Acadia Biology Department

Entomology

BIOL 3193

Part 1: Course Information

Instructor Information

Instructor: N. Kirk Hillier
Office: Biology Building 104
Office Hours: Monday, Wednesday, 10:30-11:30; Thursday 9:00-10:00,
by appointment only
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Teaching Assistants:
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Course Description

This course is an introduction to the structure, function, evolution and taxonomy of the insect, the most diverse and abundant group of animals. Topics also include the ecology, behaviour, and impact of these animals. A collection of insects gathered on field trips during regularly scheduled laboratories and independently is required.

Prerequisite

Prereq: Biol 2073 with a minimum of C-

Textbook & Course Materials

Required Text

Marshall, S.A. Insects: Their Natural History and Diversity.2nd Edition. 2017. Firefly books.

Ordered for the University Bookstore. Used and older (2006) editions of this textbook may be available at a reduced cost (i.e. Amazon, AbeBooks, etc.) and are also appropriate. Other entomology texts may be useful alternatives, however, note that identifications will be made during the laboratory component using this text as a guide.

Recommended: Insect Field Guide of your Choice. Many students also find insect field guides useful tools for this course. It is recommended to double-check any taxonomic determination from a field guide with the proper keys found in the class text.

Course Requirements

- Access to course MOODLE page
- Vaughn Memorial Library's Biology LibGuide

Course Structure

Lecture material will be presented in 50min lecture slots.

Lectures will take place **M, W, & F** in **Huggins room 16 @ 11:30AM - 12:20PM**

Labs will take place in NBB220. Specific information on lab schedule and requirements are in PART 3 below.

****Labs will begin the week of Sept 13th, 2024****

Student Learning Outcomes

This course will expose you to concepts in insect ecology and taxonomy. We will cover the material listed below in the approximate number of lectures listed.

- Fundamental knowledge of insect biodiversity and taxonomy
- An understanding of the anatomy, physiology, behavior and life histories of insects
- Skill in basic collection, curation and identification of insects
- Appreciation of impact of insect-humans interactions on the environment and ecosystems broadly.

You will meet the objectives listed above through a combination of the following activities in this course:

- Attend lectures on a regular basis, take notes, and ask for clarification when something is unclear
- Study on a regular basis
- Evaluation will be via a midterm exam, term project, and one final exam, as well as an insect collection (lab component)

Part 3: Topic Outline/Schedule (Lecture - Tentative)

Lectures:*	
4-Sep	Introduction, History of Entomology - Syllabus and brief course outline
6-Sep	Arthropods
9-Sep	Importance and biodiversity of insects
11-Sep	Anatomy, structure and development in insects (I)
13-Sep	Anatomy, structure and development in insects (II)
16-Sep	Anatomy, structure and development in insects (III)
18-Sep	Anatomy, structure and development in insects (IV)
20-Sep	Classification of insects (Hemimetabolous and Holometabolous orders) **DEADLINE TO FINALIZE FAR SIDE TOPICS**
23-Sep	Endognathous Apterygota: Collembola; Protura; Diplura
25-Sep	Ectognathous Apterygota: Microcoryphia; Marine insects; Thysanura
27-Sep	Paleopterous insects: Odonata; Ephemeroptera; Swarming behaviour
30-Sept	**Truth and Reconciliation Day – No class**
2-Oct	Neopterous insects: Exopterygotes and Endopterygotes
4-Oct	Orthopteroid Orders
7-Oct	Order Blattodea; Mantodea; and Isoptera
9-Oct	*Diversion 1: Insect Sociality: Isoptera vs. Hymenoptera*
11-Oct	*Social Insects continued*
14-Oct	**Fall Study Break (Oct 14-18)**
21-Oct	*No Class*
23-Oct	Guest lecture (pending)
25-Oct	**Midterm exam**
28-Oct	*Diversion 2: Insect communication and behaviour*
30-Oct	Order Orthoptera; Zoraptera; Grylloblattodea; Insects at low temperatures and cold adaptations
1-Nov	"Queen of Trees" – Insect Interactions
4-Nov	Dermaptera; Introduced insects – worldwide travellers
6-Nov	Phasmatodea; Embioptera; Plecoptera
8-Nov	Hemipteroid orders: Pscoptera; Phthiraptera; Hemiptera
11-Nov	**Remembrance Day**
13-Nov	*Diversion 3: Insect Relationships, Insect Defences*
14-Nov	Thysanoptera; Aphid Life histories
16-Nov	*Diversion 4: Insect Reproduction*
18-Nov	Endopterygota: Megaloptera, Raphidioptera, Neuroptera
20-Nov	Coleoptera; Strepsiptera; Siphonaptera
22-Nov	Diptera; Trichoptera
25-Nov	Lepidoptera; Hymenoptera
27-Nov	Insects and Human Society: Pests, Beneficials and Pest Control, Applied entomology
29-Nov	Insects and Human Society: Medical and Veterinary
2-Dec	Insects and Human Society: Forensic Entomology
4-Dec	**Spare Class**

*Guest lectures may substitute for selected topics coverage at points during the term, or content may be shifted.

