

BIOL 365: Insect Diversity and Evolution

MWF 10:30-11:20 am, Geology Room 165
University of Saskatchewan

Lecture:
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Office hours: MW 11:30-12:15 pm, or by appointment

Term	Fall 2023	Credits	3
Delivery	In-Person Lecture & Lab	Start Date	September 6, 2023
Class Location	Rm. 165, Geology	Lab Location	Rm. G11, Thorvaldson
Class Time	MWF 10:30-11:20	Lab Time	T 1:30-5:20

Catalogue Description

Surveys insects and their close relatives based on morphology and taxonomy. Focuses on insect natural history, comparative anatomy and classification. Representative types examined in the laboratory provide an understanding of current trends in insect taxonomy and phylogeny.

Prerequisite(s):

BIOL 120.3 and 121.3, plus 3 additional credit units of senior BIOL courses; or permission of the instructor.

Land Acknowledgement

We acknowledge that Saskatoon and the University of Saskatchewan resides on Treaty Six Territory which encompasses the traditional lands of the Cree, Dakota, Saulteaux, and the Homeland of the Métis. We pay our respects to the First Nation and Métis ancestors and are dedicated to ensuring the spirit of Reconciliation is honored and respected. This acknowledgement also reaffirms our relationship with one another, and we are committed to move forward in partnership with Indigenous Nations in the spirit of reconciliation and collaboration. During your studies you will spend time learning in other traditional territories and Métis homelands. We wish you safe and productive encounters in these spaces and that as you gather to learn, you respect the land and its knowledge.

Learning Outcomes

By the completion of this course, students will be expected to:

- Be familiar with the general diversity of insects and the diversity of western Canada.
- Be able to confidently recognize and identify insects to their proper taxonomic order, and have developed proficiency to identify insects to family (or lower) level using appropriate taxonomic keys.
- To understand the fundamental drivers of insect evolution
- Have acquired the skills necessary for the capture, preservation, identification, and presentation of insects into an organized collection.
- Learn to work efficiently both as individuals and within group settings.

Note: The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors and the institution. A copy of the Learning Charter can be found at: <https://teaching.usask.ca/about/policies/learning-charter.php>

Course Overview

This course consists of three 50-minute lectures per week, plus a lab session on Tuesdays. Weather permitting, the first two lab sessions will be local field trips to help in specimen collection. All further lab time will be spent on identifying and organizing your collections. The course in general is an introduction to the diversity of insects and the main drivers of insect diversity and evolution. It will lay a solid foundation for students interested in continued learning about insect ecology and diversity. We are faced with a massive decline in insect biomass and diversity, so my hope is to instill in you a love for insects and their biodiversity. I am excited to teach this course as for me this course is what inspired me to continue my education. This is my first year teaching this course and I am hopeful that my passion for insects is passed on to you.

Tentative Class Schedule

Date	Topics
September 6-11	Introduction and Course objectives; General body plan of an adult insect; The three body regions (head, thorax, abdomen) and their significant parts; Stages of an insect's life cycle; Metamorphosis – simple (ametabolous, hemimetabolous, paurometabolous) versus complete (holometabolous); Types of larvae and pupae; Life-cycle strategies – oviparity and some variations (viviparity, polyembryony, parthenogenesis) of insect

	reproduction; Regulation of moulting during growth of immatures to adults.
September 13- 18 <u>ID Quiz 1: Sept 18</u>	Evolutionary relationships: Arthropod and Insect Classification; Insecta and non-insect relatives. Geological history and insect evolution. Hexapod relationships and Near Insects (Collembola, Diplura, Protura). Apterygota – Orders Zygentoma, Microcoryphia; Evolution of Wings; Introduction to Pterygota and Paleoptera – Orders Ephemeroptera, Odonata; An aquatic orthopteroid order – Plecoptera.
September 20 - 27	Introduction to Polyneoptera: Remaining Orthopteroid orders – Orthoptera, Phasmatodea, Mantodea, Mantophasmatodea, Grylloblattodea, Dermaptera, Blattodea, Isoptera (including introduction to insect sociality), Zoraptera, Embioptera.
October 2-13 <u>ID Quiz 2: Oct 13</u>	Introduction to Paraneoptera – Hemipteroid orders: Hemiptera (including disease transmission to plants, animals), Psocoptera, Phthiraptera, Thysanoptera.
October 16- 27 <u>Midterm Exam on October 25</u>	Introduction to Oligoneoptera – Mecopteroid orders: Mecoptera, Lepidoptera (including silk production, role in pollination), Diptera (including importance of biting flies; degradation of organic matter), Siphonaptera.
October 30-November 3	Remaining Mecopteroid order – Trichoptera; Neuropteroid orders – Neuroptera, Megaloptera, Raphidioptera.
November 13-20 <u>Fossil ID Essay: Due Nov 20</u>	Remaining Neuropteroid orders-Coleoptera and Strepsiptera
November 22-December 8 <u>ID Quiz 3: Dec 6</u>	Hymenopteroid Order- Hymenoptera (including importance in biological control; role of bees in pollination, honey production; ants and seed dispersal); Brief review and discussion of format of Final Exam.

