

# Paleontology and Geology of Indiana



## Syllabus 2013

### *Instructor*

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Office Hours: Weds 2:15 – 3:15 PM and by appointment

### *Class Meetings*

Lectures:	WF, 1:25 – 2:15 PM	Geology 447
Labs:	F, 2:30 – 4:25 PM	Geology 518

### *Course website*

<http://www.indiana.edu/~paleoind/>

This site hosts information about paleontology and geology in Indiana, copies of lecture slides and handouts, and links to other interesting or useful information. The site is intended not only as a resource for this course, but for anyone who is interested in Indiana's "deep history".

### *Description*

G308 Paleontology and Geology of Indiana (3 cr.) P: 100-level geology, evolution, biodiversity or archaeology course, or consent of instructor. Paleontology and geology with a regional focus, emphasizing life, the sedimentary record, changing paleo-environments, and the origin of Indiana's modern landscape, biota, and natural resources. Includes fossil identification and analyses of paleontological data.

This is a course in "historical geology". It focuses on the geological and evolutionary processes that have shaped our planet and life on it. The fossil and rock record of Indiana and North America are used to illustrate how these processes have unfolded over the last 550 million years, the long, fossil-rich period known as the Phanerozoic. In this course you will learn about the evolutionary history of major groups of animals and plants, the origins of life on land, the growth of the North American continent, changes to the Earth's atmosphere and oceans, and the interactions among life, climate, sediments, and geological structures. You will also learn about the surface geology of Indiana and the most common fossils found here through a series of lab exercises and field trips.

The course makes use of the Indiana University Paleontology Collection, which is a world-class research collection of fossils from all over the world, with special strengths in the Paleozoic Era of

eastern North America. The collection originated with the work of David Dale Owen of New Harmony during the first half of the 19<sup>th</sup> Century and it now contains more than 1.3 million specimens that document the research of generations of IU scientists and students.

## **Objectives**

1. To understand the fossil and geological record of Indiana in its broad stratigraphic, paleogeographic, paleoclimatic, and evolutionary contexts.
2. To understand how processes of evolution, tectonics, sedimentation, and environmental change have made the organisms, rocks, natural resources, and physiography of Indiana what they are today.
3. To understand ways in which data from the fossil and geological record are analyzed to make inferences about past life, climate, and geography.
4. To understand how the study of paleontology and sedimentary geology in the region shaped the growth of those disciplines.
5. To be able to identify common Indiana fossils, to understand the stratigraphic and environmental contexts in which they lived, and to be able to transfer that knowledge to the study of fossils and rocks elsewhere.

## **Assessment**

**Exams:** The first midterm exam (**10%**) will cover material from the period between it and the beginning of the semester, the second midterm exam (**10%**) will cover material since the first midterm, and the final exam (**25%**) will be comprehensive. The exams will include some lab-focused questions.

**(Total 45% of course grade).**

**Quizzes:** Five short quizzes will be given on selected Wednesdays (see schedule below). The quizzes will cover terminology that needs to be memorized, such as the geological timescales, the names of fossil groups, or the names of rock units. The subject of each quiz will be announced in advance.

**(10% of course grade).**

**Labs and Field Trips:** Ten short exercises or assignments will be required, one for each lab and field trip. Note that fossil identification from the labs will be included on the exams.

**(20% of course grade).**

**Fossil Project Report and Presentation:** Throughout the semester you will work with a fossil collection from the IU Paleontology Collection. As part of the labs you will research the site, its geology, the scientific papers that have been written about it, and its fossils. The lab exercises will help guide you through the steps in this process. A written report will be worth **20%** of the total course grade and a short presentation on your site will be worth **5%**. Both will be due the last week of classes.

**(Total 25% of course grade).**

## Participation

Everyone is, naturally, expected to participate in all lectures, labs, and field trips. The material on which you will be assessed is presented in these sessions. While the texts and website provide much useful background, they do not substitute for what happens in class. Much of the learning experience comes from interacting with the instructor, with the other students, with the fossils and samples in the labs, and with the things we see on field trips. Discussion and collaboration is encouraged, but written work is expected to ultimately be your own. If you have to miss a session, please notify the instructor as early as possible in advance.