All Lecture Sets will be available on ACORN – Note that powerpoint slides on ACORN do not contain all course content as presented in class. **The instructor reserves the right to amend the above course plan with reasonable notice.**

Part 3: Topic Outline/Schedule (Lab)

Laboratory outline for Fall Session*

Date	*Lab Week*	*Topic*
Sept. 6	0	Equipment pick-up and brief orientation
Sept. 13	1	Field Trip 1: Irving Woodland Trail
Sept. 20	2	Field Trip 2: Wolfville Dykes and Rail Trail
Sept. 27	3	Field Trip 3: Cape Split or Kentville Ravine
Oct. 4	4	Field Trip 4: Oberland Agrisciences (Halifax)
Oct. 11	5	Introduction to pinning - Museum visit
Oct. 18	6	**Fall Break – No Labs**
Oct. 25	7	Identification strategies, pinning time
Nov. 1	8	Identification and pinning – Seminars (6 slots)
Nov. 8	9	Identification and pinning – Seminars (6 slots); **iNat submissions due today**
Nov. 15	10	Identification and pinning – Seminars (6 slots)
Nov. 22	11	Identification and pinning – Seminars (6 slots)
Nov. 29	12	Insect Collections **Due by 13:00** (i.e. 1:00 pm)

* All field trips are weather-permitting, and sequence may be changed. These also depend on COIVD-19 stipulations for student transit which may limit off-site activities. Students should be prepared for cold or wet weather, if necessary, and rubber boots will be an asset for aquatic sampling or travelling in boggy conditions. We may cancel field trips if the weather is extremely bad, and opt for identification and pinning in the lab on these days. **Students will need to be actively collecting and curating outside the lab hours, and as early as possible in the semester** (as the semester progresses and cold weather settles in, it will become more difficult to obtain the required diversity for your collection).

Laboratory Guidelines

I hope that your laboratory experience in BIOL3193 (Entomology) proves to be educational, rewarding and fun! To help you settle into the routine in the teaching lab (BIO 109) here are a few guidelines:

Things you need to bring with you to each lab:

- your lab manual
- a permanent marker pen for writing on plastic bags and vials
- a pencil (a fine-tipped mechanical one is the best) for writing in notebooks
- a lab notebook to cross-reference your specimens and keep notes organized
- appropriate clothing during field trips

Lab safety:

- do not eat or drink anything (except water) in the lab (we just do not know the cleanliness of the lab benches)
- avoid touching any part of your face during labs
- report any spills or other problems to one of us
- wash your hands at the start of every lab session
- clean your bench at the start of the lab period (especially if there are suspicious spills from the last users of the bench)
- dispose of contaminated material appropriately
- clean your bench (with water and soap if necessary) when you are finished
- wash your hands before you leave (or if you leave partway through a lab)

Care of microscopes:

- when you are finished with the dissecting microscopes:
- clean the stage (with water if necessary)
- turn off all lamps
- set objective wheel to the lowest power

Ethics:

- treat all living animals with respect; there is a difference between killing a mosquito that is biting your arm and allowing a grasshopper to die of dehydration because you imprisoned it in a vial and forgot about it for a week
- if you are required to kill insects for the purposes of establishing a collection (as with this course), then freeze them at -20 C for a minimum of 48 hours in a vial or bag
- a second option for killing insects will be the killing jars available from the lab.
- make sure that your insect is dead before pinning them! Many a collection has been destroyed by a rampaging skewered Carabid beetle which was

removed from the freezer too soon (Plus, it's very disturbing to see legs moving when grading student collections).

