

The University of Manitoba  
Faculty of Agricultural and Food Sciences



COURSE TITLE

[Crop Protection Entomology](#)

Department	Course Number	Academic Session	Credit Hours
<a href="#">Entomology</a>	<a href="#">ENTM 3170</a>	<a href="#">Winter 2022</a>	<a href="#">3</a>

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
<a href="#">Remote (Zoom)</a>	<a href="#">T/R 8:30–9:45 am</a>

Lab/Seminar Location	Lab/Seminar/Hours
<a href="#">Remote (Zoom)</a>	<a href="#">R 2:30–5:25 pm</a>

Department Office Location	Phone Number
<a href="#">Animal Science Building 214</a>	<a href="#">(204) 474-9257</a>

Instructor Information

Name & Title

[Dr. Jason Gibbs](#)

Office Location

[Remote](#)

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[\(204\) 474-7485](#)

Office Hours

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Teaching Assistant:

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TA Office Hours and Location

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TA Email:

[Whiteb2@myumanitoba.ca](mailto:Whiteb2@myumanitoba.ca)

## Course Philosophy

### **Territorial Acknowledgment**

The University of Manitoba campuses are located on original lands of Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation.

### **COVID-19 policy**

The instructor and students will be expected to follow all University and government policies related to the COVID-19 pandemic. The course is entirely remote due to current pandemic conditions.

### **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. Students who are uncomfortable asking a question verbally, may use the chat function. 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.

### **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.

### **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.

#### **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 exam will assess student's ability to identify insect pests and their natural enemies 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 will consist of multiple-choice, short-answer and essay questions about specific topics covered in lectures, class discussions, and in-class problem-solving modules. Questions will assess student's mastery of the content and ability to communicate and defend viewpoints on specific issues in integrated pest management (*c.f.* learning outcomes)

### Description of Assignments

#### CLASS ASSIGNMENTS (Total 35% of final grade):

1. 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 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 and draw life cycles in relation to plant growth and development. 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. Each student will be graded by other members in their group and themselves to receive a participation mark. The mark will be averaged over all grades received to arrive at the final mark. The instructors observations during class time will contribute to the 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 one of several insect pests of trees and summarize available knowledge in a short essay (one page max) aimed at intelligent but general audience.
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 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 will then formulate a series of at least 5 discussion questions and lead an in-class discussion on the topic for half of one class period (30 minutes). Each student will provide a brief overview of the paper (10 min) and summarize some the relevant issues posed in the paper. The format of the discussion is left up to the student and creativity is encouraged. Students should refer to the discussion lead grading rubric to understand what is expected to achieve full marks.

- 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.

4. **Class midterm (15%)**

Short-answer and short-essay questions

LAB ASSIGNMENTS (Total 25% of final grade):

1. **Lab quizzes – 6 quizzes (5% + 5% = 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%)** 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

**Grade breakdown:**

A+ (≥90), A (≥80), B+ (≥75), B (≥70), C+ (≥65), C (≥60), D (≥50), F (<50)

**Assignment Due Dates**

- Thurs, 17 Feb 2022, 8:30 am: Class Assignment 1 (i): Individual Assignment
- Tues 8 Mar 2022, 8:30 am: Class midterm
- Tues 22 Mar 2022, 8:30 am: Class Assignment 1 (ii): Group Assignment
- Thurs 14 Apr 2022, 8:30 am: Forest pest essay
- Thurs 21 Apr 2022, Lab Final
- Article for discussion lead must be handed out to class ONE WEEK before the actual discussion.

- The date and time of the final exam will be set by the University

## Grade Evaluation

### Class Assignments (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)
2. Assignment 2 (5% of final grade): Short essay on insect pests of trees
3. Assignment 3 (10% of final grade): Discussion lead and participation in discussions
  - a. Discussion lead (5% of final grade)
  - b. Discussion participation (5% of final grade)
4. In-Class midterm (15% of final grade)
5. Final exam (25% of final grade)

### Lab Assignments (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.

## Important Dates (e.g., voluntary withdrawal date)

February 21–25 Louis Riel Day/Winter Term break: No classes or examinations in most faculties and schools

Apr 25 Last day for Voluntary Withdrawal from Winter Term 2022 courses

Apr 25 Last instructional day.

