

## DINOSAURS - EARTH 2401 – Course Outline for Fall 2022

**INSTRUCTOR:** Dr. Michael Ryan, MichaelJ.Ryan@carleton.ca

You can learn more about your instructor at [dinoresearch.wordpress.com](http://dinoresearch.wordpress.com)

Note that I do not have an on-campus office.

**TEACHING ASSISTANTS:** To Be Announced

**BRIGHTSPACE:** 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>).

**LECTURES:** EARTH 2401 will have two 80 minute lectures each week, Wednesday and Friday from 14:35 pm to 15:55 pm EDT/EST beginning on Wednesday, Sept 7, 2022. The last lecture will be on Weds, Dec. 7th, 2022. The lectures will usually be presented live, but these will be recorded and posted to the course Brightspace site later the same day.

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

Please note that some lectures may be pre-recorded. Also, many lectures will have additional pre-recorded components or links to outside, on-line sources that will also be part of the course examination material. Please use caution in opening outside links.

If a lecture is to be presented through a pre-recorded video (no live lecture by Dr. Ryan), you will be made aware of this fact through a class announcement e-mail that I will send out to all students at the start of each week. During classes when a guest lecture is presenting live, their lecture will typically start at the beginning of the class and my lecture for that class will be prerecorded. All this will be made clear each week in my weekly e-mail announcements.

**REQUIRED READING:** 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). This textbook is mandatory for the course. **ALL QUIZZES, MIDTERMS AND THE FINAL EXAM WILL BE OPEN BOOK.**

The textbook can be obtained through the Carleton Bookstore. Earlier editions of the textbook may still be available from other sources, but be aware that some information in those editions will be out of date. Examination material for the course will be derived from the 4th edition textbook (see information on QUIZZES below) and the lectures (both my own and the guest lecturers), and well as any additional pre-recorded or on-line material that I post to Brightspace that I specially designate as examination material.

**OFFICE HOURS:** My office hours are by appointment Wednesdays and Friday, 1:00 pm to 2:00 pm. Office Hours for the Teaching Assistants are also by appointment, time and dates to be

determined. Please contact us by e-mail to set up an appointment and you will be sent a zoom link.

Questions about the course or the lecture material should be emailed to [MichaelJ.Ryan@carleton.ca](mailto:MichaelJ.Ryan@carleton.ca). 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 EST/EDT, Monday to Friday. I do not monitor this e-mail on weekends or holidays.

### **GRADE BREAKDOWN:**

There will be six (6) short quizzes and two (2) midterm exams during the term, and a final exam scheduled by the university after classes have finished. Each quiz will be based on questions from a specific textbook chapter or chapters (see course schedule below). The midterms are *non-cumulative*. The quizzes, midterms and final exam will be taken on-line through Brightspace. Questions on the quizzes, mid-terms and final exam will consist of True & False, Fill in the Blanks, and Short Answer questions (not all quizzes will have short answer questions). ALL QUIZZES, MIDTERMS AND THE FINAL EXAM WILL BE OPEN BOOK.

**QUIZZES:** There will be a total of six (6) quizzes in the course; two before the first midterm, two before the second midterm and two before the final exam. Each quiz will be worth 3% of the final course grade (out of 100%), but your lowest mark scored on a quiz will be discarded, so that the combined mark for your five best quizzes will be 15% of the final total grade. Please consult the schedule in this syllabus for the exact date for each quiz and the specific chapter(s) that will be covered on it.

Each quiz will consist of approximately 15 short questions that will be derived from the questions that are at the end of the chapter(s) that the quiz will cover. Note that they will not typically be the exact questions from the textbook, but a variation on them that will be converted into a random assortment of True & False, Multiple Choice, Short Answer, and/or Matching questions. You will have 60 minutes in which to write each quiz and a one week window in which to take the quiz. The quizzes will be taken outside of the regularly scheduled class timeslot. The quiz window will open on Brightspace Quiz at 8:00 am EST/EDT on the Wednesday of the quiz (see lecture outline below for the dates of the quizzes) and that quiz window will close at 8:00am EST/EDT the following Wednesday (with the exception of Quiz #3; see schedule below). Once you begin a quiz you cannot close the quiz and restart it. You will not be able to answer questions or modify questions after 60 minutes (or whatever timeframe your accommodation registered through the Paul Menton Centre for Students with Disabilities is set for, if you have one). WHEN YOU HAVE FINISHED YOUR QUIZ BE SURE TO HIT THE SUBMIT BUTTON TO SUBMIT THE QUIZ. If you forget to do this, don't panic. Contact your TA and one of them will override the system and submit your quiz manually.

