DINOSAURS - ERTH 2401 (Earth Sciences) – Course Syllabus for Summer 2026

INSTRUCTOR: Dr. Michael Ryan (MichaelJ.Ryan@carleton.ca). You can learn more about your instructor at dinoresearch.wordpress.com. Note that Dr. Ryan does not have an on-campus office.

TEACHING ASSISTANTS: The course will have three teaching assistants who have yet to be assigned.

OFFICE HOURS: The office hours for your instructor are each Monday at noon. Office hours for your TAs are to be determined. HOWEVER, please contact us by email to schedule your meeting so that you do not have to wait while we are talking to other students. Note that some TAs have offices on campus and may be available for in-person meetings.

QUESTIONS ABOUT THE COURSE: Questions about the course or the lecture material should be emailed to your course instructor or your TA. E-mailed questions will be responded to within 24 hours. Note that e-mails will typically only be responded to between 9:00 am to 5:00 pm EDT, Monday to Friday.

MODALITY: BE AWARE THAT YOU HAVE ENROLLED IN ERTH 2401 KNOWING THE TIME AND DATES WHEN THE COURSE IS SCHEDULED AND ARE THEREFORE EXPECTED TO BE AVAILABLE DURING THOSE SCHEDULED TIMESLOTS.

The course will be delivered synchronously on-line through BrightSpace. If you have difficulties connecting to BrightSpace, please resolve these issues with the university (https://carleton.ca/its). If you try to open the lecture link using your personal Zoom account, you may need the password: ERTH2401

IF YOU HOPE TO TAKE THIS COURSE ASYNCHRONOUSLY, be aware that:

1. The two (2) midterms are scheduled to be taken during the lecture time slot (May 21 and June 4). Although they will be written on-line, you must be available to write the midterms at this time.

2. The final exam will be written on-line and you must be available to write the final exam at the time that it is to be scheduled by the Registrar's Office (date is TBA).

3. Each class will have a graded component, typically a WooClap question or questions that will be asked and answered in class. For this you will need to be able to open a second browser window to access BrightSpace. The in-class graded component will total 20% of your total final grade for the course. You have to be in attendance to complete the in class graded component.

IF YOU CANNOT FULFILL THESE REQUIREMENTS FOR THIS SYNCHRONOUS COURSE, YOU SHOULD CONSIDER ENROLLING IN ANOTHER COURSE OPTION.

COURSE ACCOMADATIONS: If you require an accommodation for the course this must be registered with the Paul Menton Centre (PMC) for Students with Disabilities (https://carleton.ca/pmc/) who will provide you with a letter of accommodation.

COURSE NOTE TAKERS: If you require a notetaker for the course you are encouraged to try to locate one yourself as the PMC does not do provide this service. If you inform PMC of your need for a notetaker, they will notify your instructor who will then send a notification to the students in the course asking for assistance. Be aware that a notetaker cannot be guaranteed for you.

LECTURES: ERTH 2401 will have four 80 minute lectures each week, Monday to Thursday from 10:05 am to 11:25 am EDT beginning on Wednesday, May 8, 2025. The last lecture will be on Thursday, June 18, 2026. The lectures will be presented live unless otherwise indicated. The lectures will be recorded and posted to the course BrightSpace site later the same day. Your instructor will typically release any prerecorded course content and the PowerPoint presentations for the week's lectures at the start of each week.

LECTURE ZOOM LINKS: A recurring Zoom link for the lectures will be embedded into the BrightSpace course page before the start of the course.

ADDITIONAL NON-LECTURE MATERIAL: Please note that some lectures may have additional pre-recorded components or links to outside, on-line sources that will also be part of the course examination material. These materials will be listed at the start of each lecture and indicated in the BrightSpace module for each lecture. Please use caution in opening outside links.

WEEKLY CLASS ANOUNCEMENTS: At the start of each week your instructor will send out an e-mail through the BrightSpace class list outlining the content of the week's lectures and any changes from the course syllabus, as well as reminding you about upcoming exams. During classes when a guest lecture is presenting live, their lecture will typically start at the beginning of the class and instructor's lecture for that class (if any) will be prerecorded.