Lab Schedule

Date	Topic and Details
September 12	Local Field Trip on UofS campus

September 19	Possibly an extended field trip to an aquatic site (e.g., Eagle Creek, SK).
September 26-December 5	Further details about the lab schedule and the preparation of your insect collection will be provided in the laboratory sessions of this course, which take place on Tuesdays from 1:30-5:20pm in Thorvaldson Rm G11.
November 28	Laboratory Exam. Room location to be announced later in the term.

This class schedule provides an “at a glance” overview of the course. It includes a by-the-date list of topics to be discussed and has due dates for assignments and exams.

If Access and Equity Services (AES) is to provide exam accommodation, students will need to meet stated AES deadlines.

Midterm and Final Examination Scheduling

Final examinations may be scheduled at any time during the examination period December 9 2023-December 23 2023 students should therefore avoid making prior travel, employment, or other commitments for this period. If a student is unable to write an exam through no fault of their own for medical or other valid reasons, documentation must be provided and an opportunity to write the missed exam may be given. Students are encouraged to review all examination policies and procedures:

<http://students.usask.ca/academics/exams.php>

Length and Mode of Final Examination

The final exam will be a 3 hour in person exam consisting of multiple choice and short answer questions.

Required Resources

There is one required textbook which contains the dichotomous keys necessary to identify your collected insects to family level. This text is available from the U of S Bookstore:

Borror and DeLong’s Introduction to the Study of Insects (2004) 7th Edition (Thomson) by C.A. Triplehorn and N.F. Johnson

Additional texts have been placed on reserve, and are available in the Science Library:

Introduction to Insect Biology and Diversity (1998) 2nd Edition (Oxford) QL 463.D34 1998 by H.V. Daly, J.T. Doyen and A.H. Purcell

Entomology (2005) 3rd Edition (Springer) QL 463.G54 2005 by C. Gillott

Insects – Their Natural History and Diversity (2006) QL 473.M34 2006 by S.A. Marshall

Assessment Details

Assessment information provides learners with valuable details about the types of assessments they can expect to see in the course. Including formative assessments (those without marks that allow students to receive feedback and improve without penalty) can help put students at ease about their ability to do well in the course. Including formative assessment and timely feedback are both strongly supported by current assessment literature and the USask assessment principles. You may wish to include information explaining under what circumstances students may request extensions and what the process would be for such a request. If you choose to penalize students for late assignments, the penalty should be stated.

Grading Scheme

Assessments that will contribute to your final grade are:

Spot Identification Quizzes	10%
Fossil Identification Essay	5%
Midterm Exam	20%
Insect Collection	30%
Final Exam	25%
Laboratory Final Exam	10%
<u>Total</u>	100%

Evaluation Components

After distribution, a syllabus may only be changed if no student in the class objects to such changes and the department head, or dean in non-departmentalized colleges, is notified. Otherwise, methods, modes, and timing of assessment for all assignments and examinations must remain as stated in the syllabus: no major graded assignment or examination is to be newly assigned in a class and no changes to already set dates or the stated grade weighting of graded assignments or examinations is permitted. ([Academic Courses Policy on Class Delivery, Examinations, and Assessment of Student Learning](#), section 1.2. See the full section for information on emergency circumstances.)

Assignment 1: Spot Identification Quiz

Value: 10% of final grade split between 3 quizzes

Due Date: See Course Schedule

Type: Short answer responses

Description: Students will be given 10 images of insects and students will have to identify the order to which each insect belongs. Each quiz will be out of 10 marks.

Assignment 2: Fossil Identification Essay

Value: 5% of final grade

Due Date: November 20 2023

Type: Essay response

Description: Students will be given an unknown fossil along with coordinates to where the fossil was found. Students will then write a 1-3 page response identifying the insect and its life history.

Midterm Exam

Value: 20% of final grade

Date: See Course Schedule

Length: 50 mins

Type: Combination of short answers and paragraph-style answers

Description: Students are responsible for all lecture material up to the end of the Polyneoptera orders. This exam must be completed by students, individually. Note that no phones, laptops, or other electronic devices, nor written materials, are allowed to be consulted during the exam.