**MISSING OR FAILING TO TAKE A QUIZ:** Missed quizzes cannot be rescheduled or made up, so plan your schedule accordingly!

## **MIDTERMS:**

Midterm 1: 25%, 80 minutes. Wednesday, Oct 5, 2021, 14:35 – 15:55 EDT (covers lectures 1 to 8)

Midterm 2: 30%, 80 minutes. Wednesday, Nov 9, 2021, 14:35 – 15:55 EST (covers lectures 9 to 15)

Midterms will be 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 approximately 50 questions depending on their level of difficulty. Each midterm will have a 48 hour window in which to take the midterm. You will be able to log into the Brightspace Midterm module starting at 8:00am EST/EDT on the day of the midterm and that midterm window will close at 8:00am EST/EDT 48 hours later. Once you begin a midterm you cannot close the midterm and restart it. Once you begin the midterm, you will not be able to answer questions or modify questions after 80 minutes (or whatever timeframe your accommodation registered through the Paul Menton Centre for Students with Disabilities is set for, if you have one). **WHEN YOU HAVE FINISHED YOUR EXAM BE SURE TO HIT THE SUBMIT BUTTON TO SUBMIT THE EXAM.** If you forget to do this, don't panic. Contact your instructor or TA and one of them can override the system and submit your exam manually.

**MISSING A MIDTERM:** Valid excuses for missing a midterm and scheduling a make-up exam include, but are not limited to, a medical issue or a death in the family, and must be documented with the appropriate a medical certificate or self declaration form (see the on-line section on Academic Accommodation). Other excuses are not valid. You must contact me within 24 hours of a missed midterm to inform me that you are requesting a make-up exam and will be providing me with appropriate documentation; otherwise you will not be eligible for a make-up exam.

If you are informing me of a medical issue as your reason for missing a midterm **DO NOT** e-mail me photos of the issue – seriously, **NO** photos of trauma injuries or you bleeding in ER! Trust me, I will believe you when you tell me that you were injured.

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

**FINAL EXAM:** Final Exam: 30%, 2 hours TBA (covers lectures 16 to 23).

The final exam is scheduled for 2 hours and will consist of between 80 to 100 questions depending on their level of difficulty. The Registrar's office will schedule the time and date of your final exam (your instructor has no say in the scheduling) and it has in the past had a 48 hour window in which to take the exam.

**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.

**BE AWARE THAT YOU HAVE ENROLLED IN EARTH 2401 KNOWING WHEN THE CLASSES ARE SCHEDULED AND ARE THEREFORE EXPECTED TO BE AVAILABLE DURING THOSE SCHEDULED TIMESLOTS.**

## **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 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 dinosaurs.
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, whenever possible, synchronously during the scheduled course hours, Wednesday and Friday, 14:35-15:55 Eastern Time Zone (EDT/EST). My lectures will be

simultaneously recorded and posted on-line after the class. I will also be posting my PowerPoint slides for each lecture.

In addition to my own lecture, many classes will also feature a guest speaker (occasionally supplanting my 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 I will also post the PowerPoint presentation from the guest lecturers.

Whenever possible, these guest lecturers will present live to class, but due to time zone differences or other commitments, some of these presentations may be pre-recorded. Some guest lecturers have yet to be determined 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, with some sub-sections possibly being deleted or moved to another lecture slot for time considerations.*

**Lecture 1 (Sept. 7): Introduction & Objectives: A Brief History of Life:** Course Introduction and Overview; Review of geological time & a brief review of the history of life; What is a dinosaur? Sedimentology & dating fossils (Chapters 1 &2, in part)

**Lecture 2: (Sept. 9): Fossils, Fossilization & Taphonomy:** What is a fossil? How do fossils form? The science of taphonomy and how we use it to interpret fossils (did that *Velociraptor* really get buried in a sandstorm?). (Chapters 1 &2, in part)

**Lecture 3 (Sept 14): The Life of A Dinosaur Hunter:** World famous palaeontologist and *Jurassic Park* movie consultant, Dr. Jack Horner, will present a lecture on his career and research. There will be a moderated Q&A period after his talk. Field palaeontology and fossil preparation will be covered in pre-recorded videos, as well as in Jack's talk.

