

## Colonnade Program Course Proposal: Explorations Category

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### **1. What course does the department plan to offer in Explorations? Which subcategory are you proposing for this course? (Arts and Humanities; Social and Behavioral Sciences; Natural and Physical Sciences)**

The Department of Geography and Geology plans to offer the existing GEOL 112 *Earth History* in the Natural and Physical Sciences subcategory within the Explorations Category.

Note: This GEOL 112 has an associated proposal with GEOL 114 *Earth History Laboratory*.

### **2. How will this course meet the specific learning objectives of the appropriate subcategory? Please address all of the learning outcomes listed for the appropriate subcategory.**

#### **Purpose of this course:**

*Earth History* is an introductory course for geology majors and minors, prospective science teachers, and students interested in a general education experience in natural science. The course provides a comprehensive survey of the major land, sea, and life patterns through geologic time from an Earth system perspective. By understanding how the Earth operated in the past, we can place present and future events in proper context. Topics include the development of geology as a science, theories concerning the origin of Earth and the solar system, nature and significance of the fossil record, stratigraphic relations, paleogeography, and global tectonics through time.

**Natural and Physical Sciences Learning Objective 1:** Demonstrate an understanding of the methods of science inquiry.

What science is and the development of geology as a science are fundamental components of this course. Throughout the semester, concepts are presented as hypotheses with clear test implications and are continually revised as our understanding of the Earth develops. Notable examples of topics that stress the methods of scientific inquiry are evolution, the age of the Earth, and climate change. These three topics are widely recognized to be “controversial” from the perspective of politics, but fundamental to a scientific understanding of our planet, and therefore represent particularly important concepts to address in a general education setting.

**Natural and Physical Science Learning Objective 2:** Explain basic concepts and principles in one or more of the sciences.

Each class meeting explores the current scientific understanding of a portion of Earth's history and the principles and concepts upon which that understanding is based. Topics such as geological time, organic evolution, paleoenvironmental reconstruction, and the causes and consequences of environmental change are introduced and scientifically investigated. Additionally, the course incorporates and builds upon concepts and principles from other disciplines, including physics, chemistry, and biology. The linkages between geology and the other physical and life sciences are emphasized throughout the course.

**Natural and Physical Science Learning Objective 3:** Apply scientific principles to interpret and make predictions in one or more of the sciences.

Early in the semester, *Earth History* focuses on what we can call ‘foundations’. Once these foundations are established, we build on them to interpret and make predictions in Earth science. For example, students learn to identify and distinguish the different sedimentary rock types and sedimentary structures (e.g., ripple marks, bedding structures). After students are comfortable with these identifications, they use them to interpret and reconstruct past environments. Other examples include Milankovitch cycles (regular fluctuations in Earth’s orbit and tilt relative to the Sun) and the movement of Earth's tectonic plates: students use that foundational knowledge to make predictions for past or future environmental conditions.

**Natural and Physical Science Learning Objective 4:** Explain how scientific principles relate to issues of personal and/or public importance.

*Earth History* directly addresses scientific concepts that are regularly in the news, such as evolution, the antiquity of the Earth, and climate change. By completing this course, students will obtain an appreciation for how scientists study these issues, where there are sources of uncertainty, and what the potential impacts are to their lives. Importantly, this course focuses on the entire history of the Earth, so it provides critical, deep-time perspective. For example, one might say the Earth was warmer when dinosaurs were alive, so the Earth will be fine if there really is global warming occurring today. A student who successfully completed *Earth History* would understand that 1) the Cretaceous is not a good analogue for future climate change, 2) conditions during the Cretaceous would have been incompatible with an Earth needing to support 7+ billion people, many of whom live perilously close to coastlines, and 3) there are better analogues in Earth’s history for evaluating how warming might impact our planet and civilization in the future.

**3. Syllabus statement of learning outcomes for course. NOTE: In multi-section courses, the same statement of learning outcomes must appear on every section’s syllabus.**

**Learning Outcomes:** After completion of GEOL 112, students will be able to:

- understand how the scientific method is used to study geological problems
- describe the methods used to establish the relative and absolute ages of geologic events, including their correlation
- explain the techniques used to reconstruct ancient geographies and environments
- describe key events of Earth history in the context of interactions of components in the Earth system
- place current changes in the Earth system, such as climate change and biodiversity loss, in their historic perspective

#### **4. Brief description of how the department will assess the course for these learning objectives.**

The Department of Geography and Geology will assess GEOL 112 for all four Natural and Physical Science Learning Objectives using a variety of tools including pre- and post-course surveys, quizzes, exercises, and examinations. These are standard assessment tools used within the Earth Sciences discipline (e.g., <http://serc.carleton.edu/introgeo/assessment/strategies.html>), and are currently in use within the WKU Geology Program. Questions will be “tagged” so that results from the assessments can be monitored to improve content delivery and assessment techniques.

