

# Insect Pathology Syllabus

ENTMLGY 5121 Spring 2023

## Course Information

- **Course times and location:** TBA: MW; 80min
- **Credit hours:** 3
- **Mode of delivery:** In-Person

## Instructors

- **Name:** Ellen Klinger
- **Email:** [klinger.80@osu.edu](mailto:klinger.80@osu.edu)
- **Phone:** 614-247-4763
- **Office location:** 255 Kottman Hall
- **Office hours:** by 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.
  
- **Name:** Sarah Short
- **Email:** [short.343@osu.edu](mailto:short.343@osu.edu)
- **Phone:** 614-247-8023
- **Office location:** 232B Howlett Hall
- **Office hours:** by 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.

Primary instructor of contact for each week will be indicated both on the course schedule and on individual assignments on Carmen.

## Course Prerequisites

BIOL 1113 or 1114; or graduate standing

## Course Description

The basic principles of pathology as applied to pathogens infecting insects and related arthropods. Course content will include how pathogens manifest diseases in individuals and populations, descriptions of major micro- and macro-organisms that routinely cause reduced fitness in arthropods, as well as how insects respond to pathogen challenge, both physiologically and behaviorally. In addition, students will learn techniques and processes that insect pathologists use to diagnose and study pathogens. The course will consist of in-person lectures, discussions, and hands-on “tech” and “demo” activities.

## Learning Outcomes

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

- Define and discuss foundational concepts of pathology including etiologic agent, pathogenicity, virulence, and disease.
- Compare and contrast major categories of pathogens, including their basic biology, taxonomy, modes of transmission, and the symptoms they elicit in insects.
- Explain modes of entry of pathogens into insects and factors that influence virulence and transmission.
- Understand insects’ major defense mechanisms and predict which would be employed upon infection with various pathogens.
- Understand and give examples of major epidemiological terms and processes.
- Explain ecological and evolutionary forces shaping insect-pathogen interactions.
- Appraise the importance of insect pathology for a variety of entomological applications and the impact insect pathogens can have on human society.
- Critique the approach and weigh the findings and implications of scientific studies in insect pathology.
- Demonstrate basic technical skills used by insect pathologists.
- Evaluate real-world case studies of insect disease and design proper courses of action.



# Course Materials, Fees and Technologies

## Required Materials and/or Technologies

- Vega, Fernando E., and Harry K. Kaya. Insect pathology. Academic press, 2012. ISBN-13: 978-0123849847. AVAILABLE AS A FREE E-BOOK THROUGH OSU LIBRARY.
- Lacey, Lawrence A., ed. Manual of techniques in invertebrate pathology. Academic Press, 2012. ISBN-13: 978-0123868992. AVAILABLE AS A FREE E-BOOK THROUGH OSU LIBRARY.
- Additional readings will be provided by your instructors on the course Carmen Page

## Fees and/or Additional Requirements

- none

## 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 at [go.osu.edu/student-tech-access](http://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](http://go.osu.edu/office365help) (go.osu.edu/office365help) help article for full instructions.

## CarmenCanvas Access

You will need to use [BuckeyePass](http://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](http://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)
- [CarmenZoom virtual meetings](https://go.osu.edu/zoom-meetings) (go.osu.edu/zoom-meetings)
- [Recording a slide presentation with audio narration and recording, editing and uploading video](https://go.osu.edu/video-assignment-guide) (go.osu.edu/video-assignment-guide)

## 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](https://go.osu.edu/it)
- **Phone:** [614-688-4357 \(HELP\)](tel:614-688-4357)
- **Email:** [servicedesk@osu.edu](mailto:servicedesk@osu.edu)

## How This Course Works

**Mode of delivery:** This course is taught in person. Students are expected to attend class each week during the scheduled meeting sessions. Exams will be assigned to you via a timed Carmen quiz and are expected to be completed outside of class. Please see the course [absence policy](#) below to understand specifics regarding your attendance requirements in this course.

**Credit hours and work expectations:** This is a 3 credit-hour course. According to Ohio State bylaws on instruction ([go.osu.edu/credithours](https://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 (reading and assignment preparation, for example) to receive a grade of C average



# Grading and Faculty Response

## How Your Grade is Calculated

Assignment Category	Points
Worksheets	240
Midterm	100
Final exam	100
Case study	60
Total	500

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

Graduate and Undergraduate students in this course will be graded on identical rubrics.

## Descriptions of Major Course Assignments

### Worksheets

**Description:** Students will be assigned 8 worksheets throughout the semester, each worth 30 points. These worksheets will vary with their content and may include reflections on readings, summaries of in class activities, or analyses relevant to insect pathology. Clear expectations and directions for each worksheet (including lead instructor for the assignment) will be available with the assignment description on Carmen.

**Academic integrity and collaboration:** Students may work with other students on worksheet related content however, students are expected to turn in original work. In the event that a worksheet requires a student not to collaborate, these directions will be made clear on the assignment description on Carmen. Students can utilize books, notes, and outside material to complete worksheets.

### Midterm and Final

**Description:** Midterm and Final will be take home short answer and essay questions. Students are expected to complete these questions and submit via Carmen quiz. In some

cases, questions may direct students to submit supporting references and documentation. All specific instructions will accompany the Carmen quiz. The final will involve cumulative concepts from the class.

**Academic integrity and collaboration:** These exams are open book. However, they will be timed, and students must work independently on them and not collaborate with other students in the class.

## Case Study

**Description:** Students will select from insect pathology cases from instructor-selected topic list. Students will perform research on the etiologic agent and host insects, propose actionable courses of action for diagnostic purposes, and interpret simulated data provided by the instructors. Students will summarize and interpret their findings and turn this in as an assignment.

**Academic integrity and collaboration:** Two class periods are set aside for students to consult with instructors and other students on issues pertaining to this project. Other than these class sessions, students must work on their case study on their own. Students may use books and notes to facilitate their answers.

## 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 submissions will be subject to a 10% point reduction per 24 hour period they are late, without an excused absence (see Absence policy). If there is a circumstance that will prohibit you from completing an assignment on time, notify your instructor as soon as possible.

## Absence policy

You are expected to attend all in-person sessions. Many class periods will contain hands-on “tech” and “demo” activities that are critical to your understanding of the content and are best experienced in-person. It is the student’s responsibility to inform the Primary Instructor of Contact for reasons for an excused absence from the class as soon as possible. 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 contact 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 instructors will not require note from a medical individual until the **second** (does not have to be sequential) absence due to illness, or illness of a student’s family member, **with the exception** of a student’s inability to complete a

midterm or final exam on time. If a student is unable to take a midterm or final exam within the exam window, the instructor may require the student to provide documentation of the illness regardless of the student's prior attendance in the class, even if it is their first absence.

## Instructor Feedback and Response Time

We are 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:** If you have a question, please contact the professor of contact first through their Ohio State email address. They will reply to emails within **24 hours on days when class is in session at the university**.
- **Class announcements:** Instructors will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check [your notification preferences](http://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, Instructors 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](#) (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 we recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

**If we suspect that a student has committed academic misconduct in this course, we are obligated by university rules to report 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 the instructors.

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)



## Safe and Healthy Buckeyes

Health and safety requirements: All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (<https://safeandhealthy.osu.edu>). Non-compliance will result in a warning first, and disciplinary actions will be taken for repeated offenses.

## 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](https://equity.osu.edu),
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or email [equity@osu.edu](mailto: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.

## 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](http://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 through the 24/7 National Suicide Prevention Hotline at 1-(800)-273-TALK or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org)

David Wirt, [wirt.9@osu.edu](mailto:wirt.9@osu.edu), is the CFAES embedded mental health counselor for students enrolled in CFAES. He is available for new consultations and to establish routine care. To schedule with David, please call 614-292-5766. Students should mention their affiliation with CFAES when setting up a phone screening.

## Diversity Statement

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/>.

