DINOSAURS AND THEIR RELATIVES
Earth and Atmospheric Sciences E114

3 Credit hours
Fall Semester, 2019

INSTRUCTOR: Dr. P. David Polly, GY 524A; 855-7994; pdpolly@indiana.edu office hours MW 12:30–1:00 pm and by appointment

AIs: Alex Zimmerman, GY515, alexzimm@indiana.edu, office hours M 2-3 pm or appt.
Charles Salcido, GY 524, csalcido@iu.edu, office hours T 2-3 pm or appt.

COURSE OBJECTIVES: The objectives of the lecture and laboratory sessions are to increase your understanding of three major themes: (1) the origin and evolution of vertebrates, including dinosaurs and their distant relatives the fish, amphibians and amniotes, and their recent relatives the birds; (2) geography and climate of the Earth during the evolution of these groups but especially during the time of the dinosaurs and birds; and (3) dinosaur morphology, phylogeny, evolution, paleobiology, paleoecology, and extinction. Through the lecture and lab exercises you will gain an increased awareness of the dynamic history of our planet and how we know it from the geological and fossil records. You will also gain practical knowledge about the vertebrate skeleton applicable to our own anatomy and develop transferrable skills in logic and inference. The scientific method, including quantitative and qualitative approaches, will be explored.

E114 carries IUB GenEd N&M credit – Natural Science, COLL (CASE) N&M Breadth of Inquiry credit.

STUDENT PREPARATION: Lectures and labs are the most important part of the course. Attend each lecture, take notes, engage fully in each lab, and ask questions – do these and you will be on the right track. This course has a **lot** of new terminology (names of bones, names of dinosaur groups, names of geological ages), but the concepts are fairly easy. Consequently, **memorizing and reviewing the terms** will get you a long way. You are only responsible for terms used in the lectures and labs, not the additional ones in the textbook. The textbook should be viewed as a supplement to the lectures and labs – doing the reading is important because it reinforces material and helps provide depth and breadth, but exams will be based on material covered in lectures and labs.

TEXT: Assigned readings are from the following required textbook

Fastovsky, D. E. and D. B. Weishampel. 2016. *Dinosaurs, A Concise*

Natural History, Third Edition. Cambridge University Press.

CLASS MEETING TIMES: Lectures are Tuesday and Thursday, 11:15 am-12:05 pm in GY 126. Labs are Wednesday 12:20-2:15 and 2:30-4:25pm and Thursday 9:05-11:00am, 12:20-2:15pm, and 2:30-4:25pm in GY 522. You are required to attend both lectures and the lab for which you are registered.

GRADES (as percent of final grade)**:**

Exams	50%
Midterm = 100 pts	
Final Exam = 150 pts	
Quizzes (x4)	10%
Weekly Lab Assignments	25%
Final Presentation	15%

Your final grade for the course will be based on scores from 2 exams, in-lecture quizzes, and laboratory assignments. The final is comprehensive and will include material presented from the beginning of the semester. Laboratory sessions have weekly assignments that must be submitted by the specified deadline, normally the end of each lab session. A large part of the lab grade comes from simply engaging with the material and participating. Assignments will be usually be graded before your next lab session. A missed lecture exam can be made-up only at the discretion of the professor.

CANVAS: *Canvas* is IU's online course system. You can log in at http://canvas.iu.edu/. The course syllabus, announcements, and grades will be posted there.

GRADE SCHEME: A+=100-97; A=96-93; A-=92-90; B+=89-87; B=86-83; B-=82-80; C+=79-77; C=76-73; C-=72-70; D+=69-67; D=66-63; D-=62-60; F=59 & lower. Class grades are not curved.

SEMESTER SCHEDULE FOR DINOSAURS AND THEIR RELATIVES

27-Aug	What is a dinosaur?
29-Aug	The major groups of dinosaurs
	Reading: Chapter 1 of *Dinosaurs*
	No Lab meetings
3-Sep	The dinosaur skull
5-Sep	Geological time
	Lab 1: The dinosaur head

Reading: Chapter 2 of *Dinosaurs*

10-Sep Plate tectonics and paleogeography of the Mesozoic (Quiz 1, skull bones)
12-Sep Mesozoic oceans and climates
Lab 2: New relatives of Tyrannosaurus rex
Reading: Chapter 3 of *Dinosaurs*

17-Sep Characteristics of vertebrates (Quiz 2, geologic time)
19-Sep Evolution of fishes and the origin of the skeleton
Lab 3: How to take a bite out of….
Reading: Chapter 3 of *Dinosaurs*

24-Sep Saurischia: sauropods, raptors, and old *T. rex*
26-Sep Ornithischia: tanks, spikes, and ducks
Lab 4: Dinosaur diversity
Reading: Chapter 5 plus browse 6-12 of *Dinosaurs*

1-Oct The dinosaur skeleton
3-Oct Dinosaur locomotion
Lab 5: Skeletons of humans and dinosaurs
Reading: Review chapter 4 of *Dinosaurs*

8-Oct Review (Quiz 3, dinosaur skeleton)
10-Oct Midterm exam
Lab 6: Meet the Marginocephalia

15-Oct Dinosaur skull mechanics and feeding
17-Oct Amphibians to reptiles: A major break from water for the amniotes
Lab 6: How to be a vegetarian
Reading: Review chapter 3 of *Dinosaurs*

22-Oct Phylogeny and evolutionary trees
24-Oct Tetrapods, amphibians, and evolution of life on land
Reading: Review chapter 3 of *Dinosaurs*
Lab 8: Phylogenetic trees

29-Oct The radiation of amniotes and synapomorphies of the skull
31-Oct Warm-blooded dinosaurs and thermoregulation
Lab 9: Vertebrate diversity and building your own phylogenetic tree