Insect Collection

The following equipment will be made available for students to make an insect collection:

- Specimen box
- Insect pins
- Killing bottle and ethyl acetate killing agent
- Paper points for pinning small specimens

Pinning block for spacing insects and labels on pins
Insect net (aerial and aquatic are available)
Vials and alcohol
Pre-printed labels
Microscope Slides (if necessary)

Insect Collection – Evaluation

Element	**Value**
Diversity:	3
Minimum representation: 60 pinned specimens; 60 species; 6 different orders	
Identification:	
Minimum 60 species each correctly identified to family	30
Presentation:	
Pinning technique, Labelling (incorrect or dishonest labelling will be penalized)	4
Presentation and arrangement	3
Total	**40**

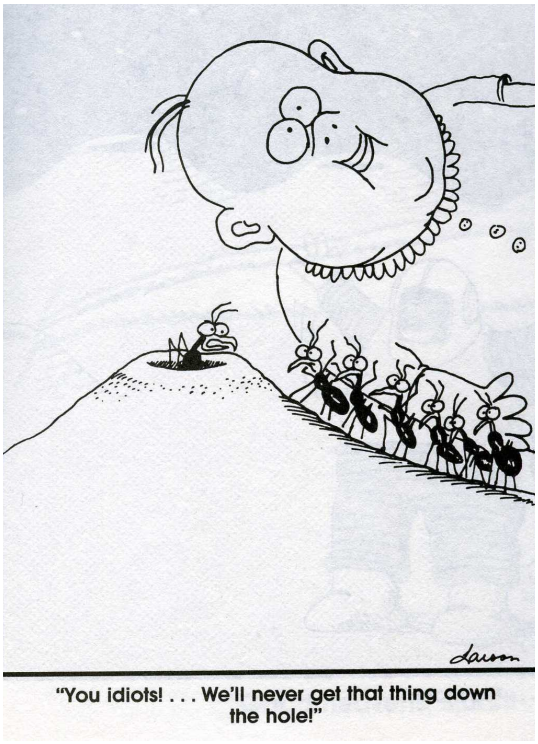
Note: A collection with obviously mislabelled (locality and date) specimens will not be accepted. If there is doubt regarding collection data, it is better to leave the specimen unlabelled. Mislabelling is scientific fraud and has caused problems for scientific research. Labels for most localities from which a significant number of specimens have been collected may be prepared by computer using templates posted on ACORN.

Students may use **SOME** insects collected by friends, family, intra-class trades, etc (these sometimes are the coolest things you can find!) – these **must be labelled** to indicate the correct collector. Because this privilege has been abused in the past,

students may have a **maximum of 5 such specimens in their collection**. If students which to include more than 5 specimens collected by others, then they must collect **additional insects** as the primary collector to make up the difference. If you have questions, please ask the instructor or TA.

Note: The use of animals in teaching and research at Acadia University is done in accordance with guidelines on the care and use of animals published by the Canadian Council on Animal Care (CCAC). For more information on the CCAC, please visit their website at http://www.ccac.ca/ .

Term Project – A Trip to *"the Far Side"* of Entomology



A key objective of this course is to outline the importance of insects and their relevance to human activities. Gary Larson's popular cartoon strip "The Far Side" has, for many years, provided a variety of examples of anthropomorphized insect and arthropod cartoons. Despite the entertaining and comical nature of these cartoons, there is often a strong scientific basis for each. For this project, students will investigate the entomological basis of an insect-related Far Side cartoon. Topics can be flexible, as long as they integrate your cartoon, and are focused on an entomology-based theme.

After selecting their theme, students **MUST** provide a one-page outline of their suggested topic with the professor to determine if it is appropriate for

this exercise along with an annotated bibliography including 5 references from primary scientific sources (**Required on Sept 20th**).

Students will present their research as a seminar during later laboratory periods.

Part 4: Grading Policy

Graded Course Activities

Points	Description
Midterm (15%)	1 midterm: 15%, 25 Oct.
Term project (10%)	Seminar: 10%, during last 4 lab slots
Lab (40%) Insect Collection	See section 3 for requirements and evaluation; Due Nov 29th.
iNaturalist submissions (5%)	10 submissions with correct minimum family level IDs for full marks; Due Nov 8th.
Final Exam (30%)	Cumulative from lecture material only
100	**Total Points Possible**

Make-up tests for either absence, or poor performance, will not be provided as an option. In the event that you have a *valid* excuse for missing either of the midterms, the weight from the missed midterm(s) will automatically be distributed across all four tests. Missed midterms without a valid excuse from the registrar will result in a mark of zero. University policies on missing classes, etc. can be found here:

https://registrar.acadiau.ca/RecordsandOtherRequests.html

Part 5: Course Policies

Attend Class (Lectures)

Students are expected to attend all class sessions as listed above.
Unwarranted Cell phone use during lectures will result in you being asked to leave the class.

