

In Spring 2024, the UNL Department of Entomology is offering a new course that will focus on vectors of plant pathogens. This graduate-level course will introduce students to various vectors that transmit plant pathogens that are primarily important to agriculture and horticulture. Although mostly focused on arthropod vectors, this course will also include nematodes and fungi as virus vectors. Class material will include transmission modes, pathogen-vector-host interactions at cellular, organismal, and ecological scales, vector competence, evolutionary significance and vector management. The course will also discuss recent examples of economically important vector-borne plant diseases as well as emerging pathogens. The course content will include:

- I. Class lectures: PowerPoint presentations that will be delivered in the in-person class and will be uploaded in Canvas for studying later.
- II. Discussion sections: These discussions are designed to enhance skills in critical thinking to review and assess scientific content in original research papers and review papers.
- III. Labs: The labs will focus on Identification of arthropod vectors, detection of vector-borne viruses, and techniques for non-persistent and persistent transmission.
- IV. Term Essay: The goal of the essay is to promote innovative thoughts and improve scientific writing.

Overall, this course will include components of **entomology, acarology, plant virology, plant pathology, vector biology, molecular biology**, as well as **Integrated Pest Management**. The course will offer a **multidisciplinary approach** to learning about agricultural and horticultural problems rendered by vectors of plant pathogens and their management.





Syllabus: Entomology 896
Arthropod Vectors of Plant Pathogens (AVPP)
Spring 2024

Spring 2024 schedule:

Weeks of classes:

1st day of class: 22nd Jan

Term Essay concept due: 8th March

Spring break: March 10-March 17

Mid-term Exam: 18th March

No class: March 25 (Mon) and March 27 (Wednesday) Due to NC ESA meeting.

Full Term Essay and 10 min presentation due: 1st May.

Last week of class: May 5-May 11.

Last lecture: May 8

Finals week: May 13-May 17

Comprehensive final exam: May 16 (3.30-5.30 PM)

Total 40 class meetings (excluding mid-term, finals)

Class lectures: 25, Labs: 5, Discussion: 10

Instructor:

Dr. Shaonpius Mondal, Assistant Professor

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Phone: 402-472-7666

Office location: 211 Entomology Hall

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1700 E Campus Mall

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Meetings:

Class hours MWF 2.00-2.50 PM 202 Entomology

Office hours for class meeting: M 3-4 (211 Entomology). Appointment needed.

Typically, M and W will be lectures and related labs. Friday will be discussion on the current topic.

To arrange extra meeting time, send me an email.

Canvas: The course material will be uploaded in UNL Canvas following the lecture. Class recording will be uploaded as well. For discussion section, each research paper and respective questionnaire will be uploaded in each Monday.

Course synopsis:

This advance course will introduce students to various arthropods that transmit plant pathogens, such as, virus, bacteria, phytoplasma etc. Class material will include virus-host-vector interactions at the cellular, organismal, as well as at the ecological scale, vector competence, and evolutionary significance. Course will primarily focus on pathogens that are important to agriculture. Detection and management of arthropod-borne phytopathogens will be discussed. In addition, several case studies throughout the US and the world will be discussed. Labs will include identification of arthropod vectors, detection of vector borne viruses, transmission technique, and use of EPG in the virus transmission studies.

Course objectives for students:

1. Make them familiar with arthropod transmitted diseases of plants that are important to agriculture.
2. Produce in-depth knowledge of virus-vector-host interactions at cellular, organismal, and ecological scale.
3. Develop skills in critical thinking to review and assess scientific content of a research paper.
4. Develop skills in creative and innovative writing.

Textbooks: No textbook is required for this class. Class lectures, discussion papers, book chapters and class materials will be uploaded in Canvas.

Suggested textbooks:

1. **Virus-Insect-Plant Interactions** by Harris K.F, Smith, O.P., and Duffus J.E. (Eds.) Academic Press. 2001 ISBN: 0-12-327681-0
2. **Vector-Mediated Transmission of Plant Pathogens** by Brown J.K (Ed.) APS Press. 2016. ISBN (Online): 978-89054-535-5, ISBN (eBook): 978-89054-534-8.
3. **Mathew's Plant Virology** by Roger Hull. 4th Edition. Elsevier Academic Press. 2002.

Course structure:

Lectures (25 classes): Lectures will focus on various areas of arthropod vector of plant pathogens.

Labs (5 classes): Lab classes will focus on identification of insect vectors, detection of virus as well as transmission techniques.

Discussion (10 classes): Discussions will focus on critical evaluation of seminal journal articles related to arthropod vectors of plant pathogens. Students will be provided questions from respective articles and will be asked to answer them. In the class, students will discuss their answer and assess how their answers are different from others.

