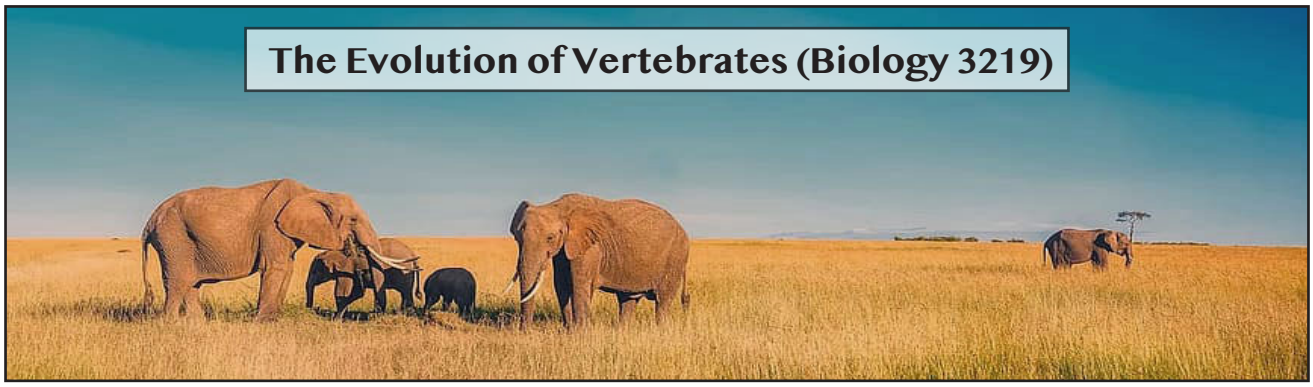

The Evolution of Vertebrates (Biology 3219)

A survey of vertebrate animals with an evolutionary and paleontological perspective on adaptive features. Lab sessions examine morphological, anatomical, and behavioural characteristics, with special reference to comparative locomotory, feeding, and reproductive strategies.

Professor: Dr. Janice M. Hughes
Email: jmhughes@lakeheadu.ca

Office hours: Wednesdays at 11:30 am on Zoom (Other days/times available by appointment)

Technician: Dan Brazeau
Email: dbrazeau@lakeheadu.ca

Textbooks: *Evolution of Vertebrates Lab Manual* (Download from D2L free of charge)

Please note: I attend to my email regularly from Monday to Friday during the academic year so I will typically respond to your messages on a same day basis. However, I may not open emails that have been sent from accounts other than your university account. Please use your *lakeheadu.ca* email for all messages.

Learner Outcomes:

Upon satisfactory completion of this course, students will be able to:

- Describe the origins and evolution of vertebrate taxa and identify their relationships to their closest living and nonliving relatives.
- Articulate current views of vertebrate systematics, conservation, and biodiversity.
- Describe how many novel innovations evolved in vertebrates, and how this contributed to the diversity of extant vertebrate life.
- Discuss how vertebrate taxa are adapted to feed, reproduce, and move from place to place.
- Describe aspects of functional anatomy and behaviour in vertebrates, and explain how it is adaptive.
- Articulate the mechanisms associated with mass extinctions, and describe how they changed the biotic and abiotic profiles of Earth.
- Appreciate and practice the handling of vertebrate specimens for scientific research and educational purposes.
- Predict aspects of the natural history of vertebrates from observations of morphology.

Overview and Marking Scheme: Lectures

Lecture Content: Lectures will be delivered remotely through Zoom; a link to all Zoom lectures is available on the course D2L homepage. You will not be required to turn your camera on during lectures or exams. Attendance in lectures is highly recommended because recordings will not be available, and PDFs of slides only show a brief outline of the course material. You are responsible for all content that I provide in class and on my lecture slides.

Exams: There are lecture exams on October 22 (Midterm) and November 24 (Final); they will be run online during the regular lecture time through the D2L course webpage. Exams are 80 minutes in length and begin promptly at 10:00 am. You will not be able to begin the exam late, and any questions answered after the exams close will not be marked. Additional instructions are posted on the course webpage. The exams are not cumulative. There is no final exam during the April final exam period.

Assignments: There are three assignments designed to build important academic skills, including referencing and researching. Detailed instructions and more information about these assignments can be found on D2L under the Content tab. Make sure that you read the instructions carefully, and email me with your questions or ask them in class. Assignments must be converted to PDFs and uploaded to the appropriate assignment dropbox on D2L by the due date. In brief, the assignments are:

(1) Reformat the References: Reformat a list of in-text citations and references to conform to a specific journal style.
(2) Trivia Challenge: Find and format journal article references that support some interesting bits of original research.
(3) Abstract Editing: Rewrite a scientific abstract to convert passive voice to active voice style, and to make other basic (but important) corrections to conform to standard format.

Late assignments will be accepted but a penalty of 10% per day will be imposed. If you are handing an assignment in late, email me to let me know so that I can reopen the assignment dropbox. Please do not email your assignments to me.

Midterm Test (Units 1 to 9)	October 22	25%
Final Exam (Units 10 to 18)	November 24	25%
Reformat the References	September 28	5%
Trivia Challenge	October 26	5%
Rewrite the Abstract	November 16	5%

Overview and Marking Scheme: Labs

Lab Content: Labs will be delivered in person. The lab manual is available on D2L. You are responsible for all material that is in the lab manual, presented during labs, and posted on D2L under Supplementary Lab Materials (Required).

Lab Quizzes: Lab quizzes are online and occur during the scheduled lab time. Lab quizzes begin promptly at 11:30 am. You will not be able to begin the quiz late, and any questions answered after the quizzes close will not be marked. The lab exams are not cumulative. It is important that you complete these quizzes at the designated time because you may not have an opportunity to write them at a later date. See D2L for more information regarding these quizzes.