April 26–May 3 Final examination period.

## Texts, Readings, Materials

Textbook(s) :

Pedigo, L.P., Rice, M.E. and Krell, R.K. (2021) Entomology & Pest Management, 7th Edition, Waveland Press, Long Grove, IL (Other editions are equally valuable) [SHOULD BE AVAILABLE THROUGH BOOKSTORE]

Also acceptable:

Pedigo, L.P. and Rice, M.E. (2009). Entomology & Pest Management, 6th Edition, Waveland Press, Long Grove, IL (Other editions are equally valuable) [MAY BE AVAILABLE AT BOOKSTORE]

Philip, H., Mori, B.A. and Floate K.D. (2018). Field crop and forage pests and their natural enemies in Western Canada. Agriculture and Agri-food Canada, Saskatoon.

A pdf will be available on UM Learn

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.

### **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 by class time on the date due. Late is considered past the set time noted in the due date. Thus, if an assignment is due at 8:30 am and is handed in at 1 pm on the same day, it is still considered 1 day late. Assignments should be submitted on UM Learn.

### **Missed Assignments**

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 2 assignments 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 (a simple note of a doctor's appointment is not sufficient), evidence of 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 assignments or missed class midterm) by the amount that would have been allocated to the missed assignment. Option three is only viable under extreme circumstances.

### **Missed Exams**

See above, however all students must write the both the lab and class final exams to pass the course. If the final exam has been missed for a valid, documented reason such as illness, or death in the family, another exam date will be set at the discretion 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 another student or bringing unauthorized materials into the exam room. Exam cheating can also include exam impersonation. 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>.

Ignorance of policies related to plagiarism, cheating, etc. will not be accepted as an excuse.

#### Additional Comments:

When assembling information for all assignments (and particularly for the individual assignment on sunflower pests), students should ensure they cite all of their sources and paraphrase information taken from those sources, rather than copy specific sentences. DO NOT USE QUOTES. Always write in your own words.

#### Reference style:

##### **Journal article**

Morton, A. & Garcia-del-Pino, F. (2017). Laboratory and field evaluation of entomopathogenic nematodes for control of *Agriotes obscurus* (L.) (Coleoptera: Elateridae). *Journal of Applied Entomology*, 141, 241-246.

Estes, R. E., Tinsley, N. A. & Gray, M. E. (2016). Evaluation of soil-applied insecticides with Bt maize for managing corn rootworm larval injury. *Journal of Applied Entomology*, 140, 19-27. DOI: 10.1111/jen.12233

##### **Book**

Gullan, P. J. & Cranston, P. S. (2005). *The insects - an outline of entomology*. Oxford: Blackwell Publishing.

##### **Chapter in an Edited Book**

Kiss, J., Komaromi, J., Bayar, K., Edwards, C. R. & Hatala-Zseller, I. (2005). Western corn rootworm (*Diabrotica virgifera virgifera* LeConte) amid crop rotation systems in Europe. In S. Vidal, U. Kuhlmann & R. Edwards (Eds.), *Western corn rootworm: ecology and management* (pp. 189–220). Wallingford, United Kingdom: CABI Publisher.

##### **Unpublished Work**

Unpublished work should only be cited when it has been accepted for publication, and then together with the name of the journal in which it has been accepted.

Ciosi, M., Toepfer, S., Li, H., Haye, T., Kuhlmann, U., Wang, H., Siegfried, B. & Guillemaud, T. (2008). European populations of *Diabrotica virgifera virgifera* are resistant to aldrin, but not to methyl-parathion. *Journal of Applied Entomology* (in press).

