SAMPLE SYLLABUS: ENTO 409/809

Insect Control by Host Plant Resistance
(online course offered only in Summer)

For more information on this course contact:

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Office Hours (Online): 4:00-7:00 pm. Call or send email with any questions related to the course.

Instructor will respond to all questions or concerns via e-mail during these posted hours. Note that this is a unique offer of availability on a 7 day a week basis.

Scope and Benefits of this course:

In this course we will study and discuss biotic stress topics such as plant resistance to insects and pathogens, one of the easiest and cheapest components of an integrated pest management program. It is a very environmentally friendly method of insect management and is compatible with other control strategies such as biological, cultural and chemical control. Two major sources of genes for resistance are now being used with great efficiency; native genes (already occurring within a plant species or related plant species) and transgenes (genes genetically engineered or moved from other species, such as from the bacteria, *Bacillus thuringiensis*). In this course, you will understand the theory and principles and you will be given a concise description of development of the role of plant resistance in an integrated management program, environmental impacts, inheritance of resistance and strategies for selecting insect resistance.

To enroll for credit you will need 12 hours of biological science courses at the college level, or the permission of the course instructor. This course is also offered for noncredit and certificate programs with permission of the course instructor.

This course will be of benefit and of interest to broad group of learners/students of entomology, agronomy, biology, crop production and horticulture, plant pathology, weed science and environmental studies. Teachers of science, biology and agriculture, as well as crop consultants, extension educators, seed producers, field and production agronomists and biotechnology specialists will find benefit in the course. Anyone who wishes to learn more about the techniques, identification, screening, development and deployment of plants with genes for resistance to insects, plant pathogens and herbicide tolerance, abiotic stress such as drought tolerance, and with nutrient-use efficiency can benefit. Issues centered on the environment and regulation of the products or crop plants that result from this approached will be studied and discussed.

Course Structure and Credit Hours:

The course is comprised of three modules and a total of 3 credit hours.

Module 1: Plant Resistance to Arthropods (Biotic Stressors)
This module covers plant resistance and related traits to major biotic stressors such as insects, pathogens, weeds and nematodes. This module covers topics that are traditionally covered in courses on plant resistance to insects and diseases. Traditionally, conventional breeding techniques using predominantly single gene resistance has been used for the development of biotic stress resistance. This module will look at both the conventional, as well as molecular approaches in breeding and screening for resistance to biotic stressors. This module will be followed by Module 2 and Module 3 and several crop-based case studies. The value of these crop case studies is to give students and participants a broader perspective and knowledge on the crops, pests, germplasm, and needs for multidisciplinary approaches in dealing with pests and developing plants resistant to pests.

Module 2: Transgenic Plant Resistance: *Tools, Applications, Management and Regulations*
Module 2 will study the development and use of transgenic crops in production systems. This component of the course covers tools and techniques, testing, and applications to increase crop production. The Module will also cover approaches in using transgenic plants and field production including methods in managing insect resistance, as well as designing field layouts to minimize insect resistance. As for any technology, the module will also cover the environmental concerns by public, regulatory aspects and agencies and emerging national and global issues on the use and impact of transgenic crops.

Module 3: Plant Resistance to Abiotic Stressors
Module 3 covers plant resistance or tolerance to multiple and variable abiotic stressors such as salinity, drought, flooding, water logging, nutrients unbalance, metal, high temperature and cold tolerance. This module covers topics related to the emerging field of multiple-gene resistance and the use of molecular approaches for developing the resistance to abiotic stressors. Since crops are affected by a number of stressors both biotic and abiotic, this module will complement Module 1 and provide a broader perspective and knowledge on the development, methodology, and deployment of crop plants resistant to abiotic stressors. Although not as extensively covered as Module 1, this component of the course will be valuable to students and practitioners on the values of developing crops with multiple resistances to more than one stressor or yield-reducing factor. At the end of this module, crop-based studies covering all three Modules will be presented. These case studies will include specific crop germplasm and a bit of genetics, geographical distributions, and methodology for breeding for resistance to stressors.

Requirements:

To enroll for credit, participants and students in areas listed above will have had college level biological sciences, agronomy, social sciences, economics, or be currently active in areas of quarantine, research and extension services. Assessment will be done for students with other specialized majors who want to take this course to improve knowledge and/or for professional development. Course Instructors may grant permission to register for other categories of interested students not listed under these requirements, such as noncredit and certificate programs.

Learning Outcomes:

This course will provide the student with a working knowledge of how plants defend themselves naturally, how insects and pathogens, through co-evolution, have adapted plant defenses and overcome these mechanisms of resistance. The student will learn how to screen and breed for resistance to biotic

stressors, and the role and use of plant resistance to biotic stressors in an integrated pest management system, the major sources of genes for resistance: native genes and transgenes. A comparison will be made throughout the course between the development of insect resistance and plant pathogen resistance as biotic stressors. Finally, the current biotechnology use of transgenes as well as the molecular approaches for the development of plants with multiple-resistance genes to address abiotic stressors will be discussed. The role of regulatory agencies and public concerns for use of genetically modified plants and the development of resistant plants will be studied, discussed and addressed. Several crop-based studies will be presented and discussed to enhance the applied part of the course.