Examples of specific questions designed to evaluate each of the objectives are listed below.

**Natural and Physical Sciences Learning Objective 1:** Demonstrate an understanding of the methods of science inquiry.

Essay question: “Why is evolution considered a scientific theory while other explanations for the origins of life, such as creationism, are not considered science? Provide an example from the fossil record, as discussed either in class or in your textbook, for evolution at work.”

**Natural and Physical Science Learning Objective 2:** Explain basic concepts and principles in one or more of the sciences.

Multiple-choice question: “A three-dimensional, negative imprint of a fossil organic structure is called: a) permineralization, b) carbonization, c) impression, d) mold.”

**Natural and Physical Science Learning Objective 3:** Apply scientific principles to interpret and make predictions in one or more of the sciences.

Essay question: “Let's think about Earth's present conditions and make some predictions for the future. A) How does Earth's climate over the past 100 years compare to the previous 100,000? What changes are expected in the next 1000 or so years in terms of sea level, ecosystems, and land use by humans? B) Make predictions for what the continents will look like 100,000,000 years from now. Think about the positions of the continents and features like mountains and volcanoes. Describe the processes that will lead to these changes. [Hint: You may wish to have a look at this webpage: <http://www.scotese.com/earth.htm>. Be sure to click through the various time periods listed on the left-hand side.]”

**Natural and Physical Science Learning Objective 4:** Explain how scientific principles relate to issues of personal and/or public importance.

Multiple-choice question: “As the Earth warms and tundra gives way to coniferous evergreen forests, which of the following does NOT occur? a) Albedo of the forest causes further warming of the land around the adjacent glaciers, b) Icy soil thaws and trapped methane is released into the atmosphere, c) The cooling effect of the shade from the trees helps balance out global warming, d) Ice caps beyond the tundra give way to tundra and forests.”

**5. How many sections of this course will your department offer each semester?**

The Department of Geography and Geology will offer 1 section of GEOL 112 and 1 to 2 sections of the associated laboratory (GEOL 114) each semester with a goal of enrolling 40 students per semester. Sections are offered every summer as well. We plan to monitor demand for the course and adjust offerings as necessary.

**6. Please attach sample syllabus for the course. PLEASE BE SURE THE PROPOSAL FORM AND THE SYLLABUS ARE IN THE SAME DOCUMENT.**

See attached.

# GEOLOGY 112– EARTH HISTORY

Western Kentucky University

**Instructor:** Dr. Fred Siewers

**Office Location:**

**Meeting Location:**

**Email:**

**Office Hours:**

**Meeting Times:**

**Course Description:** There are no prerequisites for this course. *Earth History* is an introductory course for geology majors and minors, prospective science teachers, and students interested in a general education experience in natural science. The course provides a comprehensive survey of the geologic and life history of Earth from an Earth system perspective. By understanding how the Earth operated in the past, we can place present and future events in proper context. Topics include the development of geology as a science, nature and significance of the fossil record, basic stratigraphic relations, theories concerning the origin of Earth and the solar system, prehistoric life, paleogeography, and global tectonics.

This course fulfills three credit hours of the Natural and Physical Sciences Explorations component of the Colonnade Program, and will help you attain these general education goals and objectives.

**Course Content Discipline:** Geology

**Credit Hours:** 3

**Note About Associated Laboratory:** GEOL 114, *Earth History Laboratory*, is designed to accompany GEOL 112. Sedimentary rocks, fossil specimens, stratigraphic concepts, and geologic maps are studied. This laboratory is required for geology majors and minors and some prospective science teachers, but is optional for most other students. GEOL 114 fulfills one credit hour of the “essential applied/lab component” of the Colonnade Natural and Physical Science Explorations category.

**Learning Outcomes:** After completion of GEOL 112, students will be able to:

- understand how the scientific method is used to study geological problems
- describe the methods used to establish the relative and absolute ages of geologic events, including their correlation
- explain the techniques used to reconstruct ancient geographies and environments
- describe key events of Earth history in the context of interactions of components in the Earth system
- place current changes in the Earth system, such as climate change and biodiversity loss, in their historic perspective

**Textbook (required) and Other Instructional Materials:**

Stanley, Steven M. 2009. *Earth System History*, 3<sup>rd</sup> ed. Freeman, New York, NY. 608 pp.

