course will introduce you to the biology of insects, from insect diversity, classification, and evolutionary history, to their morphology, physiology, behavior, ecology, and relevance to human activities. My hope is that it will inspire wonder and respect in you for these remarkable organisms!

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Office hours: Online only, see Canvas for details



**Instruction modality:** Hybrid, with much content delivered online, and face-to-face meetings in the scheduled lecture (TR 10 – 11:15 am, ISC 136) and lab (W 1-4 pm, ISC 206) times to practice methods and work with collections.

**Course description from Bulletin:** A survey course dealing with the classification, morphology, physiology, ecology, and economic importance of insects. (4 credits; 3 hrs lecture/3 hrs lab)

**Prerequisites:** Biol 117 and Biol 119

**Course website:** [canvas.geneseo.edu](http://canvas.geneseo.edu)

**What you will need:** Internet access and computer with webcam and microphone to participate in Zoom meetings. USB microscope *highly* recommended – see details on Canvas.

**Required textbook:** *Field Guide to Insects: America North of Mexico* by D.J. Borror and R.E. White. Peterson Field Guide Series. (Any edition, Houghton Mifflin Co.)

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### Learning outcomes

Successful students in this course will be able to

- integrate knowledge about the morphological, physiological, and ecological traits of insects to explain the success, abundance, diversity, and ecological importance of insects
- interpret the evidence for the proposed evolutionary relationships of insects and related groups and how this informs insect systematics
- identify insects to order and the most common families in major orders
- apply a variety of methods to collect insects and prepare insect specimens for a formal collection using standard museum techniques
- interpret and synthesize primary literature
- effectively communicate the context, interpretation, and significance of research findings

## How this course will run

### Overview of course activities

The lecture portion of the course will introduce you to many aspects of insect biology: classification and evolutionary history, anatomy, physiology, development, life history, behavior, and ecology. We will also address the impacts of insects and applied topics like pest management and medical entomology. In the course laboratory, you will practice methods of collecting, preserving, and curating insects. During several local field trips you will have opportunities to collect specimens and practice common methods of insect sampling. You will also be required to develop an insect collection meeting specific criteria. The lab will also include activities to learn about insect internal and external morphology, insect identification, and ecological patterns in insect distributions.

### Course format

Our course will be taught in a **hybrid** format this semester, which means some content will be delivered online via Canvas (e.g., recorded video lectures, other videos and online materials), while we will have some face-to-face interactions as well, following physical distancing guidelines. So, what does this mean for our course?

1. In order to maximize hands-on learning that is so important to the field of entomology at the start of the semester, I will be **using many of our “lecture” periods during the TR 10-11:15 am time slot for more “lab” oriented activities**, like learning how to prepare specimens for a formal insect collection and viewing reference specimens to practice identifying insects to the order or family level. These hands-on activities will be emphasized during the early part of the semester to ensure you receive effective instruction and opportunities for practice before changing circumstances require any changes in our mode of delivering courses.
2. During the first 4 weeks of lab we will emphasize collecting insects and different collecting methods, so that you can gather enough specimens to assemble a formal insect collection. As traveling as a group to other field sites is challenging under the physical distancing guidelines that COVID-19 requires, most of this field work will be done on or near campus, exploring nearby habitats within walking distance. I will also be encouraging you to get out and collect on your own time, especially if you have not been collecting over the summer. As the fall progresses, insects will be harder to come by!
3. To facilitate more individualized help from me and to limit the need to pass around reference specimens (giving each student their own set to work with), you will **often be split into two groups to work with lab materials at different times** (i.e., split between Tuesday and Thursday lecture periods, or between the first half and second half of our Wednesday lab period). You will be split into two regular cohorts (to be determined the first week of class). Content that I would normally provide you in lecture class sessions will be delivered in videos that you will view outside of class. However, depending on the week’s activities and equipment/materials requirements, we may also meet as a complete class, as we can all fit into our lab and lecture rooms while maintaining physical distancing. I will announce the plan for each week by the Saturday that precedes it. You should pay attention to your email and Canvas announcements to learn when and where you will meet each week and keep our regular class and lab times free of other commitments.

### Attendance expectations and public health

I greatly value the learning opportunities we’ll have in our in-person class meetings and hope that you will actively participate in this important element of the learning process. The COVID-19 pandemic presents challenges to in-person learning, but by working together we can make this a safe experience.