Final Exam

Value: 25% of final grade

Date: Consult the Final Exam Schedule, arranged by the Examinations Division. Students must avoid making prior travel, employment, or other commitments for this period. Students are encouraged to review all University examination policies and procedures:

<https://policies.usask.ca/policies/academic-affairs/academic-courses.php#7Examinations>

Length: 3 hours

Type: Combination of short answers and paragraph-style answers

Description: This exam is comprehensive in that it will cover all lecture material. However, material delivered since the Midterm Exam will be emphasized. This exam must be completed by students, individually. Note that no phones, laptops, or other electronic devices, nor written materials, are allowed to be consulted during the exam.

Laboratory Exam

Value: 10% of final course grade.

Date: During the laboratory period (1:30 – 5:20pm) on Tuesday, November 28, 2021.

Duration: If required, the entire lab period (4 hrs) on November 28th is available.

Room location TBA.

Format: This exam will consist of a selection of unidentified (about 8-12, mostly pinned) insects, which the student will attempt to key correctly to family level. Students will be evaluated according to the accuracy of their identifications of these unknowns.

Description: Each student will work independently to key out the unidentified insects presented. Note that in order to complete this exam, the course textbook is required by the student because s/he must record the path of the various couplets followed, to arrive at the selected family per exam specimen.

Student Collection of Insects

Value: 30% of final course grade.

Date/Time: Deadline for submission to Dr. D. Smith is Wednesday, December 5, 2023 by 4:00 p.m. NOTE: The time required to mark each collection of insects is relatively high, and this course has a large enrolment. For these reasons, in order to have final course grades submitted in a timely manner, it is not possible to grant an extension to this deadline. Insect collections submitted after the deadline indicated above, will not be graded. Thus, ensure that

you submit your insect collection (even if not entirely completed) to Dr. Smith by the deadline date/time shown above.

Format: Each student must independently prepare and submit an insect collection, with the goal to correctly identify a minimum of 50 insect families according to the established family names specified in the course's required textbook. The student will be evaluated on the basis of the accuracy of family identifications made, plus the quality of the preservation and presentation of the insects in one's collection, as well as the collection's overall organization.

Late Assignments

I will accept late assignments for only the Fossil ID Essay up to seven (7) days beyond the due date. The penalty for your delay is 10 percent per day of lateness from the value of the assignment. Extensions may be granted only in exceptional circumstances (illness or emergency).

Students absent from the Spot ID quizzes, Midterm Examination or the Laboratory Examination must contact the Course Coordinator, in person or by telephone, within three (3) working days of the date of the scheduled exam, to explain their absence and to initiate discussion concerning a possible deferred examination. Otherwise, a grade of zero will be assigned for the missed examination. Students absent from the Final Examination in December 2023 must contact the College in which they are enrolled, to apply for permission to write a Deferred Final Exam. If granted, an exam will be arranged to be written in mid-February 2024.

Criteria That Must Be Met to Pass

The Lecture Final Exam and the Student Collection of Insects are mandatory evaluative elements of this course, and therefore must be completed and submitted by each student, in order to be eligible to pass this course.

Attendance Expectations

Students are expected to attend lectures regularly throughout the term and are responsible for obtaining any missed notes from a classmate. Identification of the specimens in one's insect collection to family level is not as difficult compared to genus or even species levels. However, it still requires dedication to learn the body structures and their patterns within one's diverse specimens, as well as the manual operation of the textbook's dichotomous keys for the various orders of insects. For that reason, following the first 1-2 lab periods involving class trips for insect collection, each lab period throughout the entire term is a vital opportunity to continue progressing toward completion of one's collection for eventual submission. Weekly dedication to this task during labs will help reduce the need, or time required, for working on specimen identification outside of lab times. If you are unable to attend classes and the scheduled lab in person, for a period exceeding one week, please contact the Course Coordinator by email to make him aware.

Recording of the Course

Recording of the course will only be allowed in certain circumstances. Please see the instructor for information on how to receive approval.

Copyright

Course material created by your professors and instructors is their intellectual property and **cannot be shared without written permission**. This includes exams, PowerPoint/PDF lecture slides and other course notes. If materials are designated as open education resources (with a creative commons license) you can share and/or use them in alignment with the [CC license](#). Other copyright-protected materials created by textbook publishers and authors may be provided to you based on license terms and educational exceptions in the [Canadian Copyright Act](#).

You are responsible for ensuring that any copying or distribution of materials that you engage in is permitted by the University's "Use of Materials Protected By Copyright" Policy. For example, posting others' copyright-protected materials on the open internet is not permitted by this policy unless you have copyright permission or a license to do so. For more copyright information, please visit <https://library.usask.ca/copyright/students/index.php> or contact the University Copyright Coordinator at copyright.coordinator@usask.ca or 306-966-8817.