You will be required to access Blackboard, available at <http://blackboard.wku.edu>, and the *Earth System History* website, available at <http://bcs.freeman.com/esh3e>

**Attendance Policy:**

Registration in this course means that you are serious about being on time and that you are an active participant. Your regular attendance and active participation in this class is essential for your success and the success of others in this course. You are expected to attend class and roll will be taken to document attendance. Please note the following:

**10 or more absences will result in a grade of “F” for the class**

There is no penalty for missing class until you reach 10 absences. Attendance means that you should be

present at the start of class when roll is taken and that you are an active participant in class. Excused absences will only be considered if written documentation is presented. In the case of family emergencies, a note from a parent or other responsible party may be accepted if it contains a phone number by which your excuse may be verified.

### **Grading/Evaluation:**

Your understanding of course content will be assessed on the basis of exams, quizzes, and exercises as categorized below.

Hour exams – 2 at 100 pts. each	200 points
Quizzes – 5 at 20 points each	100 points
Exercises – 5 at 20 points each	100 points
Final exam	<u>100 points</u>
Total	500 points

Exam questions will consist of a combination of multiple choice, matching, fill-in-the-blank, and drawing questions. These questions will come from the lecture, textbook, and the *Earth System History* website. Quizzes and exercises will be a combination of in-class and on-line exercises. The on-line exercises will use some of the internet resources associated with the *Earth System History* textbook. On-line exercises and will be submitted through Blackboard.

Quizzes and texts will generally not be given after the day they are scheduled, nor will assignments be accepted late. In other words, only under *exceptional* circumstances will there be any “make-up” opportunities for missed tests and assignments. If you are aware of a schedule conflict that prohibits you from taking an exam or quiz or from turning in an assignment, you *must* inform the instructor *prior* to the test/quiz/assignment due date. In the case of illness, make-up tests and quizzes will only be made available to those that provide a valid written excuse.

Your grades on all work will be based on the following ranges:

A ≥ 90%, B = 80-89%, C = 70-79%, D = 60-69%, F ≤ 59%

Unless it is absolutely necessary, there will be no “curved” grades. You are only “competing” against yourself.

### **University Deadlines and Schedule Change Policy:**

The Department of Geography and Geology strictly adheres to University policies regarding schedule changes. It is the responsibility of the student to meet all deadlines for drop/add etc. Only in exceptional cases will a deadline be waived (you would be required to fill out an appeal form). The form requires a written description of the extenuating circumstances involved and the attachment of appropriate documentation. Poor academic performance, general malaise, or undocumented general stress factors are not considered legitimate circumstances.

### **Students with Disabilities:**

Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Office for Student Disability Services, DUC A200. The SDS telephone number is (270) 745-5004; TTY is 745-3030. Their website is: <http://www.wku.edu/sds/> Please *do not* request accommodations directly without a letter of accommodation from SDS.

### **General Comments:**

This class will be very note intensive; meaning, you will need to take notes regarding everything that I present in class and on what is discussed in class. Much of the lecture content will be drawn from the textbook; however, we will be jumping around some of the chapters quite a bit.

In order to do well in this class, *you must read the text* (!) and you must spend some time – every week – studying your notes and working with the available course materials. Reading the text is particularly important – it’s the only way to do really well on the quizzes and tests. Get in the habit of regularly spending time on all aspects of the course – it will pay off in the end both in terms of your grade and your comprehension of the course materials.

Regarding Stanley’s *Earth System History* (ESH) text: When you do your reading is up to you, but one strategy that seems to work is to read about lecture topics shortly after I’ve first introduced them to you in class. This approach allows you to target your reading to what was emphasized in class. It will also reinforce or clarify topics that were not clear in lecture.

### **Proposed Course Schedule**

The instructor reserves the right to make changes to the course schedule at anytime. Such changes will be promptly communicated with students by email.

<b>Week</b>	<b>Topic</b>	<b>Reading</b>
1	Introduction & the Scientific Method	ESH 1
2	Correlation and Dating of the Rock Record	ESH 1 & 6
3	Sedimentary Rocks and Environments	ESH 4 & 5
4	Sedimentary Environments	ESH 4 & 5
5	Review and Exam	
6	Diversity and Evolution of Life	ESH 3 & 7
7	Evolution and Precambrian Life	ESH 7
8	Precambrian Geology	ESH 11 & 12
9	Early Paleozoic World	ESH 13
10	Review and Exam	
11	Middle Paleozoic World	ESH 14
12	Late Paleozoic World	ESH 15
13	Mesozoic Geology	ESH 16 & 17
14	Mesozoic Life and Extinction	ESH 16 & 17
15	Cenozoic World	ESH 18 & 19
16	Final Exam	

### **Final Comments:**

**Above All, This Course Is Meant To Be A Fun Learning Experience!** I am going to do what I can to make this course an interesting learning experience; on that is well worth your time and energies. At the same time I’m going to continually work to find ways to challenge and motivate you to do your best. Maintain a good attitude, work hard, and ask questions whenever you need help.

**HAVE A GOOD SEMESTER!!**