The University of Manitoba

Faculty of Agricultural and Food Sciences

COURSE TITLE

Crop Protection Entomology

Department	Course Number	Academic Session	Credit Hours
Entomology	ENTM 3170	Winter 2020	3

Prerequisites and how they apply to this course

There are no prerequisites, but it is recommended for students in years 2-4.

Classroom Location	Meeting Days and Class Hours
Online Zoom Sessions	T/R 8:30 -9:50
Lab/Seminar Location	Lab/Seminar/Hours
Online Zoom Sessions	Thursdays 2:30 pm - 5:25 pm
Department Office location	Phone Number
Animal Science Building 214	204-474-9257

Instructor Information

Name

Cole Robson-Hyska

Office Location

Zoom appointments can be scheduled via e-mail

Email Address

Cole.Robson-Hyska@umanitoba.ca

Teaching Assistant:

Crystal Almdal

TA Email:

almdalc@myumanitoba.ca

Course Philosophy

Students' Learning Responsibilities

Students are expected to practice personal and academic integrity and to take responsibility for one's own personal and academic commitments. Within the context of this class, regular attendance is critical to facilitate effective group work. Students should respect others and contribute to cooperative learning by promoting a respectful atmosphere and striving to learn from differences in people, ideas, and opinions. Students are expected to be prepared for class and submit assignments on time. Students are highly encouraged to ask for help under any circumstances, but particularly if having difficulty with material or learning in a cooperative group setting.

Remote Learning

Lectures and labs this semester will be conducted over Zoom. A link to both will be provided over UMLearn. In order to facilitate group work, it is required that you sign into Zoom from an account created with your university e-mail address (@myumanitoba.ca). For these purposes a free non-institution affiliated account is all that is required. As the class size is small, having your video feed on will be strongly encouraged in lectures and mandatory in labs (barring any special circumstances). During lectures it will be mandatory to keep your microphones off when not posing or addressing a question, or participating in a discussion, to limit the amount of inadvertent background noise that may disrupt the lecture for other participants. Lecture sessions will be recorded via Zoom and stored on an online server for up to 48 hours after the time of the live lecture. This course is very much intended to be synchronous and as such recordings will become unavailable past this point. Recordings will not be downloadable and will/are not to be shared outside of those involved with this class. Lab sessions will NOT be recorded.

Why this course is useful?

Insects affect human lives in significant ways every day, from pollinating our crops to affecting the economic survival of growers in both urban and rural communities. This course provides an excellent background in general entomology and the theory and techniques involved in integrated pest management. This course is valuable to those seeking careers in agriculture, forestry, conservation, pest control, and ecological management. This course is also valuable for those interested in entomology, biological control, ecology, and plant-insect interactions and covers many of the prominent Manitoban crop pests.

Who should take this course?

Students in the minor program in Entomology, students in Agronomy program (restricted elective) and any students interested in integrated pest management of insects, whether in Agriculture or Science.

How this course fits into the curriculum

For a B.Sc. in Agriculture, this is a restricted elective for those with an agronomy focus and provides a foundation in entomology in relation to crop production and management of agricultural ecosystems. For students pursuing the entomology minor, this course offers in-depth information in integrated pest management and will increase student's understanding of the role insects play in a variety of ecosystems. For science students this course provides a valuable entomological elective for understanding the most diverse group of invertebrates on the planet.

Course Description

Undergraduate Calendar Description

A course for students requiring a foundation in entomology and knowledge of major insect pest groups in Western Canada. The pests and principles for their control (chemical, cultural, mechanical, physical and biological methods) are explored with emphasis on the entire ecosystem. Students may not hold credit in ENTM 3170 and 038.413 or 038.431.

Instructional Methods

This course combines traditional lecture, problem-based learning modules, and discussions to achieve course and learning objectives. Traditional lectures are intended to orient students to general principle of each topic to facilitate active participation in discussion and development of critical thinking skills in problem-solving. Lab sessions will involve traditional instruction in insect identification focusing on key characteristics and the use of insect identification keys.