It is essential that all students in in-person classes follow some basic processes to help keep themselves, other students, and our faculty and staff safe. Although these processes may seem inconvenient, they reflect current public health guidance that helps minimize the spread of coronavirus. Please incorporate these essential health

and safety measures into your normal routine, consider the ways that your actions may affect the health and wellbeing of those around you, and try to approach this semester with a spirit of empathy and compassion.

In the context of the COVID-19 pandemic, it is vital that we all do what we can to protect the health and safety of each other. **If you are feeling unwell on a day that class meets in-person, do not attend.** Remember that it is better to stay home if you are not feeling well than to attend class and risk spreading illness to others. If you face this situation on the day of an exam or major quiz, contact me ASAP and we will make alternative arrangements for the assessment. Throughout the semester, please be proactive in communicating about absences and contact the Dean of Students if you expect to be out for an extended period of time. Rest assured that there will be no penalty for missing class and that I've designed our course so that there's a path for you to make up any learning that takes place in a class meeting you miss.

The college has developed an online COVID-19 screening report for students. Be sure to familiarize yourself with this process and complete the brief screening report before leaving for class. If you are experiencing common symptoms of COVID-19, stay home and contact Health and Counseling Services as soon as possible. I strongly encourage you to set a daily reminder to fill out the screening report.

### Face masks

Face masks are required in all instructional spaces (including classrooms, lecture halls, and laboratories) and all common areas including residence halls and academic buildings. If you forget your mask, please be sure to pick up a disposable one before entering the classroom. Masks must be worn for the duration of class. If you do not have a mask or are unwilling to wear one, you will be asked to leave the classroom. I cannot safely hold class if all students are not wearing face masks. Students who have concerns about wearing a face mask due to a documented disability need to contact the Office of Accessibility Services ([access@geneseo.edu](mailto:access@geneseo.edu)) to request reasonable accommodations. If you would feel more comfortable or if my teaching could be more accessible if I wear a clear face mask, please let me know as soon as possible.

### Behavior and procedures for classroom/lab use

Please familiarize yourself with any special seating arrangements in the classroom or lab and be sure to practice 6-foot physical distancing at all times. This includes entering and exiting the room and accessing frequently used resources (like the freezer where we store your insect specimens before they are prepared). As long as campus policies permit it, you will be allowed access to our lab room to work on your collections or practice sample identification. There will be special procedures for recording your presence in that room (time of arrival and departure) and limiting its capacity, as other students from our lab and another lab course may also be there. You will also be responsible for disinfecting microscopes before and after use. It is important for our management of COVID-19 risk that you follow the procedures for lab use that are established during the first week of class.

### How is your grade determined?

#### Exams (50% of grade)

You will be assessed on your knowledge of material presented in lab and lecture through several exams/identification quizzes during either the lecture or the lab period; some exams will have practical components requiring identification of insect specimens or structures. The final exam will NOT be a traditional exam format but will instead consist of several types of assessments (more details to be provided on Canvas).

### Insect collection (20% of grade)

The best way to learn about insects is to get a close look at them and experience the habitats where they live. Thus, a big part of this course involves collecting insects and learning how to preserve them in a way to facilitate their identification. I hope you started collecting insect specimens over the summer; field trips at the beginning of the fall semester will provide additional opportunities. Note that as the fall progresses insects will be more difficult to find, so it is imperative that you concentrate your collecting early in the semester. Your insect collection must include:

- adult representatives from 15 orders of insects
- adult representatives from 35 families of insects
- immature insects from 4 correctly identified orders: 2 hemimetabolous and 2 holometabolous

You should try to keep up with identifications so you know if you are missing orders or families, before it is too late. All insects must be properly labeled, mounted, and/or preserved according to provided guidelines. Extra credit of up to 24 points can be earned for including representatives of additional orders and/or families (correctly identified) than the minimum requirement. More details on the insect collection will be provided in another document. Note that insect collection is a MANDATORY component of this course – you cannot pass the course without turning in a collection.