RECOMMENDED TEXTBOOK: The course textbook is highly recommended, but not mandatory. The instructor will be drawing the examination questions from the material presented in lecture which is largely based on the textbook, but including anything presented by a guest lecturer or anything posted to BrightSpace that is specified as examination material.

The course textbook is: D.E. Fastovsky and D.B. Weishampel, 2021. *Dinosaurs, A Concise Natural History* (4th Edition). Cambridge University Press (ISBN 978-1-108-46929-6 (paperback); (ISBN 978-1-108-47594-5 (hardback). Digital and hard copies of the textbook are available from the Carleton Campus Store (formerly the Carleton Bookstore).

Used earlier editions of the textbook may still be available, but be aware that some information in those editions will be out of date.

MANDATORY REQUIRED MATERIALS: Access to a computer through which you can attend the synchronous lectures, take the midterms, final exam and complete the in-class graded course component. Please note that you will need to be able to open up a second browser window to complete the in-class graded course component.

COURSE EVALUATION: IN-CLASS GRADING, MIDTERMS & FINAL EXAM

Examination material for the course will be derived from the lectures (both your instructor's and the guest lecturers), much of which is based on the textbook (which is highly recommended), and any additional pre-recorded or on-line material posted to BrightSpace that is designated as examination material.

GRADING: There will be two (2) on-line midterm exams during the term. The final on-line exam will be scheduled by the Registrar's Office to be written after classes have finished. Additionally, there will be a series of in-class graded questions (typically at least one question per class) that will total 20% of your final course grade.

The midterms and final exam are *non-cumulative*. The midterms will be taken on-line through BrightSpace.

IN-CLASS GRADED QUESTIONS: Each class will have a graded component, typically a WooClap question or questions, which will be asked and answered in class. For this you will need to be able to open a second browser window to access BrightSpace. The in-class graded component will total 20% of your total final grade for the course. You have to be in attendance to complete the in class graded component – no exceptions!

The midterms, final exams and in-class questions are open book. This means that you can use your notes and the course textbook. However, you are not allowed to use AI (Chat GPT, etc.), Alexis or other online assistants, or access information on the internet outside of BrightSpace during the midterms, final exam or in-class questions.

MIDTERMS:

Midterm 1: 25%, 80 minutes. Thursday, May 21, 2026, 10:05 – 11:25 am EDT (covers lectures 1 to 8)
Midterm 2: 25%, 80 minutes. Thursday, June 4, 2026, 10:05 – 11:25 am EDT (covers lectures 9 to 15)

Midterms are scheduled for 80 minutes (the length of a regular class timeslot) and will replace a lecture on the date of the midterm. The midterm will typically consist of 62 questions: 30 multiple choice, 30 true & false questions, and 2 (two) short answer questions.

If you have a time accommodation for the course, please note that your time accommodation will result in your midterm running beyond the scheduled class time window, so you may need to make arrangements if this causes a conflict with something else in your schedule. Please note that your midterm cannot be rescheduled for a different date or a different time on the date of the midterm.

Once you begin a midterm, you cannot close the midterm and restart it. You will not be able to answer questions or modify questions after the 80 minutes have elapsed (or whatever timeframe your accommodation registered through the Paul Menton Centre for Students with Disabilities is set for, if you have one); at that time your exam will be automatically submitted.

E-PROCTORING: E-proctoring will not be used during this summer's course.

ACCOMODATION FOR MISSING A MIDTERM: If you have a short term incapacitation (5 days or less) that causes you to miss a midterm, please contact the course instructor and then fill out and submit the Academic Consideration for Coursework Form (https://carleton.ca/registrar/academic-consideration-coursework-form/).

You must contact your instructor within 24 hours of a missed midterm to inform them that you are requesting a make-up exam and will be providing a self-declaration form; otherwise you will not be eligible for a make-up exam. If you have a long-term incapacitation (5 days or longer) please e-mail your instructor for guidance. In this case you will also need to contact the Registrar's Office for support.

