

Dinosaur Academy: CSI Jurassic SUMMER 2019

Lecture 1

Lab 2

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Office hours: M – F 8am to 5pm

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Required Materials: Students must bring a notebook, clipboard, pens and pencils. Handouts, Tools and a 10X Loop will be furnished.

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Course Description: This course, using the 'field as a classroom,' will examine the process of scientific inquiry. Through the interdisciplinary study of paleontology, students will be exposed to major concepts in evolutionary biology and geology during field excursions, quarry work, and classroom discussions. Specific course topics include: geologic time, mountain building, sediment transport, deposition and erosion, soil formation, carbonate formation, carbon/oxygen stable isotope geochemistry, taphonomy, archosaurian anatomy and evolution of life. In addition, the topics of bone histology, fossil preparation, survey techniques, topographical maps and GPS. This course is designed to serve high school students interested in a career in earth science. Prerequisites: none.

Expectations: You are expected to attend all field and lab sessions and to **be on time**. Class will start on time and any announcements or changes to the syllabus will be given at the beginning of the course. Phones, radios, or any other electrical instrument not furnished by the teacher or teacher's assistants may not be brought to the lectures or labs. As this course is only one week long, students causing a disruption to others may be asked to leave the class and/or course.

Major Topics:

- Paleontology as an integrated science and a model for Scientific Method
- Process of Scientific Inquiry – how to build a scientific story
- Geologic Time
- Radiometric Dating
- Laramide Orogeny – Mountain Building
- Mesozoic Stratigraphy
- Sedimentary Rock Cycle
- Erosion
- Deposition
- Soil Development (Emphasis on paleosols as environment indicators)

- Soil and Lacustrine Carbonate Formation
- Carbon/Oxygen Stable Isotope Geochemistry
- Paleoclimates, Climate Change
- Taphonomy – biases and burial
- Archosaur Anatomy
- Trace Fossils
- Evolutionary History of Life on Earth
- Fossil Preparation/Excavation Techniques
- Topological and Geological Maps

Course objectives/goals:

In order to successfully complete this course, students will:

1. Use scientific inquiry to problem-solve, observe, and build a scientific story of the dinosaur quarry they work in.
2. Explain the differences between relative and absolute geological time.
3. Explain at least two major techniques for radiometric dating (not including carbon dating) and its application to geological time and paleontology.
4. Describe the geological forces responsible for the uplift of the Rocky Mountains and why specific geological formations are always present on the flanks of these mountains.
5. Use their knowledge of the sedimentary cycle to explain different facies, their formation and their environmental implications.
6. Describe soil formation and how they can be used as environmental indicators in the rock record
7. Use stable isotope data to differentiate soil carbonates from lacustrine and marine carbonates, and how this data is used to reconstruct paleoenvironments.
8. Explain how paleontology is related to the study of climate change.
9. Describe how the study of taphonomy is used to better understand paleoecosystems and paleoenvironments.
10. Be able to determine what a particular bone is based on anatomical features and be able to use comparative anatomical literature to identify elements.
11. Explain how trace fossils add to the understanding of paleoecosystems and paleoenvironments.
12. Explain what the average lifespan of a species is and the implication for the fossil record.
13. Discuss the fossil record, its importance, and how it is used today.
14. Explain the function of geological maps and use the regional geologic map to discuss the formation of the Big Horn Basin (ties into mountain building, and exposures of formations important to paleontological questions).