### Perspectives or review paper (10% of grade)

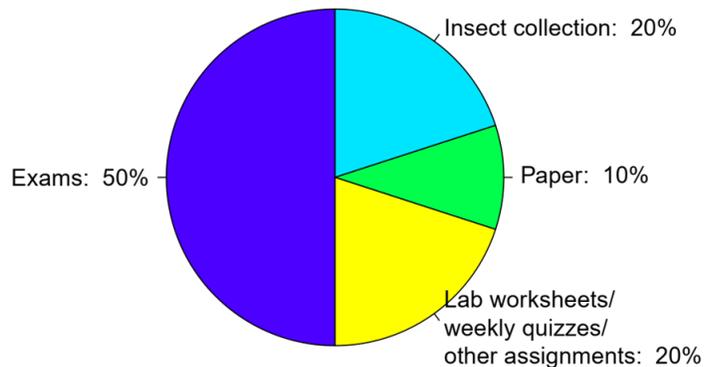
You will have an opportunity to explore more in depth a topic of your choice through writing a 4-6 page paper (1300-1600 words) that focuses on a recent important study on insect biology. The style of your paper will resemble that of the “Perspectives” articles found in *Science* magazine or the “Dispatches” in *Current Biology* – these are articles that highlight recent findings and help contextualize them for a broad audience. Alternatively, instead of focusing on a single study you can focus on a contemporary topic in insect biology and write a short review article (like the “Reviews” found in *Science* magazine, but shorter). Your focal study or topic must be approved by the instructor and cannot already be the subject of a published commentary or review. Note that this paper is also a MANDATORY component of this course – it contributes to the department writing requirement.

### Laboratory worksheets, weekly quizzes, and miscellaneous assignments (20% of grade)

Whenever we do hands-on work in lab (or lecture sessions) you will have a worksheet to complete and turn in. Online quizzes on the material presented in the week’s lecture videos and readings must be completed by the end of each week to help you keep up with course content. Your two lowest quiz scores will be dropped. Several other larger assignments are included in this category, including intermediate assignments related to developing your paper, and a video/photo project involving your collection and identification skills. More details will be provided on Canvas.

### COVID-19 contingencies

We must be flexible in this course as public health considerations might force us to alter the course modality, either temporarily (several weeks) or for the duration of the semester. If we are forced to become an entirely online course or if temporary restrictions on face-to-face interactions interfere with course activities, some of the assignments described above may be altered, and alternative assignments may be required instead.



### Grading scale

A 93-100%	B 83-86.9%	C 73-76.9%
A- 90-92.9%	B- 80-82.9%	C- 70-72.9%
B+ 87-89.9%	C+ 77-79.9%	D 60-69.9%

I follow conventional rounding procedures, so a 92.94% would represent an A- (rounded down to 92.9%), while a 92.95% would be rounded up to 93.0% and an A.

### How to be successful in this course

#### Health and well-being in a stressful time: take care of yourself

The changes brought on by COVID-19 have impacted us all in a number of ways and will continue to do so at various times and to varying degrees during the upcoming semester. Your health and well-being are foundational to your ability to learn, and if you find that you are feeling unwell (physically or mentally) and it is impacting your ability to complete your coursework, please reach out. Because the learning environment will be different than it has been in the past, the indicators that usually let you know something is wrong may not be as clear to you or those around you as they would be during a typical semester. Additionally, the ways in which you normally engage in self-care may have been disrupted. Please remember that it's never too late to ask for help. The [Dean of Students](#) (585-245-5706) can assist and provide direction to appropriate campus resources. The college also has collected resources in a [Coping with COVID webpage](#).

#### Adjust to the rhythm of the course

You will be responsible for accessing much of the course content on your own schedule in this hybrid course, so it is especially important that you establish a weekly rhythm in viewing lecture videos and online resources and keep up with weekly deadlines so that you do not fall behind. For some of our in-class activities involving working with specimens, it is important that you have reviewed relevant videos in advance. You are expected to pay attention to the syllabus, emails from me, and posted announcements on Canvas to keep pace with the course's activities. Here are some [helpful tips for students adjusting to online learning](#).

#### Take advantage of course resources and study aids

I will create Google docs with study questions and some note outlines that you can use to follow along with each video lecture (available in a Google drive folder; make your own copy of each Google doc to create a version you can edit). PDFs of the lecture slides are also posted in a Google drive folder.

#### Back up your work

Do yourself a favor to avoid last-minute computer calamities and stress by saving your work frequently and backing up your files using some kind of cloud storage system like Google Drive, Dropbox, or some other service. CIT provides some [tips on data backup](#). Also, don't wait until the day before a deadline to get started!