## Texts

The following texts are recommended. No specific readings will be assigned, but the information in these works will be useful as background reading, for field excursions, and to help you identify fossils in the labs and for your final project.

Camp, M.J. and G.T. Richardson. 1999. *Roadside Geology of Indiana*. Mountain Press Publishing Company. 315 pp. ISBN-13: 978-0878423965.

Feldmann, R.M. and M. Hackathorn (eds). 1996 (rev. 2005). *Fossils of Ohio*. Bulletin of the Ohio Department of Natural Resources Division of Geological Survey Number 70. 577 pp. ISBN-13: 978-0931079054.

Thompson, T.A. and K.H. Sowder. 2010. *Generalized Stratigraphic Column of Indiana Bedrock*. Indiana Geological Survey Poster O6A.  
[Available from the Indiana Geological Survey store in the east wing of the Geology Building on the ground floor]

## Schedule of Class Meetings

Lectures are given Wednesdays and Fridays, followed by lab on Fridays. We will take field trips on three Fridays later in the semester during the block of time usually filled with lecture and lab.

Date	Topic
9 Jan	Indiana Today
11 Jan	The Lay of the Land
11 Jan	Lab: Topography of Modern Indiana
16 Jan	A short history of North America
18 Jan	Where do Indiana's rocks come from?
18 Jan	Lab: Geological time and fossil samples
23 Jan	Overview of Indiana Geology
25 Jan	Indiana Geological Survey (Guest Lecture by Dr. John Steinmetz)
25 Jan	Lab: Bedrock geology of Indiana
30 Jan	A short history of life
1 Feb	Introduction to metazoan phyla
1 Feb	Lab: Identifying phyla
6 Feb	No meeting

8 Feb	No meeting
13 Feb	<b>Midterm I</b>
15 Feb	Ordovician: The Cincinnati and the Richmondian invasion
15 Feb	Lab: <a href="#">Bryozoans and Corals</a>
20 Feb	Climate and Isotopes in the Ordovician (Guest lecture by Dr. Seth Young)
22 Feb	Silurian and Devonian: colonization of the land
22 Feb	Lab: <a href="#">Brachiopods and Trilobites</a>
27 Feb	Mississippian: the Borden Delta
1 Mar	Mississippian: Sun, seas, and reefs
1 Mar	Lab: <a href="#">Crinoids and Microfossils</a>
6 Mar	Carboniferous carbonates in Indiana (Guest lecture by Dr. Brian Keith)
8 Mar	Pennsylvanian: Climate gone wild
8 Mar	Lab: <a href="#">Pennsylvanian Plants</a>
13 Mar	Spring Break
15 Mar	Spring Break
20 Mar	<b>Midterm II</b>
22 Mar	Evolution, Phylogeny, and Taxonomy
22 Mar	Lab: <a href="#">Sharks, Fish, and Tetrapods</a> ,
27 Mar	Industry in Indiana: Stone, coal and oil
29 Mar	Field Trip: <a href="#">Tunnel Mill and Waldron Shale</a>
3 Apr	Coal (Guest lecture by Dr Maria Masterlerz)
5 Apr	Biostratigraphy, Correlation, and Extinction
5 Apr	Lab: <a href="#">Species identification and projects</a>
10 Apr	What we miss: Mesozoic and Cenozoic
12 Apr	Field trip: <a href="#">Stobo bioherm and Lake Monroe</a>
17 Apr	Quaternary environments and glacial cycles
19 Apr	People come to Indiana and the Late Pleistocene Extinction
19 Apr	Lab: <a href="#">Quaternary taxa</a>
24 Apr	Paleoindians and the White River Valley (Guest lecture by Ed Herrmann)
26 Apr	Back to the present, and the future
26 Apr	Lab: <a href="#">project presentations</a>
1 May	<b>Final: Wed, May 1, 12:30-2:30 PM</b>