Student Feedback

You will be provided opportunities throughout the term to provide feedback about the course. This will include the use of the University administered course feedback system, SLEQ, both partway through the class and at the end of term, and less formal methods. I value this feedback and use it to modify and improve the course to best meet student learning needs. Please provide feedback promptly and I will try to adjust as necessary.

Academic Integrity

The University of Saskatchewan is committed to the highest standards of academic integrity. <https://academic-integrity.usask.ca/>

Students are urged to read the [Regulations on Academic Misconduct](#) and to avoid any behaviours that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence.

For help developing the skills for meeting academic integrity expectations, see: <https://academic-integrity.usask.ca/students.php>

Students are encouraged to ask their instructors for clarification on academic integrity requirements.

All students are encouraged to be aware of the rules for courses set out in the [Academic Courses Policy on Class Delivery, Examinations, and Assessment of Student Learning](#).

Artificial intelligence text generator tools (also known as large language models) are not permitted to be used in any assessments for this course. Any use of such tools will be considered academic misconduct in this course.

Students wanting to connect their assessment in this course to assessments they have completed in another course must get explicit permission of the instructor in order to avoid potential academic misconduct of self-plagiarism.

Access and Equity Services (AES) for Students

Access and Equity Services (AES) is available to provide support to students who require accommodations due to disability, family status, and religious observances.

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Access and Equity Services (AES) if they have not already done so. Students who suspect they may have disabilities should contact AES for advice and referrals at any time. Those students who are registered with AES with mental health disabilities and who anticipate that they may have responses to certain course materials or topics, should discuss course content with their instructors prior to course add / drop dates.

Students who require accommodations for pregnancy or substantial parental/family duties should contact AES to discuss their situations and potentially register with that office.

Students who require accommodations due to religious practices that prohibit the writing of exams on religious holidays should contact AES to self-declare and determine which accommodations are appropriate. In general, students who are unable to write an exam due to a religious conflict do not register with AES but instead submit an exam conflict form through their PAWS account to arrange accommodations.

Any student registered with AES, as well as those who require accommodations on religious grounds, may request alternative arrangements for mid-term and final examinations by submitting a request to AES by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by AES.

For more information or advice, visit <https://students.usask.ca/health/centres/access-equity-services.php>, or contact AES at 306-966-7273 (Voice/TTY 1-306-966-7276) or email aes@usask.ca.

Student Supports

Academic Help – University Library

Visit the [University Library](#) and [Learning Hub](#) to find supports for undergraduate and graduate students with first-year experience, study skills, learning strategies, research, writing, math and statistics. Students can attend [workshops](#), access [online resources and research guides](#), book [1-1 appointments](#) or hire a [subject tutor](#) through the [USask Tutoring Network](#)

Connect with library staff through the [AskUs](#) chat service or visit various [library locations](#) on campus.

Enrolled in an online course? Explore the [Online Learning Readiness Tutorial](#).

Teaching, Learning and Student Experience

Teaching, Learning and Student Experience (TLSE) provides developmental and support services and programs to students and the university community. For more information, see the students' website <http://students.usask.ca>.

College Supports

Students in Arts & Science are encouraged to contact the Undergraduate Student Office and/or the Trish Monture Centre for Success with any questions on how to choose a major; understand program requirements; choose courses; develop strategies to improve grades; understand university policies and procedures; overcome personal barriers; initiate pre-career inquiries; and identify career planning resources. Contact information is available at:

[\(http://artsandscience.usask.ca/undergraduate/advising/\)](http://artsandscience.usask.ca/undergraduate/advising/)

Financial Support

Any student who faces unexpected challenges securing their food or housing and believes this may affect their performance in the course is urged to contact Student Central

<https://students.usask.ca/student-central.php>.

Gordon Oakes Red Bear Student Centre

The Gordon Oakes Red Bear Student Centre) is dedicated to supporting Indigenous student academic and personal success. The Centre offers personal, social, cultural and some academic supports to Métis, First Nations, and Inuit students. The Centre is an intercultural gathering space that brings Indigenous and non-Indigenous students together to learn from, with and about one another in a respectful, inclusive, and safe environment. Visit

<https://students.usask.ca/indigenous/index.php> or students are encouraged to visit the ASC's website <https://students.usask.ca/indigenous/gorbosc.php>

International Student and Study Abroad Centre

The International Student and Study Abroad Centre (ISSAC) supports student success and facilitates international education experiences at USask and abroad. ISSAC is here to assist all international undergraduate, graduate, exchange, and English as a Second Language students in their transition to the University of Saskatchewan and to life in Canada. ISSAC offers advising and support on matters that affect international students and their families and on matters related to studying abroad as University of Saskatchewan students. Visit

<https://students.usask.ca/international/issac.php> for more information.