#### Getting help with online components of class

CIT has developed a [number of resources that can help you formulate good strategies for success in online courses](#). These include general strategies for keeping on track with your courses as well as more specific resources about learning experiences that you may encounter in an online course. The Office of the Dean for Academic Planning and Advising has also introduced the new KOALA ([Knights' Online Academic Learning Assistance](#)) course support resource. Throughout the semester, if you need help with online learning strategies, you can contact the KOALA support desk, which will assist you with identifying resources and strategies for success. CIT also provides a range of [technology support resources](#). When you are in Canvas, the Help menu on the left side of

the screen will also direct you to a number of CIT supports, including self-help resources and options to request technology assistance.

### **Communicating with me**

**Office hours.** All of my office hours will be **online** this semester and conducted via Zoom video conference. I will have regular “walk-in” office hours which are first-come, first-served. You may have to wait in the Zoom “waiting room” until I finish with other students. I will also have scheduled 15-min office hour sessions that you can sign up for via my Google Calendar. See Canvas for details. If any of the posted times do not suit you, you can email me to set up another appointment for a video conference. When doing so, please suggest some possible times that you are available to meet in your email to make our correspondence more efficient.

**Email communication and in-lab consultations.** I can often answer questions by email as well. Please do not expect an immediate response – I will try to get back to you within 24 hours. I am also willing to meet with you in lab if you need help with specimen identification or collection preparation.

### **Lab and field work**

#### **Lab preparation**

If we are doing a field-based activity, you should be dressed for the weather with appropriate outerwear and shoes that can get muddy or wet – it is your responsibility to check the weather conditions and use your judgment about what to wear. Make sure you bring all of your assigned collecting gear for field trips. Sometimes plans for a lab session may change at the last minute because of the weather; you should make sure to check your email on the day of a lab to find out any changes. Please be courteous to the instructor and your classmates by arriving on time, particularly on field trip days. Pay attention to announcements on Canvas that may ask you to bring your laptop or textbook for the day’s activities. Note that this lab will involve at least one dissection of an insect to learn about internal morphology and all students are expected to participate in this activity.

#### **Lab and field safety**

Your safety and comfort are important to me. Please be prepared for our field trips by dressing appropriately for the weather and terrain, bringing water, and carrying any medication you might need (allergy medication, inhaler for asthma, epipen, etc.). Inform me of any allergies (particularly to bee stings!) or other medical conditions that could require emergency treatment. Also be prepared by applying sunscreen when appropriate or wearing clothing to protect yourself from the sun. We could encounter mosquitoes, ticks, other biting/stinging insects, and poison ivy on our outings, so be aware of these risks, and feel free to ask me any questions about them. As long as we are traveling to and/or working near each other in a field site you should be wearing a face mask. You may only remove your mask if you are well distant from all of your classmates, but always have it handy to put it back on immediately if someone approaches you. Also, be mindful of your safety if you go field-collecting on your own outside of our regular lab sessions. It is a good idea to bring a friend with you, or at least to tell someone where you are going and when you expect to be back.

You should wear closed-toed shoes and either long pants (not shorts) and/or a lab coat on days that we will be working with preserved specimens. No food or drink containers are permitted in the lab, either during or outside regular lab times.

#### **Lab equipment**

You will be issued some equipment at the beginning of the semester that you may use in developing and preparing your insect collection. Make sure you keep track of and take care of the items you are assigned. You are expected to return this equipment to the Department of Biology, ideally by Thanksgiving Break.

## Other course policies

### Late work

Weekly online quizzes must be completed by their posted due dates for credit. Staying on track with these tasks is important to give you the tools to assess your progress in learning the material. It will also facilitate the timely posting of answers for the whole class. If meeting these deadlines becomes a problem for you, please discuss your situation with me. Note that you will be able to drop two quiz grades.

Graded assignments will be penalized by a loss of 5% of the total assignment's points possible per day. But if you think you must turn in something late because of extenuating circumstances, feel free to discuss the situation with me and we can negotiate terms. Your insect collection **must** be submitted before Thanksgiving break, however, even if incomplete, because of the possibility of us not returning for face-to-face learning after Thanksgiving.

### Plagiarism and academic dishonesty

Plagiarism and other forms of academic dishonesty (cheating, turning in another student's work as your own) will not be tolerated. Evidence of academic dishonesty is grounds for a score of zero on any assignment and further action including notifying the department chair, Dean of Academic Planning and Advising, Dean of Students, and Student Conduct Board, which can result a report filed with the Dean of Students.