Part 6: University Policies

University policies are available in the Acadia University Academic Calendar or through the Registrar's website:

https://registrar.acadiau.ca/welcometotheregistrarsoffice.html

Equity, Diversity and Inclusion

Acadia University is committed to becoming a culturally safe and anti-oppressive community. This can only be achieved where there are simultaneous efforts to eliminate all forms of discrimination and harassment from our campus community, including the elimination of all discrimination, harassment and violence based on one's identity, including but not limited to, gender, race, class, ethnicity, sexual orientation, disability, gender identity, gender expression, and Indigeneity.

The Equity, Diversity and Inclusion Officer is available to **students, staff, and faculty**. The fundamental objective of the Equity Office is to **prevent discrimination, sexual harassment, and personal harassment** from occurring, in part by managing Acadia's Policy Against Harassment and Discrimination. For more information, as well as for resources for students who believe they may have experienced or witnessed discrimination, sexual harassment, or personal harassment please contact Acadia's Equity, Diversity and Inclusion Officer, Polly Leonard, MSW, RSW (she/her/hers) at equity@ACADIAU.CA, and check out the website.

Last Drop Day

Last day to drop a course and receive a "W". Please check the Acadia University calendar dates, which are available here:
https://registrar.acadiau.ca/AcademicCalendars.html

Inform Your Instructor of Accommodations
If you are a student with documentation for accommodations or if you anticipate needing supports or accommodations, please contact Ian Ford, Accessibility Resource Facilitator at 902-585-1520, disability.access@acadiau.ca or Marissa McIsaac, Manager, disability.access@acadiau.ca. Accessible Learning Services is located in Rhodes Hall, rooms 111-115

https://www2.acadiau.ca/student-life/accessiblelearning.html

Commitment to Integrity

Cheating in the lecture and/or lab, including plagiarism, will not be tolerated. Please read the appropriate sections of the current Acadia University Academic Calendar https://registrar.acadiau.ca/AcademicCalendars.html
If caught cheating you will automatically receive a grade of zero on the quiz/assignment/exam, and your name will be submitted to the registrar. If this is not the first occurrence you will either receive a mark of zero for the course (2nd occurrence) or be expelled from the University (3rd occurrence).
Information on copy-write and course content from Acadia University is available through the Vaughan Memorial Library:

http://libguides.acadiau.ca/c.php?g=433650&p=5027078

The spoken and written course content (including the syllabus, handouts, lectures, presentations, labs, assignments, quizzes, tests, and exams) are the intellectual property of the instructor and may only be copied for personal use. Sharing these materials or uploading them where they may be accessed by others is a violation of copyright. If you wish to make audio, video, or photographic recordings in class, you must first obtain the consent of the instructor and of any other persons (e.g. guest speakers, other students) who may be captured in such recordings. In the case of personal use by students with disabilities, the instructor's consent shall not be unreasonably withheld. Students with disabilities who wish to request accommodation should contact Accessible Learning.

Appendix 1: Learning Outcomes

The Biology Department maps Program Learning Outcomes (PLOs) in each course throughout our program in order to identify where learners develop *Discipline Knowledge*, *Lab and Field Skills*, and *Transferable Skills*, and to align content and skills across courses. PLOs are primarily Introduced or Reinforced in this course. The table below only includes Sub-outcomes for BIOL 3193; as you take other courses, you will see additional Sub-outcomes, depending on course material.

Program Level Outcomes	**Sub-outcomes**	
Scientific Method & Inquiry	Scientific Method	reinforced
	Historical Concepts	reinforced
	Contributions by Historical Figures	introduced
	Discovery-based	reinforced
	Applied Science	reinforced
Biodiversity, Ecology & Evolution	Ecology	reinforced
	Biodiversity	reinforced
	Minas Basin and SW Nova ecosystems	reinforced
	Taxonomy	reinforced
Cells, Tissues & Evolution	Metabolism	
	Form and Function	reinforced
	Cellular Communication	introduced
	Development	introduced
Molecules, Genetics & Evolution	Phenotype and Environment	introduced
Human & Environmental Health	Environmental/Social Awareness	reinforced
	Human Health and Disease	reinforced
	Environmental Health	reinforced
Ethics & Interdisciplinary Perspectives	Interdisciplinary Perspectives/synthesis	introduced
Lab/Field Skills	Sample Preparation and Preservation	reinforced
	Museum/Herbarium	reinforced
	Observation	reinforced
Field Skills	Identification	reinforced
	Observation	reinforced
Experimental Design	Sampling	reinforced
	Observational Studies	reinforced
Professionalism	respect/professionalism	reinforced
Academic Integrity	Academic Integrity and Accountability	reinforced
	Critical Thinking	reinforced
	Engage in classroom discussion	reinforced
Scientific Communication	Scientific Writing/Referencing	reinforced
	Seminars/Presentations	reinforced