**Course Outline Form: Winter 2018**

# General Information

## Course Code: ENVS 3090

**Course Title: Insect Diversity and Biology Course Description:**

This course is an overview of insect diversity and biology emphasizing groups of importance in conservation biology, outdoor recreation and economic entomology. Labs focus on insect identification and the development of a small insect collection.

Prerequisite(s): BIOL\*1040 or (2 of BIOL\*1050, BIOL\*1070, BIOL\*1080, BIOL\*1090)

## Credit Weight: 0.5

**Academic Department (or campus): School of Environmental Sciences Campus: Guelph**

**Semester Offering: Winter 2018**

**Class Schedule and Location: Lecture (Tuesday and Thursday, 11:30am-12:50pm): MacKinnon 223; Lab (Tuesday 2:30-5:20pm or 7:00-9:50pm): Graham Hall 3309.**

**Instructor Information**

Instructor Name: Morgan Jackson

Instructor Email: [morgandjackson@gmail.com](mailto:morgandjackson@gmail.com) Instructor Phone and Extension: 519-824-4120 x52582

Office location and office hours: E.C. Bovey Building, Room 1207. Hours: Mondays 1-4pm

# GTA Information

GTA Name: Matthew Muzzatti and Tiffany Yau

GTA Email: [muzzattm@uoguelph.ca](mailto:muzzattm@uoguelph.ca) and [tyau@alumni.uoguelph.ca](mailto:tyau@alumni.uoguelph.ca)

GTA office location and office hours: TAs won't have set weekly hours; please email them to set up a meeting time if you want to discuss something outside of labs.

# Course Content

INSECT DIVERSITY AND BIOLOGY is an introductory entomology course meant to provide a basic framework for the study of the biology, importance, and identification of insects.

Insects, with their incredible variety of form and function, not only make up a huge majority of all living things, they also affect the remainder of Earth's biodiversity through their economic, medical and ecological importance. The framework for this course will be an overview of the structure and diversity of insects in an evolutionary context. That framework will be used to illustrate general themes in insect biology, and to introduce the orders and most important families of insects. Lectures provide an evolutionary perspective on the basic taxonomy, habits, morphology, habitats, and life history strategies of insects, as well as the many ways in which insects are studied. The labs are a practical introduction to insect identification. Students will learn to recognize the most significant taxa and will gain hands-on experience with the tools used to identify insects. Usage of dichotomous keys will be emphasized, and students will use keys to identify insects provided in study sets as well as specimens they have collected themselves during the term.

## Specific Learning Outcomes:

This course is a general introduction to the discipline of entomology, with an emphasis on insect diversity. Through the study of the basic taxonomy, habits, morphology, habitats, and life history strategies of insects through an evolutionary perspective, students will be expected to attain some fluency in the language of entomology, showing an understanding of basic insect structures & physiology along with recognizing the overall diversity of Insecta. They will learn to extrapolate from general patterns of life history and behavior to specific predictions about the biology of insects encountered in terrestrial and freshwater environments. Students will be introduced to the many ways that scientists study insects, including some of the people who have contributed to our understanding of insect diversity, evolution, and natural history. The laboratories will work synergistically with the lectures to reinforce recognition of important taxa (orders, families) and enable students to identify other taxa using dichotomous keys. Students will learn how to collect insects, and how to properly prepare and maintain insect specimens for scientific study. In both the lecture and the laboratory the emphasis will be on the attainment of practical skills needed by researchers, teachers, naturalists, and field biologists in a variety of related disciplines.

## Lecture Content:

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| DATE | Lecture | Content |
| 9-Jan | 1 | The Little Things that Run the World: Diversity, basic morphology, terminology, and an introduction to the Arthropoda (Assigned Reading: Chapter 13 – Non-insect Arthropods) |
| 11-Jan | 2 | Six legs are better than 10: Introduction to Hexapoda, higher classification of Insects and phylogenetic theory (Assigned Reading: Preface and Introduction; Chapter 1 – The Wingless Insects) |
| 16-Jan | 3 | Up In the Air: Dragonflies (Odonata) and Mayflies (Ephemeroptera) (Assigned Reading: Chapter 2 – Mayflies, Dragonflies, and Damselflies) |