Plagiarism. According to the Academic Dishonesty Policy in the Student Handbook (<https://www.geneseo.edu/handbook/academic-dishonesty-policy>), plagiarism includes the following:

1. direct quotation without identifying punctuation and citation of source;
2. paraphrase of expression or thought without proper attribution;
3. unacknowledged dependence upon a source in plan, organization, or argument.

In SUNY Geneseo's policy, "Plagiarism is the representation of someone else's words or ideas as one's own or the arrangement of someone else's material(s) as one's own." Take care to properly cite sources of ideas, figures, data, etc. (including internet sources) in your writing and presentations. Even if you properly cite your source, when you borrow wording and sentence structure from the original source and pass it off as your own (i.e., by not using quotation marks), you are guilty of plagiarism. Learn how to paraphrase in your own words information from the original source.

Turnitin.com. To help insure against plagiarism (intentional and unintentional), both the draft and the final version of your perspective/review paper will be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. Note that all submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

Online quizzes and exams. It is my expectation that your work on online quizzes (and exams, if we are forced to go online for any of these) is your own. I will be attentive to any anomalies that suggest student collaboration on answers in these assessments. It is not appropriate to communicate with other students while taking quizzes or exams, or share information about quiz questions and answers until the quiz has officially closed. Cheating only impedes your ability to learn and can have serious consequences.

### Copyright statement

Many of the materials that are provided to students in this course have been created by me. Students would be best to assume that all course materials are protected by legal copyright. Copyright will be indicated by a "© DATE AUTHOR" on the document. Copyright protection means that reproduction of this material is prohibited without the author's consent. Thus, students are prohibited from sharing or posting copyrighted material to any websites outside our course Canvas site. Students are also prohibited from reproducing material to be shared with other more limited groups (e.g., sorority/fraternity test bank). Be aware that UUP (Union of University

Professionals, the union representing faculty on this campus) is seeking to take legal action against these and other sites, and that posting or selling copies of materials to such sites may put a student in legal jeopardy.

### **Student success resources**

**Accessibility and accommodations.** SUNY Geneseo is dedicated to providing an equitable and inclusive educational experience for all students. The Office of Accessibility will coordinate reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities, as well as medical conditions related to pregnancy or parenting. Students with letters of accommodation should submit a letter to each faculty member at the beginning of the semester and discuss specific arrangements. Please contact the Office of Accessibility Services for questions related to access and accommodations: [access@geneseo.edu](mailto:access@geneseo.edu), 585-245-5112, [www.geneseo.edu/accessibility-office](http://www.geneseo.edu/accessibility-office).

**Bias-related incidents.** The [Community Commitment to Diversity, Equity, and Inclusion](#) states, “We are here to listen, to learn, to teach, to debate, to change, to grow. We should all be safe to pursue these goals at SUNY Geneseo while being who we are. Together, we commit ourselves to pluralism, cultivating a community that respects difference and promotes a sense of inclusion and belonging.”

If in the unfortunate instance you experience an incident of bias, we encourage you to reach out to the Chief Diversity Officer ([routenberg@geneseo.edu](mailto:routenberg@geneseo.edu)) and/or our University Police Department. In trying to create an environment that facilitates growth through diverse thoughts and ideas, reporting incidents of bias - including threats, vandalism, and microaggressive behaviors - can help bring a better understanding of our campus climate as well as provide opportunities for learning and restoring harm.

The Department of Biology has pledged to develop more inclusive pedagogical practices and work to promote diversity in our curriculum while confronting racism, particularly ways in which science has been used to sustain it ([Biology Department’s Statement in Support of Racial Justice](#), also available on [Department of Biology website](#)). This course is no exception, and to help achieve these goals I will be highlighting the work of a diversity of scientists in the field of entomology.

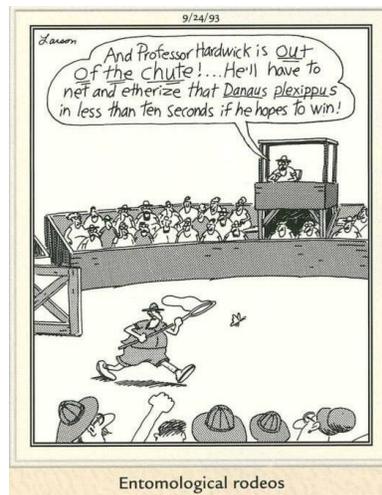
**Student well-being.** Prioritizing well-being can support the achievement of academic goals and alleviate stress. Eating nutritious foods, getting enough sleep, exercising, avoiding drugs and alcohol, maintaining healthy relationships, and building in time to relax all help promote a healthy lifestyle and general well-being.