Term Essay: Term essay should be an appealing essay on the various novel areas of research related to arthropod vectors of plant pathogen. Each student will choose a research topic and develop original ideas supported by data in primary literature. I expect strong rationale, originality, and scholarly rigor in term essay. Each essay will have three components: i) submission of concept and outline and ii) Final essay submission, iii) 10 min presentation on the essay.

Mid-term examination– Middle of the semester.

Comprehensive final examination – End of semester.

*Note: Discussion topics will be uploaded/provided in the beginning of the semester.

Point structure:

Topic	Points
Discussions	500 (50 in each discussion)
Mid-term	100
Comprehensive finals	200
Term essay	160
10-min presentation on term essay	40
Total	1000

Grades (in percent):

A: 100 – 98 A+, 97 – 94 A, 93 – 90 A-

B: 89 - 87 B+, 86 - 83 B, 82 - 80 B-

C: 79 - 77 C+, 76 - 73 C, 70 - 72 C-

D: 69 – 67 D+, 66 – 63 D, 62 – 60 D

F: < 60 F

Detailed outline in calendar, discussion, and exam schedule:

Date	Lecture/discussion	Content
M Jan 22	Lecture 1	Orientation: Introduction of students, their research goals and how this course is related to their research. Significance and importance of arthropod vectors of plant pathogens.
W Jan 24	Lecture 2	Modes of transmission – known and unknown. Important arthropod vectors. Evolutionary significance.
F Jan 26	Lecture 3	Aphids as virus vector – non-persistent and persistent transmission by aphids.
M Jan 29	Lecture 4	Helper component – invention, importance, and significance.
W Jan 31	Lecture 5	Chemical ecology of aphid transmitted viruses.
F Feb 2	Discussion 1	Questions will be provided on Jan 29.
M Feb 5	Lecture 6	Whitefly as virus vector.
W Feb 7	Lab 1	Identification of different arthropod vectors and few diseases they transmit.
F Feb 9	Discussion 2	Questions will be provided on Feb 5.
M Feb 12	Lecture 7	Role of endosymbionts in virus transmission
W Feb 14	Lecture 8	Leaf hopper, plant hopper, and tree hopper transmitted diseases.
F Feb 16	Discussion 3	Questions will be provided on Feb 12.
M Feb 19	Lecture 9	Thrips as virus vectors.
W Feb 21	Lab 2	Introduction to virus detection methods and hands on training: ELISA and PCR.
F Feb 23	Discussion 4	Questions will be provided on Feb 19.
M Feb 26	Lecture 10	Beetles as vectors of plant pathogens.
W Feb 28	Lab 3	Transmission using aphids as a vector of potyviruses
F Mar 1	Discussion 5	Questions will be provided on Feb 26.
Term essay title and abstract (max 250 words) due on F March 1		
M Mar 4	Lecture 11	Psyllids as vectors of bacteria.
W Mar 6	Lecture 12	Mite as virus vector.
F Mar 8	Discussion 6	Questions will be provided on Mar 4.
Term essay concept is due on F March 8		
March 10-March 17: Spring Break. No class.		
M Mar 18 Mid-term Exam		
W Mar 20	Lecture 13	Mealybugs and soft scales as virus vectors.
F Mar 22	Lecture 14	Nematode borne plant viruses.
M Mar 24: North Central Branch Entomological Society meeting. No Class		
W Mar 27: North Central Branch Entomological Society meeting. No Class		
F Mar 29	Lecture 15	Insect transmission of phytoplasma.
M April 1	Lecture 16	Fungus as virus vector.

W April 3	Lab 4	Transmission using mites as a vector of WSMV
F April 5	Discussion 7	Questions will be provided on April 1 st .
M April 8	Lecture 17	Vector specificity, vector competence, and evolutionary significance.
W April 10	Lab 5	Transmission using aphids as a vector of BYDV
F April 12	Discussion 8	Questions will be provided on April 8 th .
M April 15	Lecture 18	Arthropod vector management I
W April 17	Lecture 19	Arthropod vector management II
F April 19	Discussion 9	Questions will be provided on April 15 th .
M April 22	Lecture 20	Case study: Non-persistently transmitted virus: Potato virus Y, Soybean mosaic virus
W April 24	Lecture 21	Case study: Semi persistently transmitted virus: Criniviruses.
F April 26	Discussion 10	Questions will be provided on April 22 th .
M April 29	Lecture 22	Case study: Persistently transmitted virus (non-propagative) – BYDV complex, PLRV, Gemini virus.
W May 1	Full Term Essay due on May 1 st . 10 Min presentation for each essay.	
F May 3	Lecture 23	Case study: Persistently transmitted virus (propagative) – Tospovirus
M May 6	Lecture 24	Case study: Unknown transmission modes: Mite transmitted virus.
W May 8	Lecture 25	Emerging virus vector: Cotton blue disease, aphid transmitted nano virus, Cowpea mild mottle virus, torado virus, rice yellow mottle virus.
F May 10	Revision	Final study guide and revision.
M May 16: Comprehensive Final Exam (3.30PM-5.30PM)		

Additional Information

PLEDGE OF INSTRUCTIONAL STANDARDS

Entomology instructors will provide our students a complete syllabus meeting all UNL standards, our classes will be based on current science and will follow published schedules and descriptions, and our instructors will be timely in returning grades and in responding to our students.