## **QUIZ #1 (CHAPTERS 1 &2) 3%**

**Lecture 4 (Sept. 16): Evolution and Phylogenetics:** Review of evolution; What is a species? Phylogenetic systematics; Cladograms and how they are constructed. (Chapter 3)

**Lecture 5 (Sept. 21): Chordate Evolution & Skeletal Anatomy:** Vertebrate anatomy; Overview chordate evolution leading up to the clade Dinosauromorpha and the key features of each major group. (Chapter 4)

**QUIZ # 2 (Chapter 3) 3%**

**Lecture 6 (Sept 23): From The First Tetrapods to the Earliest Dinosaurs:** Picking up from lecture 5, we expand on some of the important steps in tetrapod evolution and introduce the earliest dinosaurs. This lecture will include a guest lecture from Dr. Ted Daeschler on the discovery and biology of *Tiktaalik*, a rhipedestian fish that shows the first adaptations to living on land; Dr. Kristen Brink on the synapsid reptile *Dimetrodon* (a branch on the lineage to present day mammals); and, Dr. Danny Barta on the Triassic theropod *Coelophysis*, an early dinosaur.

**Lecture 7 (Sept 28): Theropoda 1:** Tetanurae; guest lecture by Dr. Nizar Ibrahim, world expert on *Spinosaurus*. (Chapters 5 & 7, in part)

**Lecture 8 (Sept 30): Theropoda 2:** Introduction to Coelosauria. Tyrannosauridae and *T.rex* biology by Dr. Eric Snively, expert on *T. rex* feeding mechanics; Ornithomimids. (Chapters 6 & 7, in part)

**OCT 5 (WEDS), 14:35 – 15:55 PM EDT, MIDTERM LECTURE #1  
(COVERING LECTURES 1 - 8 ONLY); 80 MINUTES; 25%**

**Lecture 9 (Oct. 7): Maniraptora & the Origin of Birds:** Maniraptora; Oviraptors & *Anzu* guest lecture by Dr. Matt Lamanna; Feathers, wings and the origin of flight. (Chapters 6, 7 & 8, in part)

**Lecture 10 (Oct. 12): Sauropodomorpha:** Origin and biology of sauropods. Guest lecture by Dr. Kristi Curry Rogers on sauropod palaeohistology and dwarf sauropods. (Chapter 9)

**Lecture 11 (Oct. 14): Thyreophora:** Thyreophora origins; Ankylosaurs and Stegosaurs. Guest lecture by Dr. Susie Maidment on stegosaurs. (Chapter 10)

**Lecture 12 (Oct. 19): Marginocephalia:** Pachycephalosauria and Ceratopsia. Guest lecture by Dr. David Evans on pachycephalosaurs; Spotlight on *Aquilops*. (Chapter 11)

**QUIZ #3 (CHAPTERS 8 &9) 3%**

**[NOTE THE CLOSING DATE FOR THIS QUIZ IS NOV. 2, AFTER THE MIDTERM BREAK]**

**Lecture 13 (Oct. 21): Ornithopoda:** Basal ornithopods; Hadrosauridae; Spotlight on *Parasaurolophus*. (Chapter 12)

**FALL BREAK OCT. 24 – 28, NO LECTURES. However, Dr. Ryan plans to host a ‘non-mandatory attendance’ virtual dino-movie night on an evening to be determined over the break. Bring**

**your popcorn and chat with the special guest experts providing a running commentary on the dinosaur-themed movie to be selected from Carleton Library's 'Films-On-Demand' site.**

**Lecture 14 (Nov. 2): Dinosaur Metabolism and Biology:** Endothermy vs. ectothermy; Guest lecture on dinosaur palaeohistology by Dr. Mateus Wosik; Spotlight on the bat-wing dinosaur, *Yi qi* from China. (Chapter 13 & 14, in part)

**Lecture 15 (Nov. 4): Dinosaur Behaviour:** How do we infer behaviour? Parental care and nesting behaviour (guest lecture by Dr. Danny Barta); Tyrannosaurid herding behaviour (Chapter 6, in part)

**NOV. 9 (WEDNESDAY, 14:35 – 15:55 PM EST, MIDTERM LECTURE #2 (COVERING LECTURES 9 - 15 ONLY), 80 MINUTES; 30%**

**Lecture 16 (Nov. 11): In The Shadow of The Dinosaurs:** Mesozoic plants (spotlight on the palynology of Dinosaur Provincial Park); Pterosaurs; Marine reptiles (Chapter 15 for plants)

**Lecture 17 (Nov. 16): Palaeoecology:** Cretaceous palaeoecology guest lecture by Dr. Jordan Mallon; reconstructing fossil communities from microsites.

**Lecture 18 (Nov. 18): Exploration and Discovery:** Early history of palaeontology; Spotlight on Mary Anning; Guest lecture on Roy Chapman Andrews and the Central Asiatic (Gobi) Expeditions of the American Museum of Natural History by palaeontologist and historian, Clive Coy. (Chapter 16)

**Lecture 19 (Nov. 23): Dinosaurs of Canada:** Overview of Canadian dinosaur localities; Dr. Ryan talks about his Southern Alberta Dinosaur Project that has discovered and named more than a dozen new dinosaurs in the past 15 years.