Concerns about academic performance, health situations, family health and wellness (including the loss of a loved one), interpersonal relationships and commitments, and other factors can contribute to stress. Students are strongly encouraged to communicate their needs to faculty and staff and seek support if they are experiencing unmanageable stress or are having difficulties with daily functioning. The Dean of Students (585-245-5706) can assist and provide direction to appropriate campus resources. For more information, see [www.geneseo.edu/dean\\_students](http://www.geneseo.edu/dean_students).

**Mental health.** As a student, you may experience a range of challenges that can impact your mental health and thus impact your learning; common examples include increased anxiety, shifts in mood, strained relationships, difficulties related to substance use, trouble concentrating, and lack of motivation, among many others. These experiences may reduce your ability to participate fully in daily activities and affect your academic performance.

SUNY Geneseo offers free, confidential counseling for students at the Lauderdale Center for Student Health and Counseling, and seeking support for your mental health can be key to your success at college. You can learn more about the various mental health services available on campus at [health.geneseo.edu](http://health.geneseo.edu). Getting help is a smart and courageous thing to do -- for yourself and for those who care about you.

**Other resources.** Additional resources are available to support your academic success and well-being, including academic support services, library research help, computer and technology support, and food security. See the “Student Success Resources” link on the Canvas course page for more information about these services.



**Dates of exams**

(Note: subject to change if public health demands changes in course modality)

Exam	Topic	Date	Location, special arrangements
Exam 1	Modules 1 & 2	Thurs, Oct 1	ISC 136
ID exam	Insect orders	Thurs/Fri, Oct 1-2	ISC 206, schedule time
ID exam	Coleoptera/Hemiptera families	Thurs/Fri, Oct 22-23	ISC 206, schedule time
ID exam	Diptera/Hymenoptera/Orthoptera families	Wed, Nov 4	ISC 206, schedule time
Exam 2	Module 3	Thurs, Nov 5	ISC 136
Exam 3	Module 4	Thurs, Nov 19	ISC 136
Final “exam”	Module 5, some cumulative components	Week of Dec 15-21; multiple assessments	Submit online

**Dates of major assignments** (excludes weekly online quizzes, lab worksheets)

(Note: may require modification if public health situation requires changes in course modality)

Assignment	Deadline	Details
Perspective/review paper: Focal paper/topic choice with 1-2 primary sources	Thurs, Oct 15	Submit online; earlier for earlier feedback; might need to submit revised topic
Perspective/review paper: outline/annotated bibliography (8 sources, 6 primary)	Wed, Nov 11	Submit online; earlier for earlier feedback
Identification videos/slide show	Wed, Nov 18	Submit online
Insect collection	Tues, Nov 24	Drop off in ISC 206, with collecting supplies
Perspective/review paper: draft	Wed, Dec 2	Submit online; earlier for earlier feedback
Perspective/review paper: final version	Tues, Dec 14	Submit online
Final exam: infographic on insect benefits	Sat, Dec 18	Submit online
Final exam: final essay	Tues, Dec 21	Submit online
Final exam: ID challenge	Tues, Dec 21	Submit online