Textbooks:

Plant Resistance to Arthropods: Molecular and Conventional Approaches. 2005. by C. Michael Smith. Published by Springer. 423pp. *Print version: ISBN-10 1-4020-3701-5(HB). eBook version: ISBN-10 1-4020-3702-3(e-book).* This book will serve as the basis for the study of biotic stressors in the development of resistant plants. Current and relevant research papers will be posted on Blackboard for the additional reading to extend course content and knowledge for learners.

Abiotic Stresses: Plant Resistance through Breeding and Molecular Approaches. 2005. M. Ashraf, P. J. C. Harris, editors. The Haworth Press, Inc. 725pp. ISBN 1-56022-964-0(Hard). ISBN-1-56022-965-0(Soft). Selected chapters used in this book will be posted for readings. Additionally, research papers and reviews will be posted on the Blackboard for enhancing course learning and outcome.

Technical Requirements:

The course is offered online and will provide three (3) semester credit hours. It requires the ability to access course materials online using the University of Nebraska Blackboard System. This will include taking tests online, and home work assignments and online discussions through the Blackboard System. Tutorials are available on the Blackboard website if you are not familiar with the system. The location of all course materials will be posted in the Announcements section. Announcements will also be sent to all students by e-mail. Completed assignments will be submitted by students to Instructor via e-mail. Students must have access to the Internet, e-mail, Microsoft Word and Adobe Acrobat Reader. Lectures will be in PowerPoint format and supplemental readings in PDF or Word documents.

Evaluation and Grading:

This second 5-week Summer Session of this course is arranged by 5 weekly lectures (the total number of lectures will be adjusted as needed), 1 short review paper or report, 2 hourly exams and 5 mini-quizzes of 10 questions each during the semester. Regular assignments for each week will be due by a specified day and time of the week. It is important that you complete each assigned work by the due date. The work posted after the due dates will not be graded unless you have contacted the instructor and received permission for a late submission of the assignments. All assignments are to be submitted via Blackboard unless otherwise specified. Exams and mini-quizzes will be taken via the Blackboard System. These exams are not proctored; however, a time limit is in place once the learner logs on to take the exam.

The exams will be a combination of multiple choice and/ or true-false formats. Course participants are expected to use and integrate knowledge learned from the class, as well as information from assigned readings and external sources pertinent to the course into the exam questions. A review or report related to a topic of the course will be submitted by each student in addition to the two exams and 5 mini-quizzes. The review topic and title selected by each student must be submitted to and approved by the course instructor. The sooner you start, the better in accomplishing the task and enjoying the course and

completing the assignment. The format and grading criteria of the short review or report will be specified and posted. You are encouraged to cover multi-sources for references as appropriate, but with a balanced referencing and not rely solely on the websites. UNL library provides a good sources also for books and journal articles with the online search facility. Proper professional reference in a scientific matter is required. Discussion topics will also be consist of weekly posting of a main question by each class participant. Each class participant will also respond to posts from other class participants. Guidelines on grading these discussion posts will be uploaded online for reference. Participation in the discussions is required and will be graded. Discussion posts must exhibit relevance about the class topic. A simple "I agree" or similar responses will receive no points. The Discussion Board should be used only for your topic discussions. A social room will also be supplied when needed.

Points:

2 Hourly Exams: 100 points each ---------- 200
Short review/Report ---------- 100
Discussion/participation ---------- 100
5 Mini-Quizzes (20 points each) ---------- 100
Total points---------- 500

Letter grades will be assigned based on points earned in the course in accordance with the University of Nebraska's grading policy. For more information visit the website on the grading policy at: http://www.unl.edu.regrec/acadserv/handbookframes.htm and click on "grade system "in the index.

Grading Scale:

98-100 = A+	85-89 =B+	74-76 = C+	64-66 = D+
94-97 = A	80-84 = B	70-73 = C	60-63 = D
90-93 = A-	77-79 = B-	67-69 = C-	57-59 = D- 56 and below =F

Policy on Timely Submission of Exams and Assignments:

To benefit and make the most out of the course, turn in exams and review papers or assignments on time. Late submission of exams and assigned work will result in the loss of points which will affect your final course grades. In case of circumstances which prevent students / participants from turning in an assignment or exam on-time, it is requested that you inform the course instructor(s) ahead of time or as soon as circumstances are known.

Academic Dishonesty:

Students are expected to conduct themselves with honesty and integrity. Please review the **student code of conduct** at www.unl.edu/sja/Student-Record-Policy.pdf and UNL's policy on **academic integrity and academic dishonesty** at www.unl.edu/UFP/acadinte.htm.

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, our instructors will be timely in returning grades and in responding to our students.

American Disabilities Act Compliance:

Students with disabilities are encouraged to contact the instructor 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.