Course Objectives

The course will examine theory and practice of integrated pest management (IPM) of insects and explore economic and ecological considerations in decision making and program implementation in IPM, including population ecology of insects, surveying and sampling methodology for informed decision-making, and the effect of market values and input costs on economic thresholds. Course objectives include:

- Gain an appreciation of insect diversity in the Prairie Ecoregion and understand basics of insect biology and taxonomy
- Develop effective decision-making skills in integrated pest-management with respect to economic and environmental considerations

- Understand the roles of insects in crop production, the destructive nature of pest insects in relationship to plants, and the importance of beneficial insects
- Appreciate the different viewpoints stakeholders of crop production have and understand the ethical, economic, and environmental considerations when making decisions in insect pest-management

Learning outcomes: By the end of the course students should be able to:

- Recognize, evaluate, and articulate the advantages and disadvantages of different management strategies in pest control of insects.
- Make sound judgments on pest management issues by analyzing relevant information on insect life cycles within the context of economics and stable ecological functioning.
- Be able to work effectively within a group to solve problems related to insect pest management by sharing, listening, and contributing in group discussions, by respecting diverse opinions, and by completing one's own responsibilities to the group in a manner that promotes cooperation
- Understand the different classes and modes of actions of pesticides and regulatory and environmental issues involved with insecticide use
- Assess and critique the primary literature, formulate opinions on issues in pest management, and be able to concisely argue a specific viewpoint in a group setting.
- Research , assemble, and communicate life history facts, ecological information, and identifying characteristics of specific species

Description of Examinations

The lab quizzes and final lab exam will assess student's ability to identify insect pests and beneficial insects in various Manitoba agricultural systems and households. Students will be expected to know specific identifying characteristics of organisms to allow them to identify the family and scientific or common name of specific species covered in laboratory session. Students will also be expected to know some basic information about the biology of species covered in the lab sessions (e.g. host plant(s), damaging stage of the insect, characteristics of damage, etc.).

The midterm and final exams for the lecture portion will consist of multiple-choice and written response questions about specific topics covered. Questions will assess student's mastery of the content and ability to communicate and defend viewpoints on specific issues in integrated pest management.

Description of Assignments

CLASS ASSIGNMENTS (Total 35% of final grade):

1. Group problem-solving module: Pest management decision making (20%)
    a. Students will be assigned to groups of 3-4 students to work together to solve a problem related to insect pest management. There are multiple elements of the assignment and students

should refer to the module handout (to be distributed) for additional information and grading rubrics.

i. Individual assignment (10%): Each student will be required to research two different pests and answer questions on a provided handout. Specific species will be assigned to individuals within the group. Students are expected to obtain information from a variety of reputable sources, including the primary literature, textbooks, provided supplementary materials, and reliable internet resources. Information found should be paraphrased and adequately cited, including internet material. See the university guidelines on how to avoid plagiarism : http://umanitoba.ca/libraries/units/dafoe/media/plagiarism.pdf.

ii. Group assignment (10%): Students working within their group will be expected to answer a series of questions provided in a handout. Groups should process all the information each member gathered in their individual assignments as well as analyze information from smaller, in-class problem-solving exercises to answer the questions. Additional in-class handouts will also be handed in as part of the assignment. Answers to questions must be well justified and defended. As a small portion of this grade, each student will be graded by other members in their group and themselves to receive a participation mark. Students should refer to the participation grading rubric and grading handout so they understand what actions and behaviors will lead to full marks.

2. Short essay on forest insects (5%)

Trees are an important resource in Manitoba for the forestry industry. Winnipeg also has its own urban forest, which is under threat. Students will research on of several insect pests of trees and summarize available knowledge in a short essay (one page max not including references; concise writing will be the key here). This assignment is tied to the monetary Kennedy award that has traditionally been affiliated with this course in particular. For more information: https://umanitoba.ca/faculties/afs/dept/entomology/media/Kennedy_H_W__Prize.pdf

3. Discussion Lead and Participation (10%)

The goal of in-class discussions are to enhance students understanding of specific issues involved with decision making and implementation of integrated pest management. The main point is to critically evaluate the reading material in context with the issues, formulate opinions, and learn to defend those positions. Listening and expressing ones viewpoints are equally important tasks, as well as respecting diversity of opinions.

a. Discussion Lead (5%): Students in pairs will choose one side of a topic (from a provided list) covering an important ethical, economic, or environmental issue related to pest management for

the class to discuss. Student pairs will also choose one journal article from the primary literature for the class to read (must be available to class one week prior to actual discussion). Each student pair will provide a brief overview of the paper and summarize some the relevant issues posed in the paper to help form their side of the debate. The format of the discussion is left up to the students and creativity is encouraged. Each student pair should have several discussion points ready in advance to stimulate class participation. Students should refer to the discussion lead grading rubric to understand what is expected to achieve full marks. It is expected that both students of the pair will participate equally in the presentation, though how this is broken up will be at the students' discretion.

b. Discussion Participation (5%): Effective discussion requires participation among those in the discussion. Students should refer to the discussion participation grading rubric for more information. For clarity, every student in the class is intended to participate in the discussion of each topic and is meant to have read the discussed papers beforehand.