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| 18-Jan | 4 | Know when to fold 'em: The Neoptera (Stoneflies (Plecoptera) and orthopteroids) (Assigned Reading: Chapter 3 – Stoneflies; Chapter 4 – Cockroaches, Termites, Mantids and other Orthopteroids) |
| 23-Jan | 5 | Singing in the Rain: The Orthoptera (grasshoppers, katydids, crickets) plus Eating Insects (Entomophagy) (Assigned Reading: Chapter 4 – Grasshoppers, Crickets and Katydids) |
| 25-Jan | 6 | Fringe: The Thrips (Thysanoptera) and True Bugs (Hemiptera) (Assigned Reading: Chapter 6 – True Bugs and Other Hemipteroids) |
| 30-Jan | 7 | This Lecture Sucks: The Heteroptera (Hemiptera continued) (Assigned Reading: Chapter 6) |
| 1-Feb | 8 | Nitpicking: The Lice (Psocodea) plus Scientific Illustration for the 21st Century (Assigned Reading: Chapter 6) |
| 6-Feb | 9 | The Metamorphosis: The Holometabola and parasitic wasps (Hymenoptera) (Assigned Reading: Chapter 12 – Sawflies, Wasps, Bees, and Ants) |
| 8-Feb | 10 | The Sting: The bees and wasps (Hymenoptera continued) (Assigned Reading: Chapter 12) |
| 13-Feb | 11 | The Social Network: The ants (Hymenoptera) and the nerve-winged insects (Neuropteroidea) (Assigned Reading: Chapter 12; Chapter 9 – Lacewings, Antlions, Fishflies, and Related Insects) |
| 15-Feb | 12 | Mid Term (in class) – Long & short answer questions on the biology, evolution, natural history of insects, and their study & significance to humans. |
|  |  | Reading Week |
| 27-Feb | 13 | Twisted Sister Groups: The Strepsiptera and Beetles (Adephaga and lower beetles) (Assigned Reading: Chapter 10 – Beetles) |
| 1-Mar | 14 | The Beetles Second Lecture: The Rove beetles (Staphylinoidea) to click beetles (Elateroidea) (Assigned Reading: Chapter 10) |
| 6-Mar | 15 | The White Lecture: The Lady beetles (Coccinelloidea), darkling beetles (Tenebrionoidea), and checkered beetles (Cleroidea) (Assigned Reading: Chapter 10) |
| 8-Mar | 16 | Let it Beetle: The Flat bark beetles (Cucujoidea), leaf beetles (Chrysomeloidea) and weevils (Curculionoidea) (Assigned Reading: Chapter 10) |
| 13-  Mar | 17 | Scrapers, Shredders, and Collectors: The caddisflies (Trichoptera) (Assigned Reading: Chapter 8 – Caddisflies) |
| 15-  Mar | 18 | The Butterfly Effect: The Micromoths to Butterflies (Lepidoptera) (Assigned Reading: Chapter 7 – Butterflies and Moths) |
| 20-  Mar | 19 | A Sense of Scales: The Macromoths (Lepidoptera continued) (Assigned Reading: Chapter 7) |
| 22-  Mar | 20 | From the Permian to the Plague: The Scorpionflies (Mecoptera), Fleas (Siphonaptera), and Flies (Diptera) (Assigned Reading: Chapter 11 – Flies Scorpionflies and Fleas) |
| 27-  Mar | 21 | Death on Two Wings: The biting Nematoceran flies (Diptera continued) (Assigned Reading: Chapter 11) |
| 29-  Mar | 22 | Robber, Dancer, Soldier, Fly: The Orthorrhapha, dance flies (Empidoidea) and the Platypezoidea (Diptera continued) (Assigned Reading: Chapter 11) |
| 3-Apr | 23 | Scar Face: The Schizophora (Diptera continued) (Assigned Reading: Chapter 11) |
| 5-Apr | 24 | Bats, Bots, and Bodies: The Calyptratae (Diptera continued) and course wrap-up (Assigned Reading: Chapter 11) |

**Labs:**

Each lab will focus on the identification of a different group of insects. Dichotomous keys will be used to identify insects and teach the morphological characters necessary to recognize the assigned taxa. Please note that students will not have access to keys during Lab Tests, and will be required to learn how to distinguish insect orders and families with only a microscope.