If you are informing your instructor about a medical issue as your reason for missing a midterm, DO NOT e-mail them photos of the issue. Also, you do NOT need to submit a doctor's note – only the Academic Consideration for Coursework form.

The only form you need to submit to your instructor for missed coursework is the Academic Consideration for Coursework Form.

A make-up midterm must be taken within one week of the missed scheduled midterm.

REVIEWING YOUR EXAM MARK: If you would like to review your answers for a midterm, please contact your TA.

FINAL EXAM: Final Exam: 30%, 120 minutes TBA (covers lectures 16 to 23).

The final exam will typically consist of 83 questions: 40 multiple choice, 40 true & false questions, and 3 (three) short answer questions.

MISSED OR DEFERRED FINAL EXAM: If you miss the final exam or require a deferral of the final exam for any reason, be aware that you must contact the Registrar's Office. Your instructor cannot arrange for deferred exams; only the Registrar's Office can do this.

EXTRA CREDIT: Due to the size of the course there will NOT be optional extra assignments.

FINAL COURSE GRADE ADJUSTMENT: Please DO NOT contact your instructor or TA requesting an adjustment of your final grade (e.g., rounding up a grade percentage) as calculated by BrightSpace. These requests will not be responded to unless there has been an issue with the grading in BrightSpace.

COURSE OBJECTIVES

1. Identify the major events in the evolution of dinosaurs. (Remembering and Understanding)
2. Explain the importance of fossils for palaeoenvironmental interpretations. (Remembering)
3. Explain the position of dinosaurs in the evolutionary history of life and their development throughout the Mesozoic Era, including extinction theories. (Remembering, Analyzing and Understanding)
4. Distinguish dinosaurs according to the characters of their fossil remains. (Remembering and Understanding)
5. Analyze dinosaur intraspecific and interspecific behaviour through time. (Remembering and Understanding)
6. Analyze dinosaur palaeobiology for each major group. (Remembering and Understanding)
7. Describe the non-dinosaur flora and fauna of the Mesozoic. (Remembering and Understanding).
8. Explain the importance of dinosaurs in culture and as a tool for educating about science. (Understanding)

LEARNING OUTCOMES

By the end of this course, students will be able to:
1. Recall the anatomy of dinosaurs.
2. Describe and evaluate patterns of relationships between major dinosaur groups.
3. Describe key evolutionary events in the origin and radiation of dinosaur clades.
4. Describe the inferred biology and behaviour of dinosaurs.

LECTURE TOPICS AND DATES

The lectures are derived from, but diverge at times from, the textbook, and some lectures are not covered in the textbook. The relevant chapters for each lecture (where appropriate) will be stated at the start of each lecture, although only portions of some chapters may be covered in some lectures (chapter numbers follow the 2021 edition of the textbook). By the end of the

course we will have covered almost the entire textbook, so reading ahead is encouraged and will help those of you without a strong background in biology and geology.

The lectures will be delivered synchronously during the scheduled course hours, Monday to Thursday 10:05 to 11:25 AM, Eastern Time Zone (EDT). These lectures will be simultaneously recorded and posted to BrightSpace after the class. The instructor's PowerPoint slides for each lecture will also be posted to BrightSpace.

In addition to the lectures, some classes will feature a guest speaker (occasionally supplanting the instructor's lecture) lecturing on the subject material for that class, but focusing on their area of expertise. These guest speakers will be acknowledged experts in their research fields, and unless otherwise indicated, these lectures will also be covered in the exams. Whenever possible the PowerPoint presentation from the guest lecturer will be posted to BrightSpace.

Whenever possible, guest lecturers will present live to class, but due to time zone differences or other commitments, some of these presentations may be pre-recorded. Please note that some guest lecturers have yet to be confirmed at the time this syllabus is being written.

Before the first class of each week, I will send out an e-mail announcement informing students who the guest lecturer(s), if any, will be for the week along with a short bio or link for each person. Any changes from this syllabus for that week will also be noted in the e-mail announcement.