LAB ASSIGNMENTS (Total 25% of final grade):

1. Lab quizzes – 6 quizzes (Best 5 of 6 = 10% of final grade): Students will be required to identify insects by sight that they learned in the lab as well as unfamiliar insects to Order. Pest information will also be tested on quizzes in a limited amount.
2. Lab final (15% of final grade)
   - Students will be required to not only identify specific insect species and families, but to recall all pertinent information regarding certain pest and beneficial insect species.

EXAMS (40%):

1. Class midterm (15%)
   An assortment of multiple choice, fill-in-the-blank, T/F, matching, short-answer and short-essay questions. The exam will be written during the class period via UMLearn.
2. Final exam (25%)
3. An assortment of multiple choice, fill-in-the-blank, T/F, matching, short-answer and short-essay questions. The exam will be conducted via UMLearn. Date TBA

Important Dates

- Thurs Feb 11, 8:30 am: Individual Assignment due
- February 15 - 19 Mid-Term break: No classes or examinations in most faculties and schools
- Tues, Mar 2, 8:30 am: Lecture Midterm
- Tues Mar 9, 8:30am: Group Assignment due
- Wed Mar 31 – Voluntary Withdrawal (VW) deadline

- Thurs Apr 8, 8:30am Forest pest essay due
- Thurs Apr 15, Lab Final
- Fri. Apr 16 – Last day of classes
- April 19 – May 1 – Final examination period
- Article for discussion lead must be handed out to class one week before the actual discussion (preferably approved by instructor first).
- Dates of class discussion are in detailed class schedule below
- The date and time of the Lecture final will be set by the University

Grade Evaluation

Lecture portion (75% of grade)

1. Assignment 1 (20% of final grade): Decision making in pest management:
    a. Individual assignment (10% of final grade)
    b. Group assignment: 4 modules (10% of final grade)
    c. Participation in group assignment (5% of final grade)
2. Assignment 2 (10% of final grade): Discussion lead and participation in discussions
    a. Discussion lead (5% of final grade)
    b. Discussion participation (5% of final grade)
3. Assignment 3 (5% of final grade): short essay on a forest pest
4. Lecture midterm (15% of final grade)
5. Lecture final (25% of final grade)

Lab portion (25% of grade)

1. Lab quizzes (10% of final grade)
2. Lab Final (15% of grade). Note: The lab component of this class must be passed to pass the course.

Grade Breakdown:

A+ (90-100%)

A (80-89%)

B+ (75-79%)

B (70-74%)

C+ (65-69%)

C (60-64%)

D (50-59%)

F (>50%)

Texts, Readings, Materials

Suggested Textbook(s) :

Pedigo, L.P. and Rice, M.E. (2009). Entomology & Pest Management, 6th Edition, Prentice Hall, Upper Saddle River, N.J. (Other additions are equally valuable)

Philip, H. and Mengersen, E. (1989). Insect pests of the prairies. University of Alberta Press, Edmonton. (this is a nice resource to have – although recent and emerging pests are not included). A copy will be available in the lab.

Philip, H. 2019, Field Crop and Forage Pests and Their Natural Enemies in Western Canada: Identification and Management Field Guide. Agriculture and Agri-food Canada. (A digital copy of this will be provided over UMLearn).

Supplementary Reading and Materials

Will be provided in class

Course Policies

Inquiries to the Instructor or TA:

Students are encouraged to discuss issues pertaining to assignments with the instructor well in advance of deadlines. While every effort will be made to return student inquiries via email as soon as possible, students should expect a minimum of 24 hours to receive a response. Private Zoom meetings can be made available upon request.

Late Assignments

Late assignments will be deducted 10% of the final grade for that assignment for every 24-hour period it is late. Assignments must be submitted at class time on the date and time due. Late is considered past the set time noted in the due date. Thus, if an assignment is due at 8:30am and is handed in at 1pm on the same day, it is still considered 1 day late.

Missed Assignments and exams

To pass the course, all items for which a mark is allocated must be completed and submitted. Additionally, the lab component of the course (including quizzes and the lab final) must be passed to successfully complete the course. Unexcused missed assignments will be given a grade of zero. Where assignments are missed and excused through written notification such as a doctor's certification of illness, death in the family, or other circumstances that are beyond the control of the student, the student may be given the following options: 1) complete the assignment and receive the late assignment penalty as described above, 2) establish a new due date with the instructor and complete the assignment without penalty when handed in by the new due date, or 3) the final grade will be determined by increasing the value of the final class or lab exam (for missed lab

quizzes or missed class midterm) by the amount that would have been allocated to the missed assignment. Option is to be determined through discussion with the instructor and is at their discretion. Missed final exams will be handled by the department instead of the instructor.