Students will also have time to work on their Insect Collection assignment during lab hours, including instruction on collecting, pinning, labeling, and preparing an insect collection, and the identification of all families of insects that they may encounter in the process. Students should be prepared to bring their textbook with them to every lab to reinforce the lab exercises, and to use the identification keys contained within it for their Insect Collection.

Lab Schedule:

Lab 1 (January 9): University of Guelph Insect Collection Tour & Introduction to Insect Orders: Winged Adults

Lab 2 (January 16): How to Collect & Preserve Insects & Introduction to Insect Orders: Wingless Adults and Immature Forms

Lab 3 (January 23): Lab Test 1 & Introduction to Orthoptera

Lab 4 (January 30): Introduction to Hemiptera (note: you should be familiar with taxa in both the "Homoptera" & "Hemiptera" study boxes)

Lab 5 (February 6): Lab Test 2 & Introduction to Hymenoptera

Lab 6 (February 13): Insect Collection Preview Due & Introduction to Coleoptera 1 Reading Week

Lab 7 (February 27): Introduction to Coleoptera 2

Lab 8 (March 6): Lab Test 3 & Introduction to Lepidoptera Lab 9 (March 13): Introduction to Diptera 1

Lab 10 (March 20): Introduction to Diptera 2 Lab 11 (March 27): Lab Test 4

Lab 12 (April 3): Final Insect Collection Assignment Due

Lab Tests will be timed bell-ringer tests, primarily testing the identification skills of the student, but with some short answer questions that draw from lecture and textbook material. Students will be asked to identify insect specimens to the taxonomic level they have been taught in preceding labs (Order and/or Family). The correct spelling of taxonomic names is a vital component of this assessment. All Lab Tests are cumulative, but there will be a greater focus on material learned since the prior test.

Lab Test 1 will test the student's familiarity with the identification and Natural History of Insect Orders.

Lab Test 2 will test the student's familiarity with the identification and Natural History of Orthoptera and Hemiptera (including both "Homoptera" and "Hemiptera" study boxes) in addition to the material tested in Lab Test 1.

Lab Test 3 will test the student's familiarity with the identification and Natural History of Hymenoptera and Coleoptera in addition to the material tested in Lab Tests 1 & 2.

Lab Test 4 will test the student's familiarity with the identification and Natural History of Lepidoptera and Diptera in addition to the material tested in Lab Tests 1, 2, & 3.

## Seminars:

Not Applicable

## Course Assignments and Tests:

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| **Assignment or Test** | **Due Date** | **Contribution to Final Mark (%)** | **Learning Outcomes Assessed** |
| Lab Test 1 | January 23th | 5 | Nomenclature, identification of common insect families, and association of relevant natural history information |
| Lab Test 2 | February 6h | 10 |
| Lab Test 3 | March 6th | 10 |
| Lab Test 4 | March 27th | 15 |
| Insect Collection Preview | February 13th | 3 | Experience in collecting, preparing, and identifying Ontario insects |
| Full Insect Collection | April 3rd | 12 |
| Mid Term Exam (in class) | February 15th | 20 | Familiarity with the classification, diversity, and natural history of insects |
| Final Exam (location TBA) | April 10th  (8:30-10:30am) | 25 |

**Additional Notes (if required): N/A**

**Final examination date and time:**

8:30-10:30am, Tuesday, April 10, 2018. Room: TBA. Please check WebAdvisor for updated exam time, date and location.

## Final exam weighting:

25%

# Course Resources

## Required Texts:

Insects: Their Natural History and Diversity — S.A. Marshall. Firefly Books (2007 or 2017). (ISBN 1552979008). One copy available in the library (QL473 .M33 2006).

## Recommended Texts:

Evolution of the Insects – D. Grimaldi and M.S. Engel (2005) (ISBN 0521821495). One copy available in the library (QL 468.7 .G75).