ADA STATEMENT

Students with disabilities are encouraged to contact the Services for Students with Disabilities (SSD) office for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY (updated 8/20/07)

ACADEMIC HONESTY

Students are expected to adhere to guidelines concerning academic dishonesty as specified in Entomology's Academic Integrity Policy (<http://entomology.unl.edu/dishonesty.shtml>). As a student at UNL, you enjoy rights and protections under the student code of conduct (<http://stuafns.unl.edu/dos/code>) and are obligated to conduct yourself in compliance with the code. Academic dishonesty can involve cheating; fabrication or falsification of information; plagiarism; or misrepresenting illness, injury, accident, etc., to avoid and/or delay an examination/quiz or the timely submission of academic work and assignments. Disciplinary action imposed may range from a warning (written or oral) to assigning the student a final course grade of F for the semester. The instructor may choose to assign zero or partial credit for a specific assignment, quiz, examination or written report in which academic dishonesty was involved.

If a student wishes to appeal a claim of academic dishonesty, the following process must be followed. First, the student must submit a written appeal to the instructor of the course and state their reason(s) for appealing. If this student appeal cannot be resolved with the course instructor, then the student must immediately submit their appeal statement within seven days to the Department's Curriculum Committee for their recommendation. If a satisfactory solution to this appeal is still not reached with the Department Curriculum Committee, the student's written appeal will then be forwarded to the Department Head. If a satisfactory solution is still not achieved at the Department Head level, the student may then submit their written appeal statement to the College of Agricultural Sciences and Natural Resources (CASNR) Dean's Office. The appeal process for the College of Agricultural Sciences and Natural Resources will then be followed as outlined by the College. Students are encouraged to contact the instructor for clarification of these guidelines if they have questions or concerns.

COUNSELING AND PSYCHOLOGICAL SERVICES

UNL offers a variety of options to students to aid them in dealing with stress and adversity. [Counseling and Psychological & Services \(CAPS\)](#) is a multidisciplinary team of psychologists and counselors that works collaboratively with Nebraska students to help them explore their feelings and thoughts and learn helpful ways to improve their mental, psychological, and emotional well-being when issues arise. CAPS can be reached by calling 402-472-7450. [Big Red Resilience & Well-Being](#) provides one-on-one wellbeing coaching to any student who wants to enhance their well-being. Trained well-being coaches help students create and be grateful for positive experiences, practice resilience and self-compassion, and find support as they need it. BRRWB can be reached by calling 402-472-8770.

DIVERSITY AND INCLUSION

The University of Nebraska-Lincoln does not discriminate on the basis of race, ethnicity, color, national origin, sex (including pregnancy), religion, age, disability, sexual orientation, gender identity, genetic information, veteran status, marital status, and/or political affiliation.

INFORMATION FOR EMERGENCY RESPONSES: Fire Alarm (or other evacuation)

In the event of a fire alarm: Gather belongings (Purse, keys, cellphone, N-Card, etc.) and use the nearest exit to leave the building. Do not use the elevators. After exiting notify emergency personnel of the location of persons unable to exit the building. Do not return to building unless told to do so by emergency personnel.

Tornado Warning: *When sirens sound, move to the lowest interior area of building or designated shelter. Stay away from windows and stay near an inside wall when possible.*

Active Shooter Evacuate: *if there is a safe escape path, leave belongings behind, keep hands visible and follow police officer instructions. Hide out: If evacuation is impossible secure yourself in your space by turning out lights, closing blinds and barricading doors if possible. Take action: As a last resort, and only when your life is in imminent danger, attempt to disrupt and/or incapacitate the active shooter.*

UNL Alert: *Notifications about serious incidents on campus are sent via text message, email, unl.edu website, and social media. For more information go to: <http://unlalert.unl.edu>. Additional Emergency Procedures can be found here:*

http://emergency.unl.edu/doc/Emergency_Procedures_Quicklist.pdf

INCLEMENT WEATHER POLICY (CONTINUITY PLAN)

In case of severe weather, class might be cancelled and rescheduled in a later date.

<https://bf.unl.edu/policies/inclement-weather>