Academic Integrity

Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty. Cheating in examinations or tests may take the form of copying from, or collaborating with for the purposes of exams, another student or the use of unauthorized materials during exams. Exam cheating can also include exam personation. A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. Students should acquaint themselves with the University's policy on plagiarism, cheating, exam impersonation, and duplicate submission (see Section 7, p. 29 in the University of Manitoba Undergraduate Calendar 09/10). See also: http://umanitoba.ca/libraries/units/dafoe/media/plagiarism.pdf

Additional Comments:

When assembling information for assignments students should ensure they cite all of their sources and paraphrase information taken from those sources, rather than copy specific sentences.

Reference style:

a. From journals

Engels H, Sinha A, Schuphan I, Eber S, 2008. Small-scale dispersal of the European corn borer and its relevance for resistance management in Bt maize. Journal of Applied Entomology 132, 675-680.

b. From books or other non-serial publications

Chapman RF, 1998. The insects - Structure and function. 4th edition. Cambridge University Press, Cambridge.

c. From reference book contributions

Zlotkin E, 2001. Insecticides affecting voltage-gated ion channels. In: Biochemical site of insecticide action and resistance. Ed. by Ishaaya I, Springer, Berlin, Heidelberg, 43-76.

d. From websites

Beckleheimer J, 1994. Controlling cutworms. IPM in Canola. Retrieved Sept 27, 2009. www.ipm.com

Use of Third Party Detection and Submission Tools

Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

Course Schedule:

Schedule is subject to revisions in content. Deadlines for all submissions , regardless of date, will always be 8:30am

Day	Date	Topic	Format	Lab	DUE DATES
TU	19-Jan	Intro to the course, insects and IPM	Lecture		
TH	21-Jan	Insect Anatomy and Life Cycles	Lecture	No Labs This Week	
TU	26-Jan	Insect Classification: Insect Orders	Lecture		
TH	28-Jan	Insect Physiology	Lecture	Basic morphology, feeding modes, the Orders, using keys	
TU	2-Feb	Pest Damage/Insect-Plant Relationships	Lecture		
TH	4-Feb	Population Dynamics/Insect Ecology I	Lecture	Internal Insect Anatomy: Grasshopper dissection	**Lab Quiz #1 due Mon Feb 8**
TU	9-Feb	Population Dynamics/Insect Ecology II	Lecture		
TH	11-Feb	Monitoring/Sampling Insects	Lecture	Group work Submodule 1+2 Sunflower pests	**Individual Assignment due**
TU	23-Feb	Economic Injury Levels Submodule 3	Lecture, Group Discussion		
TH	25-Feb	Host-Plant Resistance	Lecture	Pests of Cereals	**Lab Quiz #2 due Mon Mar 1**
TU	2-Mar	**Lecture Midterm**	**Midterm**		**Midterm**
TH	4-Mar	Insecticides	Lecture	Pests of Canola & Forage	**Lab Quiz #3 due Mon Mar 8**
TU	9-Mar	Risks of Insecticides	Lecture		**Group Assignment Due**
TH	11-Mar	*Possible Guest Lecture*	Lecture	Pests of Fruits & Vegetables	**Lab Quiz #4 due Mon Mar 15**
TU	16-Mar	Class Discussion Topic: Neonicotinoids	Class Discussion		
TH	18-Mar	Biological Control	Lecture	Pests of Stored Grain	**Lab Quiz #5 due Mon Mar 22**
TU	23-Mar	Class Discussion Topic: Biological Control	Class Discussion		
TH	25-Mar	Cultural Control Methods	Lecture	Beneficial Insects	**Lab Quiz #6 due Mon Mar 29**
TU	30-Mar	Class Discussion Topic: "Organic" Farming	Class Discussion		

TH	1-Apr	New Technologies for Pest Control I	Lecture	Class Discussion Topic: GMOs	
TU	6-Apr	Class Discussion Topic: Environmental Protection	Class Discussion		
TH	8-Apr	New Technologies for Pest Control II	Lecture	Class Discussion Topic: Insect Armageddon	**Forest Pest essay due**
TU	13-Apr	*Possible Guest Lecture*	Lecture		
TH	15-Apr	Beneficial Insects	Lecture	**Lab Final**	**Lab Final**