Please note that each lecture should be viewed and understood before proceeding to the next lecture. Each lecture will assume an understanding of the preceding lectures.

LECTURE OUTLINES:

Note that lecture topics are subject to change.

Lecture 1 (May 6): Introduction & Objectives: A Brief History of Life: Course Introduction and Overview; review of geological time & a brief review of the history of life. **From the textbook: Part 1; Chapter 1, Chapter 2, p 33-43; Chapter 15, p 400-412.**

Lecture 2: (May 7): Fossils, Fossilization, Sedimentology & Stratigraphy: What is a fossil? How do fossils form? How to conduct field work. The science of sedimentology and stratigraphy – how we determine the age of fossils? **From the textbook: Chapter 1; Chapter 2, p 27-33**

Lecture 3 (May 11): Taphonomy: The study of how dinosaurs died and became incorporated into the fossil record. Guest lecture by Dr. Ray Rogers (Macalester Univ., MN). **Non-textbook Lecture**

Lecture 4 (May 12): Evolution and Phylogenetics: What is evolution? Overview of phylogenetics and how we determine the interrelationships of dinosaurs. **Chapter 3**

Lecture 5 (May 13): Chordate Evolution and Vertebrate Anatomy: Overview of chordate evolution and a review of vertebrate anatomy (bones of the body). **Chapter 4**

Lecture 6 (May 14): Archosauromorpha to the Earliest Dinosaurs: We expand on some of the important steps in tetrapod evolution and introduce the earliest dinosaurs. **From the textbook: Chapter 5**

May 18 (Monday) – HOLIDAY. NO CLASSES

Lecture 7 (May 19): Theropoda 1 (Up to Coelosauria): Tetanurae. **From the textbook: Part II; Chapter 6; Chapter 7, p. 152-158.**

Lecture 8 (May 20): T.rex and Tyrannosaurs. Guest lecture by Dr. Eric Snively on the biology and behaviour of the coelosaurian theropod Tyrannosaurus rex and its relatives. **From the textbook: Chapter 7, p. 158-167 + non-textbook material.**

May 21 (Tuesday), 10:05 – 11:25 AM EDT, MIDTERM #1 (COVERING LECTURES 1 - 8 ONLY); 80 MINUTES; 25%

Lecture 9 (May 25): Theropoda 2: Introduction to Coelosauria. Tyrannosauridae and *T.rex;* Ornithomimids. **From the textbook: Chapter 7, p. 158-167**

Lecture 10 (May 26): Maniraptora & the Origin of Birds: Maniraptora; oviraptors; feathers, wings and the origin of flight. Spotlight on the bat-wing dinosaur, *Yi qi* from China. **From the textbook: Chapter 7, p. 167-178; Chapter 8**

Lecture 11 (May 27): Sauropodomorpha: Origin and biology of sauropods. **From the textbook: Chapter 9**

Lecture 12 (May 28): Basal Ornithischia & Thyreophora: Thyreophora origins; ankylosaurs and stegosaurs. **From the textbook: Part III; Chapter 10**

Lecture 13 (June 1): Marginocephalia: Pachycephalosauria and Ceratopsia. **From the textbook: Chapter 11; Chapter 6, p. 140-141**

Lecture 14 (June 2): Ornithopoda: Basal ornithopods; Hadrosauridae. **From the textbook: Chapter 12**

Lecture 15 (June 3): Dinosaur Metabolism & Behaviour: Endothermy vs. ectothermy; How do we infer dinosaur behaviour? **From the textbook: Chapter 14.**

June 4 (Thursday), 10:05 – 11:25 AM EST, MIDTERM #2 (COVERING LECTURES 9 - 15 ONLY), 80 MINUTES; 25%

Lecture 16 (June 8): Palaeohistology: Guest lecture on dinosaur palaeohistology by Dr. Mateusz Wosik Misericordia Univ.); **From the textbook: Part IV, Chapters 13.**