##### **Websites**

Estes, R. (2004). *2004 Evaluations of Rootworm Control Products*. [Text article]. Retrieved from <http://bulletin.ipm.illinois.edu/print.php?id=182>

##### **Using the DOI (Digital Object Identifier) Number**

Nestel D., Papadopoulos N. T. & Miranda Chueca M. A. (2008). Current advances in the study of the ecology of fruit flies from Europe, Africa and the Middle East. *Journal of Applied Entomology*, DOI: 10.1111/j.1439-0418.2008.01378.x

#### Use of Third Party Detection and Submission Tools

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

#### Group Work Policies:

We will have a portion of one class period devoted to understanding effective group work practices and establishing policies that will be in effect for each group. Students will be encouraged to assign specific roles in group work and to take minutes for group meetings. Groups should consider how they can create a supportive, respectful, and relaxed environment where everyone can contribute regardless of strengths and weaknesses.

**Grading Rubrics:**

See in-class handouts.

**Course Schedule:**

See table on next page

Schedule is subject to revisions in content. All due dates will remain firm.

Day	Date	Topic	Format	Lab	DUE DATES
TU	25-Jan	Overview of Course, Intro to insects and insect diversity, Intro to IPM	Lecture	No lab this week	
TH	27-Jan	Insect external morphology metamorphosis, basic internal morphology	Lecture	No lab this week	No lab this week
TU	1-Feb	Insect Classification, The Insect Orders	Lecture		
TH	3-Feb	Insect Physiology	Lecture	Basic morphology, feeding modes, The orders, using keys	
TU	8-Feb	Pest damage, Insect plant relationships	Lecture		
TH	10-Feb	Collecting insects in agroecosystems; Sampling, Monitoring, and Forecasting Pests	Lecture	Immature insects; internal anatomy	<b>Lab quiz #1: know your orders!</b>
TU	15-Feb	Population Dynamics/Insect Ecology	Lecture		
TH	17-Feb	Population Dynamics/Insect Ecology cont'd, PBL learning. <u>Submodule 1</u>	Lecture, Group discussion	Pests of Sunflower	<b>8:30 am Individual assignment</b>
<b>TU</b>	<b>22-Feb</b>	<b>midterm break</b>			
<b>TH</b>	<b>24-Feb</b>	<b>midterm break</b>			
TU	1-Mar	Group work: Surveillance and Sampling - <u>Submodule 2</u>	Group Discussion		
TH	3-Mar	Economic Injury Levels and Decision Making, <u>Submodule 3</u>	Lecture, Group Discussion	Group project time / Pests of trees	
TU	8-Mar	<b>Class Midterm</b>	<b>Midterm</b>		<b>Class midterm</b>
TH	10-Mar	Host-plant resistance, Putting it all together	lecture	Pests of Cereals	<b>Lab quiz #2</b>
TU	15-Mar	Chemical control	Lecture		
TH	17-Mar	Chemical control	Lecture	Pests of Canola (Crop Management App)	<b>Lab quiz #3</b>
TU	22-Mar	Unwanted effects of insecticides	Lecture		<b>Group Assignment due</b>
TH	24-Mar	Biological control, Beneficial insects	Lecture	Pests of Fruits and Veggies	<b>Lab quiz #4</b>
TU	29-Mar	Class Discussion:Neonictionoids	Class Discussion		

Day	Date	Topic	Format	Lab	DUE DATES
TH	31-Mar	Beneficial insects cont'd, Cultural /Ecological/Physical management of pests	Lecture	Pests of Stored Products (Stored Insects App)	Lab quiz #5
TU	5-Apr	Class Discussion: Biological Control	Class Discussion		
TH	7-Apr	GMOs (Bt)	Lecture	Pests of Forage & Pasture	Lab quiz #6
TU	12-Apr	Class Discussion: Organic Farming	Class Discussion		
TH	14-Apr	New technologies in Insect Pest Management (RNAi/Crispr-Cas9)	Lecture	Beneficial Insects	Forest pest essay due
TU	19-Apr	Class Discussion: Environmental Protection	Class Discussion		
TH	21-Apr	Class Discussion: Insect Armagaeddon	Class Discussion/Lecture	Lab Final	Lab Final
	Apr. 26 to May 3	FINAL EXAM (TBD)			