

Syllabus: Entomology 409/809
Insect Control by Host Plant Resistance
Summer 2022 (5-week session; June 6 – July 8)

INSTRUCTOR

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Office hours: The best way of contacting me is via email. You can expect a response to messages received Monday – Friday within 24-36 hours.

Teaching Assistant: Heena Puri (fheena2@huskers.unl.edu)

COURSE DESCRIPTION

OBJECTIVES:

1. Learn the many ways plants defend themselves naturally, and how crops have been developed for pest resistance.
2. Discover ways phytophagous insect behavior and physiology is affected by resistant plants.
3. Learn the role of biotechnology and the use of transgenes for the development of plants with multiple-resistance genes.
4. Assess current research on plant resistance genes, along with the molecular, biochemical and physiological aspects of insect/microbe interactions with host plants.

PRE-REQUISITE: 12 hrs of agricultural sciences and/or biological sciences including one course in entomology and one course in genetics/biochemistry.

REQUIRED MATERIALS: In order to take this course, you must have:

1. E-mail
2. Internet connection
3. A web browser to access the UNL Canvas.
4. Word processor program (e.g., Microsoft Word)

COURSE FORMAT: This is a 3-credit course and will involve a combination of lectures and presentation of recent and classical papers. This course will be divided into three modules. Each module will last for 1 to 2 weeks. Within each module, there will be a set of lectures, with accompanying reading assignments. The number of lectures for each topic will vary.

Lecture Schedule (*Tentative*)

Module 1: Categories of plant resistance and techniques to measure resistance

- History of host plant resistance (HPR), Antibiosis
- Antixenosis, behavior, Electrical Penetration Graph (EPG)
- Plant tolerance, quantifying tolerance
- Breeding plants resistant to insects

Module 2: Biotechnological approaches for the management of insect pests

- Transgenic insect resistance – *Bt*, non-*Bt* transgenes
- RNAi in HPR
- Signaling mechanisms in plant-insect interaction
- Molecular and biochemical mechanisms of plant defense against insects

Module 3: Induced defenses and application of plant signaling mechanisms to enhance crop productivity

- Plant recognition of insects – receptors, *R* genes, etc
- Insect counter-defenses - Effectors in plant-insect interactions
- Plant signaling mechanism to improve crop productivity
- Strategies for control of viruses and insect vectors

INSTRUCTIONAL METHOD: Canvas will be used for delivery of all materials pertinent to this course (lectures, reading assignments, etc.).

TEXTBOOKS: THERE ARE NO REQUIRED TEXT BOOKS. Readings or links to readings will be posted on Canvas.

RECOMMENDED READING:

Plant Resistance to Arthropods – Molecular and Conventional Approaches. C. M. Smith (2005)

EXAMS AND ASSIGNMENTS:

Exams: There will be two exams during the semester. First exam will be at the end of Module 2. Students will be provided examinations online via the Canvas. All exams will be open book and will be provided via Canvas one week before the deadline for completed exams to be returned to the instructor. Exams should be returned by email or through Canvas. Second exam will be the Final Exam (comprehensive), covering 60% from Module 3 and remaining 40% from Modules 1 and 2.

Weekly Reports: These are 1-2 page reports that needs to be submitted on reading assignments. Students need to submit three reports on reading assignments. Top two grades among three reports will be used for grading. Each report will carry 25 points. Reports should include innovation in the article and most importantly, identify **at least two questions/pitfalls** not addressed in the paper and how would you test this hypothesis using (multiple) experimental approaches? Also, discuss the expected results of these experiments. **Weekly reports are due at 5 PM CST on June 15, 22, and 29, 2022.** First report is due on June 15. Published papers for each topic will be posted on Canvas one week before the submission. Weekly reports should be typed and returned to the instructor by email or through Canvas.

Term Paper (only for students enrolled in ENTO 809): Students enrolled in ENTO 809 need to complete a term paper on a subject area that is covered in the class (topic must be approved by instructor). Term project is similar to a review paper and should be **six page (1.5 line spacing and margins 1 inch all sides)** long. Title and abstract (250 words limit) of your project are due to the instructor

by **5 PM CST on Friday June 17, 2022**. Final term project is due by **5 PM CST on Friday July 1, 2022**. The six page limit includes; Title and abstract (1 page), introduction (1-2 pages), background information and literature review (2-3 pages), and future prospects (1 page). This six page does not include the list of references and you should include at least 15 references. Grading for the term project will consist of 20 points for title and abstract, 55 points for scientific content, 20 points for writing style, and 5 points for relevant references. Proposal should be typed and returned to the instructor by email or through Canvas.

Grading (ENTO 409)

Exam 1	100 points
Final Exam	100 points
Weekly reports	50 points
Total	250 points

Grading (ENTO 809)

Exam 1	100 points
Final Exam	100 points
Weekly reports	50 points
Term Paper	100 points
Total	350 points

Letter grades will be assigned based on straight percentages of 100 - 90% A range, 89 - 80% B ranges, etc. The department of entomology requires that graduate students must receive a **B or better grade** in order for the class to count towards graduation.

SCALE

100 – 98 A+	89 - 87 B+	79 - 77 C+	69 – 67 D+	59 or below F
97 – 94 A	86 - 83 B	76 - 73 C	66 – 63 D	
93 – 90 A-	82 - 80 B-	70 - 72 C-	62 – 60 D-	

ADDITIONAL INFORMATION:

MAKE-UP, EXTRA CREDIT AND LATE SUBMISSIONS POLICY

No make-up exams will be offered. No extra credit will be available. Exams and assignments that are not received by the deadline will be subject to a penalty of 20% of the available points per day (or part thereof).

CANVAS

Various student resources are available for any issues you experience with Canvas and any other technical problems that might arise during the course of the semester. You can find a list of helpful resources under “Help” on the “My.UNL” Canvas page.

LIBRARY SERVICES

UNL distance students have access to UNL’s Library Services. The website can be accessed directly at: <https://libraries.unl.edu/libraries>

COURSE POLICIES AND RESOURCES

Visit the link below for UNL policies on Attendance, Academic Honesty, Students with Disabilities, Mental Health and Well Being, Emergency Procedures, Diversity and Inclusion, Title IX, and Final Exam Schedules. <https://executivevc.unl.edu/academic-excellence/teaching-resources/course-policies>