Lecture 17 (June 9): Palaeoecology: Dinosaur palaeoecology. Guest lecture by Dr. Jordan Mallon (Canadian Museum of Nature). **Chapter 15 from the textbook.**

Lecture 18 (June 10): Roy Chapman Andrews (RCA) & The Central Asiatic Expeditions of the American Museum of Natural History. Internationally recognized RCA scholar, Clive Coy (University of Alberta) presents how the explorer RCA changed our understanding of dinosaurs. **Non-Textbook Lecture.**

Lecture 19 (June 11): Exploration and Discovery: Early history of palaeontology. **From the textbook: Chapter 16**

Lecture 20 (June 15): Dinosaur Palaeobiogeography – Dinosaur distribution in time and space. **From the textbook: Chapter 15, p. 394-400.**

Lecture 21 (June 16): The End of the Dinosaurs? Dinosaurs at the end of the Cretaceous. Guest lecture by Dr. Alessandro Chiarenza (University College London). Prerecorded lecture by Dr. Ryan on the terminal Cretaceous extinction event. **From the textbook: Chapter 17**

Lecture 22 (June 17): Movie Event: "The Beast From 20,000 Fathoms". We will be watching this classic film by Oscar-winning Special Effects artist, Ray Harryhausen, which kicked off the late 20th Century series of dinosaur movies and inspired the creation of Godzilla. The film will be viewed using your 'Criterion On Demand' MacOdrum Library resource. Details of how to view the film in class will be emailed to you at the start of the week. **Non-Textbook Presentation.**

Lecture 23 (June 18): Dinosaurs, Science & Culture: SFX artist (*The Mandalorian, Jurassic World*) Andreas Feix and writer/artist (*Swamp Thing*)/film historian Stephen Bissette join Dr. Ryan to discuss how the overlapping history of science and popular culture (films, literature, comic books, etc.) has influenced our understanding and interpretation of dinosaurs. **Non-textbook lecture**

FINAL EXAM:
TBA, (COVERING LECTURES 17 -23 ONLY), 120 MIN; 30%

REQUESTS FOR ACADEMIC ACCOMMODATION

Carleton is committed to providing academic accessibility for all individuals.
Please review these links:
Academic Accommodation: https://students.carleton.ca/services/accommodation/
Requesting Academic Accommodations: https://carleton.ca/pmc/faq-requesting-academic-accommodations/
Human Rights Policy: https://carleton.ca/equity/accommodation-guidance/
Family Status Accommodation Guidelines: https://carleton.ca/equity/family-status-academic-accommodation-information/

For more information on academic accommodation, please contact the Earth Sciences departmental administrator.

EXAM ACCOMMODATIONS FOR PAUL MENTON CENTRE FOR STUDENTS WITH DISABILITIES (PMC) VIA VENTUS

Carleton University now uses Ventus as its academic accommodation management system, Ventus. Ventus provides students with more control over their accommodations on a per-course and per-test basis, and creates an improved user experience for students and faculty with real-time data in one shared web location. Students can request and manage their academic accommodations via the Ventus Student Portal: https://ventus.carleton.ca/student. More information on using Ventus, can be found on VentusHelp: https://carleton.ca/ventushelp.

ACADEMIC INTEGRITY

The University demands, unequivocally, academic integrity from all of its members, including students. Misconduct in scholarly activity will not be tolerated. The integrity of a student's academic work is critical to enabling student success. Students who violate the principles of academic integrity undermine the quality of their education and the value of a Carleton University degree.

Plagiarism and other forms of misconduct will not be tolerated. It is the student's responsibility to read and understand the university's Academic Integrity Policy which is available here: https://carleton.ca/registrar/academic-integrity/

CHAT GPT/GENERATIVE AI USAGE: The use of Chat GPT/Generative AI is not allowed in this course to assist in generating answers for exams.

IT IS THE RESPONIBLITY OF THE STUDENT TO READ AND UNDERTAND THIS COURSE SYLLABUS. IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT YOUR INSTRUCTOR.