Reading: Chapter 13 of *Dinosaurs*

5-Nov Characteristics and success of birds (Quiz 4, amniote phylogeny)

7-Nov Feathered dinosaurs and the origin of flight
Lab 10: Poster / Mini-Lecture Organization
Reading: Chapter 8 of *Dinosaurs*

12-Nov The origin of mammals

14-Nov Evolution of plants and Mesozoic ecosystems
Lab 11: Poster / Mini-Lecture Compilation
Reading: Chapters 14 and 1 of *Dinosaurs*

19-Nov Dinosaur ecosystems

21-Nov The Cretaceous revolution: changing ecosystems, climates, and oceans
Lab 12: Poster / Mini-Lecture Completion
Reading: Chapter 14 of *Dinosaurs*

26-Nov Thanksgiving

28-Nov Thanksgiving

3-Dec Where dinosaurs are found and the laws and ethics of collecting fossils

5-Dec Meet a paleontologist
Lab 13: Poster session

10-Dec The asteroid, dinosaur extinction, and afterwards

12-Dec Summary and review
Lab 14: Mini-Lectures
Reading: Chapter 16 of *Dinosaurs*

19-Dec **Final Exam**
12:30-2:30 pm, Thursday, Dec 19
GY 126 (normal lecture room)
Final Exam is Comprehensive

Code of Student Rights, Responsibilities, and Conduct
http://www.iu.edu/~code/

Academic Integrity: As a student at IU, you are expected to adhere to the standards

and policies detailed in the *Code of Student Rights, Responsibilities, and Conduct* (*Code*). When you submit an assignment with your name on it, you are signifying that the work contained therein is yours, unless otherwise cited or referenced. Any ideas or materials taken from another source for either written or oral use must be fully acknowledged. If you are unsure about the expectations for completing an assignment or taking a test or exam, be sure to seek clarification beforehand. All suspected violations of the *Code* will be handled according to University policies. Sanctions for academic misconduct may include a failing grade on the assignment, reduction in your final course grade, a failing grade in the course, among other possibilities, and must include a report to the Dean of Students, who may impose additional disciplinary sanctions.

Access to computer apps from IU

Get no-cost access to hundreds of software programs and applications through IUware and IUanyWare. All you need is your IU email address. Use IUware to install software directly onto your hard drive. Use IUanyWare to stream 400+ apps on your desktop or through the mobile app with your IU login. Visit https://iuware.iu.edu/ and https://iuanyware.iu.edu/ or contact the UITS Support Center to learn more.

Academic Support

AIs and the professor are available during office hours or by appointment to help with course materials and to discuss strategies for studying. The IU Academic Support Center also offers free tutoring, spaces for learning, technology, peer coaching, workshops, and more in three campus residence halls, and in the Office of the Vice President for Diversity, Equity, and Multicultural Affairs (OVPDEMA) academic units. Available Sunday through Thursday from 7 p.m. to 11 p.m.
https://academicsupport.indiana.edu/index.html

Students with disabilities

If you have a disability that may require assistance or accommodation, or you have questions related to any accommodations for testing, note takers, readers, etc., please contact the Disability Services for Students at 855-7578 or iubdss@indiana.edu.
https://studentaffairs.indiana.edu/student-support/disability-services/index.html

Counseling

Counseling and Psychological Services (CAPS) is located in the Student Health Center, 855-5711. https://healthcenter.indiana.edu/counseling/

Classroom Emergencies

- Know the emergency exits and evacuation areas for every classroom.
- Devise "buddy systems" so that everyone is accounted for in an evacuation.

- Evaluate the challenges that you might face during an evacuation.
- Be personally prepared for an emergency: http://protect.iu.edu/emergency

Emergency Communication

Campus emergency communication is done via a voice message, text and/or an email through IU Notify. Go to One to review your contact information. See more information about IU Notify at: https://protect.iu.edu/emergency-planning/index.html

Fire

- When you see smoke or fire, immediately evacuate the building.
- If not already activated, pull the fire alarm switch to alert others of the situation.
- Use a fire extinguisher only if you know how to use it and the fire is small.

Evacuations – Drills or real

- You may not know if this is a drill or not, so take every call to evacuate seriously.
- Take your personal belongings and immediately leave the building.
- Know where the evacuation area is for every building you are in.
- Leave the campus only if instructed.

  FOR THIS CLASS, the closest exit is: back door on ground floor exiting to the parking lot. We will meet across the street in the next parking lot.

  If it is severe enough to move furniture, **DROP, COVER and HOLD ON**: Immediately seek shelter (under a desk or table, if possible) cover your head and hold on. Evacuate if directed, or you feel it is safe to do so.

Severe Weather

Thunderstorms are the most common type of severe weather in the Bloomington area. However, winter storms, extreme hot/cold temperatures, flooding, and tornadoes can occur.

- Seek shelter indoors in a low part of the building (Maps w/shelter locations are located throughout the building)
- Move to a windowless interior room away from hazardous materials
- Monitor https://protect.iu.edu/emergency-planning/index.html and local media
- Take cover under a sturdy object or against an interior wall
- Wait for the all clear before leaving your safe space

FOR THIS CLASS, the closest shelter location is: GY 126 (lecture room) or GY 447

Violence/Active Shooter

There may be situations where it is imperative that you seek shelter and not leave the building.

- RUN – if a safe path is available. Always try to escape or evacuate if possible.
- Call IUPD (812-855-4111) or 911 when it is safe to do so
- If evacuation is not possible, HIDE in a concealed location, Lock and/or barricade the door, Turn off the lights, stay quiet and silence your cell phone
- FIGHT – as a last resort, working together or alone, act with aggression; use improvised weapons to disarm the shooter. Commit to taking the shooter down.
- See the video at http://protect.iu.edu/police/active-shooter