**QUIZ #5 (Chapter 15) 3%**

**Lecture 20 (Nov. 25): The Rise & Fall & Rise of the Dinosaurs:** Dinosaurs at the end of the Cretaceous. Guest lecture by Dr. Alessandro Chiarenza on 'What Killed the Dinosaurs' (Chicxulub asteroid impact vs. Deccan traps)? (Chapter 17)

**Lecture 21 (Nov. 30): Dinosaurs Around The World:** Dinosaur palaeobiogeography in the Mesozoic - who was where when.

**QUIZ #6 (Chapter 16 & 17) 3%**

**Lecture 22 (Dec. 2): Dinosaurs, Science & Culture:** Writer and artist Stephen Bissette joins Dr. Ryan as they present a lecture on the evolution of dinosaurs in (pop) culture and how that culture helped to shape the science of dinosaur palaeontology. Industrial Light & Magic CGI

artist Andreas Feix presents the history of cinematic dinosaurs and how he builds and animates dinosaurs for *Jurassic Park*.

**Lecture 23 (Dec. 7): Dinosaurs, Climate Change, & Preserving Our Future:** Dr. Scott Sampson, CEO of the California Academy of Sciences (aka 'Dr. Scott' from PBS's 'Dinosaur Train' series) presents a guest lecture on how dinosaurs can be used to communicate science and what cautionary tales from the Reign of the Dinosaurs can tell us about the environmental extremes the world is currently experiencing.

**Bonus Lecture 24 (Dec. 9):** Friday Dec. 9th is a 'Monday' schedule for Carleton classes, so no EARTH 2401 lecture is scheduled for this date. However, I will be hosting a non-mandatory, non-examination lecture by Dr. David West Reynolds, New York Times Best Selling Author of the *Star Wars Visual Dictionaries* talking about our expedition to the actual locality of 'Tatooine' in Tunisia to discover the remains of the Krayt Dragon (actually a sauropod dinosaur) first shown as a skeleton in *Star Wars: A New Hope* and recently featured in the hit Disney+ series *The Mandalorian*. Dr. Reynolds is a world expert on *Star Wars* and *Indiana Jones*, and will have many stories to tell from his time working for LucasFilm, and what *Star Wars* can teach us about dinosaur palaeontology.

**FINAL EXAM: TBA, (covering lectures 16 -23 only), 2 hours; 30%**

---

## REQUESTS FOR ACADEMIC ACCOMMODATION

Carleton is committed to providing academic accessibility for all individuals.

Please review this link for the processes the [processes for academic accommodation requests](https://students.carleton.ca/course-outline): <https://students.carleton.ca/course-outline>. This link includes information regarding addressing Human Rights Concerns and accommodations for pregnancy obligations, religious obligations, academic accommodations for students with disabilities, survivors of sexual violence, and accommodations for student activities.

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 has launched a new 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): <https://ventus.carleton.ca/student>. More information on using Ventus, can be found on [VentusHelp](https://carleton.ca/ventushelp): <https://carleton.ca/ventushelp>.

## **SPECIAL INFORMATION FOR PANDEMIC MEASURES**

Carleton will continue to follow all public health guidelines as the COVID-19 pandemic continues. Please visit the [COVID-19 website](https://carleton.ca/covid19/safe-return-to-campus/classroom-guidelines): <https://carleton.ca/covid19/safe-return-to-campus/classroom-guidelines>.

## **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://students.carleton.ca/services/academic-integrity>

## **IMPORTANT DATES FOR 2022-23**

A [full list of important dates](https://calendar.carleton.ca/academicyear/) (<https://calendar.carleton.ca/academicyear/>) is available on the Calendar website. Please note that the academic withdrawal dates have changed recently.

### **FALL TERM 2022**

- **Deferred Exams:** Full summer and late summer term deferred final examinations will be held September 23 to 25; Early Fall undergraduate deferred final examinations will be held November 18 to 20.
- **Fall Break:** Carleton students will have a week-long break from October 24 to 28. No classes will take place during this time. Students cannot be required to attend class or submit coursework from October 22 to October 30. If exceptional circumstances necessitate holding a test after Friday, October 21, such a test can only be scheduled for Saturday, October 22 and must be announced on the course outline distributed at the beginning of the term.
- **Remembrance Day:** Remembrance Day is on Friday, November 11. As much as possible, course instructors are asked to allow for a moment of silence for personal reflection at 11 a.m. in accordance with [Senate policy](#).