



**COURSE TITLE**

[Crop Protection Entomology](#)

Department	Course Number	Academic Session	Credit Hours
<a href="#">Entomology</a>	<a href="#">ENTM 3170</a>	<a href="#">Winter 2024</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="#">Agriculture 138</a>	<a href="#">T/R 8:30–9:45 am</a>
Lab/Seminar Location	Lab/Seminar/Hours
<a href="#">Animal Science / Entomology Building 203</a>	<a href="#">M 2:30–5:25 pm / R 2:30–5:25 pm</a>
Department Office Location	Phone Number
<a href="#">Animal Science / Entomology Building 214</a>	<a href="#">(204) 474-9257</a>

**Instructor Information**

**Name & Title**

[Dr. Jason Gibbs](#)

Office Location	Office Phone Number
<a href="#">Animal Science / Entomology 213 or Zoom</a>	<a href="#">(204) 474-7485</a>

**Office Hours**

[Email for appointment](#)

**Email Address**

[jason.gibbs@umanitoba.ca](mailto:jason.gibbs@umanitoba.ca)

**Teaching Assistant:**

[Shayla Woodland](#)

**TA Email:**

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

**TA Office Hours and Location**

[Animal Science / Entomology 217](#)

## 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. As a courtesy to others, please stay home when sick and wear a mask if you have a lingering cough.

### **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 30% 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 (5%)**

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 (5%):** During discussions students will be expected to review a scientific paper on the topic (available on UM Learn). Each week a subset of students will be expected to upload discussion points on the paper that will be raised in class following a lecture.
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 (10% 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.
3. **Participation (5% of final grade):** Students are expected to attend labs, fully review material, and engage in group discussions.

## EXAMS (45%):

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.
2. **Final exam (30%)** An assortment of multiple choice, fill-in-the-blank, T/F, matching, short-answer and short-essay questions. The exam will be arranged by the Registrars Office during the final lab period. Date TBA

## Grade breakdown:

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

## Assignment Due Dates

- Thurs, 1 Feb, 8:30 am: Class Assignment 1 (i): Individual Assignment
- Tues 15 Feb, 8:30 am: **Class midterm**
- Tues 5 Mar, 8:30 am: Class Assignment 1 (ii): Group Assignment
- Thurs 28 Mar, 8:30 am: Forest pest essay
- Mon 1, Thurs 4 Apr, **Lab Final**
- Discussion assignments will vary by group. Should be handed in at least 24 hours before 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 (5% of final grade): Discussion points
  - a. Discussion lead (5% of final grade)
4. In-Class midterm (15% of final grade)
5. Final exam (30% of final grade)

### Lab Assignments (25% of grade)

1. Lab quizzes (10% of final grade)
2. Lab Final (10% of grade).
3. Participation (5% of grade).

**Note:** The lab component of this class must be passed to pass the course.

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

February 19–23 Louis Riel Day/Winter Term break: No classes or examinations in most faculties and schools

Mar 20 Last day for Voluntary Withdrawal from Winter Term 2022 courses

Apr 9 Last instructional day.

April 12–Apr 26 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 notification of illness (See: temporary student absence form and policy), 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 firgifer virgifer 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.](#)

[Note that Monday lab sections \(not listed in schedule below\) will take place in the same week as Thursday labs.](#)

Day	Date	Topic	Format	Lab	DUE DATES
TU	9-Jan	Overview of Course, Intro to insects and insect diversity, Intro to IPM	Lecture	No lab this week	
TH	11-Jan	Insect external morphology metamorphosis, basic internal morphology	Lecture	No lab this week	No lab this week
TU	16-Jan	Insect Classification, The Insect Orders	Lecture		
TH	18-Jan	Insect Physiology	Lecture	Basic morphology, feeding modes, The orders, using keys	
TU	23-Jan	Pest damage, Insect plant relationships	Lecture		
TH	25-Jan	Collecting insects in agroecosystems; Sampling, Monitoring, and Forecasting Pests	Lecture	Immature insects; internal anatomy	<b>Lab quiz #1: know your orders!</b>
TU	30-Jan	Population Dynamics/Insect Ecology	Lecture		
TH	1-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>
TU	6-Feb	Group work: Surveillance and Sampling - <u>Submodule 2</u>	Group Discussion		
TH	8-Feb	Economic Injury Levels and Decision Making, <u>Submodule 3</u>	Lecture, Group Discussion	Group project time / Pests of trees	
TU	13-Feb	Insect ecology	lecture		
TH	15-Feb	<b>Class Midterm</b>	<b>Midterm</b>	Pests of Cereals	<b>Lab quiz #2</b>
<b>TU</b>	<b>20-Feb</b>	<b>midterm break</b>			
<b>TH</b>	<b>22-Feb</b>	<b>midterm break</b>			
TU	27-Feb	Chemical control	Lecture		
TH	29-Feb	Chemical control	Lecture	Pests of Canola (Crop Management App)	<b>Lab quiz #3</b>
TU	5-Mar	Unwanted effects of insecticides	Lecture		<b>Group Assignment due</b>
TH	7-Mar	Neonicotinoids (lecture/discussion)	Class Discussion	Pests of Forage and Pasture	<b>Lab quiz #4</b>
TU	12-Mar	Beneficial insects	Lecture		

Day	Date	Topic	Format	Lab	DUE DATES
TH	14-Mar	Biological Control	Lecture	Pests of Fruits and Veggies	Lab quiz #5
TU	19-Mar	Host Plant resistance	Lecture		
TH	21-Mar	GMOs (Bt)	Class Discussion	Pests of Stored Products (Stored Insects App)	Lab quiz #6
TU	26-Mar	Cultural control	Lecture		
TH	28-Mar	Organic Farming	Class discussion	Beneficial Insects	Forest pest essay due
TU	Apr-02	New technologies in Insect Pest Management (RNAi/Crispr-Cas9)	Lecture		
TH	4-Apr	Applications of IPM	Class Discussion	Lab Final	Lab Final
TU	9-Apr	Overview of pest trends			
	Apr. 14-28	FINAL EXAM (TBD)			