# Accessibility Accommodations for Students with Disabilities

## Requesting Accommodations

The university strives to make all learning experiences as accessible as possible. 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. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let us know immediately so that we can privately discuss options. To establish reasonable accommodations, we may request that you register with Student Life Disability Services. After registration, make arrangements with us as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 098 Baker Hall, 113 W. 12th Avenue.

## Disability Services Contact Information

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

## Accessibility of Course Technology

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

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

## Course Schedule

See below but refer to the CarmenCanvas course for up-to-date due dates

Week	Date	Instructor of Contact	Lecture topic	In-class activity	Assignments due
<b>Unit 1: What is a pathogen?</b>					
1	Jan 9	Klinger	Insect Pathology- Intro and history	How to search scientific literature	
1	Jan 11	Klinger	Fundamental concepts of insect pathology	Literature discussion	Worksheet 1: Guide to understanding primary sources
2	Jan 16		No class; Martin Luther King Jr. Holiday		
2	Jan 18	Klinger	Insect Pathogens: Bacteria	Tech: How to inoculate nutrient plates	
3	Jan 23	Klinger	Insect Pathogens: Bacteria	Tech: Observe growth on plates	
3	Jan 25	Klinger	Insect Pathogens: Fungi	Tech: Wet mounts and gram stains	
4	Jan 30	Klinger	Insect Pathogens: Fungi/Viruses		Worksheet 2: Observations of microbial growth.
4	Feb 1	Klinger	Insect Pathogens: Viruses	Tech: Determining Fungal viability	
5	Feb 6	Klinger	Insect Pathogens: Protozoa	Tech: How to calculate LD50	Worksheet 3: Fungal growth observations
5	Feb 8	Klinger	Insect Pathogens: Nematodes	Literature discussion	
<b>Unit 2: What happens when an insect gets infected?</b>					
6	Feb 13	Short	How does infection happen?		Worksheet 4: Future research ideas from primary literature.
6	Feb 15	Short	Process of infection		Midterm assigned in Carmen
7	Feb 20	Short	Insect immune defense I: Behavior	Literature discussion	
7	Feb 22	Short	Insect immune defense II (cellular immune response and melanization)	Demo: melanization in microsporidia infected larvae	Midterm due in Carmen 11:59PM



Week	Date	Instructor of Contact	Lecture topic	In-class activity	Assignments due
8	Feb 27	Short	Insect immune defense III (Humoral immune response, RNA interference)		
8	Mar 1	Short	Insect immune defense IV (Humoral immune response, RNA interference)	Tech: Infection/wounding of mutant flies	
9	Mar 6	Short	Costs of infection: how do insects die?		Worksheet 5: Mutant fly observations
9	Mar 8	Short	Costs of infection: sublethal effects and fitness compromises		
	Mar13-17		Spring Break		
<b>Unit 3: Ecology and evolution of infectious disease in insects</b>					
10	Mar 20	Klinger	Fundamentals of epidemiology	Group discussion on pathogen transmission	
10	Mar 22	Klinger	Real-world examples of disease outbreaks	Literature discussion	
11	Mar 27	Klinger	Host-pathogen co-evolution		Worksheet 6: Create a mini-review
11	Mar 29	Klinger	Modeling diseases in populations		
12	Apr 3	Klinger	Infection by multiple pathogens, microbe-microbe interactions	Tech: Collect insects from the field	Worksheet 7: SIR modelling in practice
12	Apr 5	Klinger	Microbiomes, <i>Wolbachia</i>	Tech: DNA extraction of infected insects	
13	Apr 10	Short	Application: Pathogens as biocontrol	Tech: PCR of DNA extracts	
13	Apr 12	Short	Application: Pathogens in insect rearing	Tech: Gel visualization of PCR results	
14	Apr 17	Short	Case study	In-class discussion of diagnostic approach	Worksheet 8: Wolbachia PCR results
14	Apr 19	Short	Case study	In-class interpretation of data (provided)	
15	Apr 24	Short	TBD/review, further case study examples		Final Exam assigned in Carmen
<b>Final exam due Thursday April 27<sup>th</sup> 11:59PM</b>					