Lab Assignments: There are three short lab assignments in labs 2 (Aquatic Locomotion), 4 (Terrestrial Locomotion), and 5 (Flight) that must be completed and handed in during the lab. There is no opportunity to make up missed lab assignments. More information and worksheets will be provided on D2L and in the lab.

Lab Quiz 1 (Lab 1)	September 19	10%
Lab Quiz 2 (Lab 2 and 3)	October 31	10%
Lab Quiz 3 (Lab 4 and 5)	November 28	10%
Lab Assignments (Labs 2, 4, and 5)	Sept 26, Nov 7, Nov 21	5%

Other Important Information:

I am committed to providing a learning environment that will give all students the best possible chance of success in the course. Please drop into my Zoom office hours (or make an appointment) if I can be of assistance.

Accessibility: I am also committed to achieving full accessibility for persons with disabilities and/or medical conditions. This commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and/or medical condition and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services for more information.

For students already registered with Student Accessibility Services, I can offer many solutions for your recommended accommodations. Please feel free to make an appointment with me to discuss these options.

Absence due to Illness: If you miss an exam due to illness, you must inform me by email within 24 hours of the scheduled test time; otherwise, you may not be able to write a make-up exam. Athletes who will miss an exam due to competitions must provide a letter or email from their coach in advance that clearly shows the dates of their competitions. No other excuses (e.g., vacations, sleeping in, or non-university related activities) for missing exams will be accepted.

Academic Dishonesty: Lakehead University takes academic dishonesty very seriously; this includes (but is not restricted to) cheating, plagiarism, impersonation, and collaboration on tests. There is a zero-tolerance policy for academic dishonesty in my courses, and penalties will be strictly enforced. If you are caught participating in academic dishonesty in this course, a formal report will be sent to the Dean of Sciences and Environmental Studies and Office of Student Affairs, and documentation of the offence may be added to the Student Conduct Database and your permanent academic record.

A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students are strongly advised to familiarize themselves with the Student Code of Conduct (Academic Integrity) and, in particular, sections 26 and 83 through 85. Non-compliance with the Student Code of Conduct will not be tolerated in this course and the Student Code of Conduct will be adhered to in terms of disciplinary action. The Student Code of Conduct provides a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

You can find the university regulations regarding academic dishonesty here:
https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity

According to these regulations, any collaboration on exams and lab quizzes is considered cheating. You must do the online tests alone with no help from friends, family, or classmates! The minimum penalty for collaboration or cheating is a mark of zero on the test. Also, cutting and pasting, copying, or downloading answers from another source (e.g., Wikipedia) is considered plagiarism. The minimum penalty for plagiarism will be a mark of zero on the test. You can find more information on the D2L course webpage. Not reading these instructions is not an excuse for not knowing them!

Use of AI Programs: The use of any AI programs (such as ChatGPT) on exams, quizzes, and assignments in this course is considered a breach of academic integrity and, as such, the minimum penalty will be a grade of zero on the work.

Generative artificial intelligence (Generative AI or GenAI) is a category of AI systems capable of generating text, images, or other media in response to prompts. These systems include ChatGPT and its variant Bing (built by OpenAI) and Bard (built by Google) among several others. Other Generative AI models include artificial intelligence art systems such as Stable Diffusion, Midjourney, and DALL-E. Any use of GenAI systems to produce assignments or exam answers for this course is not permitted. All work submitted for evaluation in this course must be the student's original work. The submission of any work containing AI generated content will be considered a violation of academic integrity ("Use of Unauthorized Materials").

More information: Please see the *Frequently Asked Questions* posted on the D2L course webpage.

Schedule of Lecture Topics

Week of	Sept 3	Introduction to the Course Unit 1: Vertebrate Diversity
Week of	Sept 8	Unit 2: Chordate and Vertebrate Bauplans
Week of	Sept 15	Unit 3: Early Vertebrates and Agnathans Unit 4: Life in Water Perfected
Week of	Sept 22	Unit 5: Early Gnathostomes Unit 6: Chondrichthyans
Week of	Sept 29	Unit 7: Osteichythans Unit 8: Tetrapod Origins and Invasion of Land
Week of	Oct 6	Unit 9: Extant Amphibians: Lissamphibians Unit 10: Evolution of Amniotes; Anapsids

Week of	Oct 13	**Study week**
Week of	Oct 20	Unit 11: Lepidosaurs **Midterm Exam** (October 22) - Units 1 to 9
Week of	Oct 27	Unit 12: Mesozoic Archosaurs and Crocodilians
Week of	Nov 3	Unit 13: Avian Evolution Unit 14: Avian Flight
Week of	Nov 10	Unit 15: Avian Behavioural Ecology Unit 16: Rise of Mammals
Week of	Nov 17	Unit 17: Monotremes and Marsupials Unit 18: Eutherians
Week of	Nov 24	**Final Exam** (November 24) - Units 10 to 18 No lectures (November 26 and December 1)

Schedule of Lab Topics

September 5	Lab 1: Integuments and Skeletons
September 12	No lab
September 19	**Lab Quiz 1** (Lab 1)
September 26	Lab 2: Aquatic Locomotion
October 3	No lab
October 10	Lab 3: Feeding - Form and Function
October 17	**Study Week**
October 24	No lab
October 31	**Lab Quiz 2** (Labs 2 and 3)
November 7	Lab 4: Terrestrial Locomotion
November 14	No lab
November 21	Lab 5: Flight
November 28	**Lab Quiz 3** (Labs 4 and 5)