### Course Schedule

Week	Day	Date	Lecture topic	Class/lab activity	Location/ cohort
			<b>Module 1</b>	<b>Phylogeny &amp; systematics</b>	
1	T	9-1	Introduction to course, insects & their importance	Distribute handouts, equipment	ISC 136; all
1	W	9-2		<b>LAB:</b> Collection methods (Arboretum)	ISC 206; all
1	R	9-3	Hexapods, Apterygotes, Paleoptera	Pinning and point-mounting insects	ISC 206; all
2	T	9-8	Polyneoptera & Paraneoptera orders	Insect orders: Look at Paleoptera, Polyneoptera, Paraneoptera	ISC 206; cohort 1
2	W	9-9		<b>LAB:</b> Collect in Arboretum	ISC 206; all
2	R	9-10	Holometabola orders	Insect orders: Look at Paleoptera, Polyneoptera, Paraneoptera	ISC 206; cohort 2
			<b>Module 2</b>	<b>Habitats, habits, &amp; morphology</b>	
3	T	9-15	Aquatic insects – overview of taxa, biological indicators	Insect orders: Look at Holometabola samples	ISC 206; cohort 1
3	W	9-16		<b>LAB:</b> field trip (stream sampling)	ISC 206; half at a time
3	R	9-17	Aquatic insects: how they breathe, feed, etc.	Insect orders: Look at Holometabola samples	ISC 206; cohort 2
4	T	9-22	Ground-dwelling insects	Practice order ID	ISC 206; cohort 1
4	W	9-23		<b>LAB:</b> collect on campus, pond	ISC 206; all
4	R	9-24	Mouthparts & digestive system	Practice order ID	ISC 206; cohort 2
5	T	9-29	Library research, paper assignment	Arrange ID practice times (optional)	
5	W	9-30	<b>REJUVENATION DAY</b>	<b>NO LAB</b>	
5	R	10-1		<b>Exam I</b> (modules 1&2, insect order ID; arrange time for practical)	ISC 136; all
			<b>Module 3</b>	<b>Evolutionary innovations</b>	
6	T	10-6	Family ID: Coleoptera/Hemiptera	Practice ID: Coleoptera	ISC 206; cohort 1
6	W	10-7		<b>LAB:</b> external anatomy	ISC 206; all
6	R	10-8	Insect flight	Practice ID: Coleoptera	ISC 206; cohort 2
7	T	10-13	Family ID: Hymenoptera	Practice ID: Hemiptera	ISC 206; cohort 1
7	W	10-14		<b>LAB:</b> collection work; Practice ID: Hymenoptera	ISC 206; all
7	R	10-15	Metamorphosis/hormones	Practice ID: Hemiptera	ISC 206; cohort 2

Week	Day	Date	Lecture topic	Class/lab activity	Location/ cohort
8	T	10-20	Family ID: Orthoptera & Diptera	Practice family ID: Orthoptera & Diptera	ISC 206; cohort 1
8	W	10-21		<b>LAB:</b> Practice family ID: Orthoptera & Diptera (cohort 2); Opportunity to practice family ID: Hemiptera & Coleoptera; collection work	ISC 206; all
8	R	10-22	Metamorphosis, evolution of holometaboly, life history variation	<b>Coleoptera/Hemiptera family ID exam (Thurs or Fri)</b>	ISC 206; arrange time R/F
9	T	10-27	<b>REJUVENATION DAY</b>	<b>NO CLASS</b>	
9	W	10-28		<b>LAB:</b> internal morphology	ISC 206; all
9	R	10-29	Social insects I	Practice family ID: Hymenoptera/Orthoptera/Diptera	ISC 206; cohort 2
10	T	11-3	Social insects II	Practice family ID: Hymenoptera/Orthoptera/Diptera	ISC 206; cohort 1
10	W	11-4		<b>LAB: Hymenoptera/Orthoptera/Diptera family ID exam</b>	ISC 206; arrange time
			<b>Module 4</b>	<b>Insect senses &amp; communication</b>	
10	R	11-5	Nervous system, detecting sound	<b>Exam 2</b> (module 3)	ISC 136; all
11	T	11-10	Temperature regulation		No meeting
11	W	11-11		<b>LAB:</b> Collection work	ISC 206; all
11	R	11-12	Chemoreception, pheromones	Discussion; lecture-related activities	ISC 136; all
12	T	11-17	Vision	Discussion & review	ISC 206; all
12	W	11-18		<b>LAB:</b> Collection work	
			<b>Module 5</b>	<b>Ecological roles of insects</b>	
12	R	11-19	Herbivory	<b>Exam 3</b> (module 4)	ISC 136; all
13	T	11-24	Pollination	<b>Insect collection due</b>	No meeting
13	W	11-25	<b>THANKSGIVING BREAK</b>	<b>NO LAB</b>	
13	R	11-26	<b>THANKSGIVING BREAK</b>	<b>NO CLASS – class is all online after break</b>	
14	T	12-1	Monarch butterflies	Synchronous lecture and discussion	synchronous
14	W	12-2		<b>LAB:</b> insect collection data analysis	synchronous
14	R	12-3	Predators & parasites		No meeting
15	T	12-8	Insect apocalypse	Synchronous lecture and discussion	synchronous
15	W	12-9		<b>LAB:</b> digital collections	synchronous
15	R	12-10	Medical entomology; insect control		No meeting
	T	12-14	Benefits of insects & their study	Synchronous lecture & discussion; overview of final requirements	synchronous
	Sa	12-18		Final exam infographic due	
	T	12-21		Final exam essay & ID challenge due	