Borror and DeLong’s Introduction to the Study of Insects, 7th Ed. – C.A. Triplehorn, N.F. Johnson,

and D.J. Borror (2005)(ISBN 0030968356). One copy is available in the library (QL 463 .B69 2004).

## Lab Manual:

Refer to the Insect Picture Keys in the required textbook (Marshall 2007/2017), as well as the assigned readings associated from lectures for additional information on natural history, evolution, and biology.

## Other Resources:

CourseLink:

Although the textbook is current and followed closely, the CourseLink site provides a useful forum for updates, interesting links and post-lecture addenda, as well as a convenient repository for general information about the course. Please note: Students must use their University of Guelph central login ID (e-mail account) and password to log on to CourseLink. If you forget your password, contact Computing and Communication Services.

## Field Trips:

Not Applicable.

## Additional Costs:

Not Applicable.

# Course Policies

Missed lab tests and midterm exams: While lab tests and midterms are the primary means by which we evaluate and assign grades, they are more importantly a means for you to evaluate how you are interpreting and synthesizing the material, concepts, and techniques that you have chosen to learn about by enrolling in this course. With that in mind, it is important that you make every effort throughout the semester to take lab tests and midterms. However, if for any reason you are unable to complete a test or midterm, please contact the instructor or your program counsellor and alternate arrangements will be made to assign the weighting of missed assessments to the final lab test and/or exam. Alternate or make-up tests and exams will not be available.

Late assignments: Insect Collections must be submitted during your scheduled lab period on the due date. Late submissions will be accepted up until 4 pm on the Friday immediately following the due date, but will incur a 30% penalty. Failure to submit the assignment by that time will result in a zero grade for the assignment unless extenuating circumstances are properly documented by your program counsellor.

## Course Policy on Group Work:

While there is no assigned group work for this course, it is recommended that you work in pairs or groups when collecting insects, particularly if you will be visiting localities that can be dangerous in the winter (e.g. cold streams, frozen ponds, etc.). Some sharing of specimens is allowed, but label data for every specimen must reflect the actual collector, and penalties will be applied if a student's collection is more than 50% material they did not collect. Purchasing insect specimens, either online or from past students, and/or falsifying information on the labels of your insect collection will result in a mark of zero for the assignment. Data falsification is an example of academic misconduct, and will be treated as such per Section VIII of the Undergraduate Calendar.

## Course Policy regarding use of electronic devices and recording of lectures:

You are welcome to use electronic devices during lecture and labs, including photographing specimens during lab for later review, granted they do not pose a distraction to neighboring students. Electronic devices are not to be used during lab tests or exams. If you wish to record lectures or lab introductions (either audio or video), please ask the instructor or lab supervisor prior to doing so. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

# University Policies

## Academic Consideration:

The University of Guelph is committed to supporting students in their learning experiences and responding to their individual needs and is aware that a variety of situations or events beyond the student's control may affect academic performance. Support is provided to accommodate academic needs in the face of personal difficulties or unforeseen events in the form of Academic Consideration.

Information on regulations and procedures for Academic Consideration, Appeals and Petitions, including categories, grounds, timelines and appeals can be found in Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar.

## Academic Misconduct:

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Detailed information regarding the Academic Misconduct policy is available in Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar.

## Accessibility:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS), formerly Centre for Students with Disabilities (CSD), as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or em[ail sas@uoguelph.ca](mailto:sas@uoguelph.ca) or visit the Student Accessibility Services website ([http://www.uoguelph.ca/csd/).](http://www.uoguelph.ca/csd/))

## Course Evaluation Information:

End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions used as an important component in the Faculty Tenure and Promotion process, and as valuable feedback to help instructors enhance the quality of their teaching effectiveness and course delivery.

While many course evaluations are conducted in class others are now conducted online. Please refer to the Course and Instructor Evaluation Website for more information.

## Drop period:

The drop period for single semester courses starts at the beginning of the add period and extends to the Fortieth (40th) class day of the current semester (the last date to drop a single semester courses without academic penalty) which is listed in Section III (Schedule of Dates) of the Undergraduate Calendar.

The drop period for two semester courses starts at the beginning of the add period in the first semester and extends to the last day of the add period in the second semester.

Information about Dropping Courses can be found in Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar.