Term Information

Effective Term	Autumn 2021
Previous Value	*Spring 2020*

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

GE Physical Science Laboratory designation

What is the rationale for the proposed change(s)?

This is course is functionally identical to the lab component of Earth Science 1121, an existing course that fulfills the GE Physical Science with lab requirement.

We propose that the stand-alone lab meets the requirements of a physical science GE lab.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

This add flexibility for many students:

(1) Permits students more control over their schedules

(2) Transfer students can earn GE Lab credit without repeating 3-credits of course-based work when only missing the lab

(3) Permits students to earn GE Lab credit when paired with many of our GE physical science classes.

Is approval of the requrest contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Earth Sciences
Fiscal Unit/Academic Org	School of Earth Sciences - D0656
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	1200
Course Title	Introduction to Earth Science Laboratory
Transcript Abbreviation	Intro EarthSc Lab
Course Description	Laboratory application of basic earth sciences principles to the identification and categorization of rocks and minerals, use and construction of maps to solve geological problems, and analysis of Earth's physical processes.
Semester Credit Hours/Units	Fixed: 1

Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week, 6 Week, 4 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Laboratory
Grade Roster Component	Laboratory
Credit Available by Exam	No
Admission Condition Course	No

Off Campus	Never
Campus of Offering	Columbus, Lima, Mansfield, Marion, Newark

Prerequisites and Exclusions

Prerequisites/Corequisites	Prereq or concur: 1105, 1108, 1121, 1151, 2203, 2205, 2206, or 2206S
Previous Value	*Prereq or concur: 1105, 1108, 1151, 2203, 2205, 2206, or 2206S.*
Exclusions	Not open to students with credit for 1100 or 1122. Not open to students with credit for EarthSc 1121 prior to Au 21.
Previous Value	Not open to students with credit for 1100, 1121, or 1122.
Electronically Enforced	Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	40.0601
Subsidy Level	Baccalaureate Course
Intended Rank	Freshman, Sophomore, Junior

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors
General Education course:
Physical Science; Natural Sciences
The course is an elective (for this or other units) or is a service course for other units

Previous Value

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

- Introduction to basic earth science skills, including

(1) the identification and categorization of rocks and minerals,

(2) use and construction of maps to solve geological problems,

(3) analysis of Earth's physical processes.

Content Topic List

- Identification and Classification of Minerals
- Identification and Classification of Igneous Rocks
- Identification and Classification of Metamorphic Rocks
- Identification and Classification of Sedimentary Rocks
- Plate Tectonics and mapping
- Age dating of materials
- Groundwater, streams, and flooding
- Methods in paleoclimatic reconstructions

Sought Concurrence No

Attachments

- EARTHSC1200 Syllabus.docx: syllabus

  (Syllabus. Owner: Panero,Wendy R)

- ES 1200 GE Assessment Plan.docx: Proposal and Assessment plan

  (GEC Course Assessment Plan. Owner: Panero,Wendy R)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Panero,Wendy R	01/15/2021 01:58 PM	Submitted for Approval
Approved	Panero,Wendy R	01/15/2021 01:59 PM	Unit Approval
Approved	Haddad,Deborah Moore	01/15/2021 05:32 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Oldroyd,Shelby Quinn Hilty,Michael Vankeerbergen,Bernadette Chantal	01/15/2021 05:32 PM	ASCCAO Approval

EARTHSCI 1200 Introduction to Earth Science Lab Syllabus

Semester YEAR

Instructor: NAME
Email: EMAIL.#
Mailbox: Mendenhall 275
Office: Office ###
Office Hours: Time, Day
Required: (free, online) "An Introduction to Geology," Johnson et al., 2017:
http://opengeology.org/textbook/

Meeting: Once a week, 110 minutes

Course goals and learning objectives:
Students will demonstrate competency in the hands-on aspects of basic earth sciences principles, including
(1) the identification and categorization of rocks and minerals,
(2) use and construction of maps to solve geological problems,
(3) analysis of Earth's physical processes.

This course is designed to provide hands on experience with geologic materials and modern geological methods as a complement to Earth Sciences 1105, 1108, 1151, 2203, 2204, 2205, and 2206.

Grading:

Grading weights
5% lab quizzes
95% lab assignments, equally weighted
Extra Credit
Up to 5% on each lab assignment, for the weekly "What is this rock?" bonus.
Grading Scale
100-93% **A**; 92.9-90% **A-**; 89.9-87% **B+**; 86.9-83% **B**; 82.9-80% **B-**; 79.9-77% **C+**; 76.0-73% **C**;
72.9-70% **C**-; 69.9-67 **D**+; 66.9-60 **D;** 59.9-0 **E;**

Lab meetings: Each week will follow the same pattern: a 5-minute quiz to assess your preparation for the week's lab, a 10-20 minute introductory lecture on the background material and process for the lab, and then at least 85 minutes to complete the laboratory assignment before the end of the period.

Quizzes:
- Each meeting will begin with a brief quiz on the introductory material for each lab assignment. Be certain to allow at least 30-60 minutes to read this material carefully before lab.
- You will not be tested on the gritty details, which we expect you to learn during the activity—focus on answering the question, "What will I do in lab and why?"

Due Dates and Late Assignments:
- Lab assignments are due at the end of your scheduled lab period. Late assignments will not be accepted.
- All work will be graded; **the two lowest weekly lab assignment grades for the semester will be dropped.**

Attendance:

- Attendance will be taken at each lab.

Make-Up Labs:

- Your attendance is expected and required at every assigned lab session and **no make-up labs** will be scheduled.

General Rules:

- **Show courtesy and respect** to your instructor and lab mates.
- Students must either tear out lab book sheets or bring photocopies. Labs completed on loose-leaf paper **will not be accepted**. Do not come to class with completed labs or pre-marked labs.
- Working in groups will be common in this course, but **turn in individual work and ideas.** Plagiarism and cheating (e.g. copying answers) will not be tolerated and will be handled according to OSU's academic misconduct policy.
- When a question prompts you to show work, **you must show your work** and use **proper units** to get full credit for problem. Be thorough—show your entire process in a way that is COHESIVE and NEATLY WRITTEN. Indicate final answers by boxing in answer.
- Students are responsible for keeping track of their own grades and should retain graded labs until final grades received.
- Students with disabilities: please notify the lab instructor of recommended accommodations as soon as possible.

What I expect of you:

- Communicate issues (scheduling, struggles with coursework, disability, family emergency, etc.) in a *timely manner*
- ASK QUESTIONS...these labs fit a lot of content into a short lab period. If you are stuck on a question, ask for help sooner rather than later so you will finish the lab on time.
- Treat your classmates and instructor with respect—there is no tolerance for hate or discrimination in this classroom and any instances of this will be reported to disciplinary councils.

Lab Schedule:

Week of…	**Lab Name (Found in Lab manual)**	**Preparatory Reading**
Jan 7th	The Scientific Method: hypothesis testing with a focus on measurements, precision, and units	Introduction to Geology: Chapter 1 & the lab assignment
Jan 14th	Minerals: Applying the Scientific Method with multiple measurements of physical properties	Introduction to Geology: Chapter 7 & the lab assignment
Jan 21st	**No labs**	
Jan 28th	Geologic Time: Relative and absolute dating across time and space	Introduction to Geology: Chapter 2 & the lab assignment
Feb 4th	Rocks and the Rock Cycle:	Introduction to Geology: Chapter 9 & the lab assignment
Feb 11th	Fossils	Introduction to Geology: Chapter 4 & the lab assignment
Feb 18th	Tectonics	Introduction to Geology: Chapter 3 & the lab assignment
Feb 25th	Hotspots	Introduction to Geology: Chapter 4
Mar 4th	Ground Water Quality: of the South Oval	Introduction to Geology: Chapter 5

Mar 11th	**No labs**	
Mar 18th	Introduction to Geodesy	Introduction to Geology: Chapter 6
Mar 25th	Natural Hazards	The lab assignment
Apr 1st	Paleoclimate	Introduction to Geology: Chapter 15 & the lab assignment
Apr 8th	Earthquake locations; Earth structure	Introduction to Geology: Chapter 11 & the lab assignment
Apr 15th	Coastal processes	Introduction to Geology: Chapter 11 & the lab assignment

Disability Services

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Statement on Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/.

Student Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.

Statement on Harassment

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.eduor by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

GE COURSE PROPOSAL AND ASSESSMENT PLAN FOR EARTHSCI 1200: Introductory Earth Science Lab

INTRODUCTION

We submit the existing course, EarthSci 1200, Introductory Earth Science Lab, for GE approval. Included is our GE assessment plan for this 1-credit hour laboratory course teaching the basic skills and techniques in the Earth Sciences. Introduction to Earth Science Lab (EarthSci 1200) meets the University Bachelor of Arts and Bachelor of Science GE requirement as a laboratory course to be paired with several introductory-level Earth Sciences courses.

We would seek to initiate this as a GE course in the College of Arts and Sciences, School of Earth Sciences, in the fall semester of 2021. This course is designed to align with the GE category of Natural Science (Physical Science) goals and learning outcomes.

Together with this proposal, we also propose to restructure the existing Earth Science 1121: The Dynamic Planet. ES 1121 is currently a 4-credit hour course, taught as a 3-credit hour lecture with 1-credit hour of lab. We will propose reducing ES 1121 to a 3-credit course *removing the lab*. During the School of Earth Sciences curriculum revision study (2018-2019), a study of our course ELO showed that most of our GE courses covered similar scientific concepts but drawing on different themes. That is, each cover the age of the Earth, Plate Tectonic theory, and the dynamical processes of earthquakes and volcanic eruptions that result. Each class covers the history of climate on Earth and the science of climate change. While ES 1121 covers these topics in a traditional format, as an example, National Parks (1105) covers these topics as demonstrated at different US National Parks; and Gemstones (1108), covers these through the formation and mining of earth materials for technological and artistic purposes. The EarthSc 1200 class was proposed in 2019 as a means for Earth Science majors to begin the major with any of these classes, and complete the introductory lab, *containing the identical laboratory exercises as in Earth Science 1121*, to be well prepared for the major.

As the labs in EarthSc 1200 are *identical* to the labs in EarthSc 1121, we propose that the EarthSc 1200 laboratory class count for students in the GE, such that any pair of the 3-credit GE pre- or co-requisite courses *plus* 1-credit EarthSc 1200 be awarded GE Physical Science credit *with lab*.

Current Prereq and concur: 1105, 1108, 1121, 1151, 2203, 2205, 2206, or 2206S. Not open to students with credit for 1100, or 1122. Not open to student with credit to 1121 prior to AU21.

COURSE DESCRIPTION

This course provides an introduction to aspects of basic earth science principles, including the history of the planet, the identification and categorization of rocks in the context of how they form, the use of maps to solve geological problems, and the analysis of Earth's physical and chemical processes. The goal of this course is for students to gain hands-on access to physical samples and modern geological equipment through an interactive learning environment.

The foundation of Natural Science is fully met in the course as students will (1) develop an intuition for the age- and time-scales of the Earth, (2) apply the scientific method to identify natural materials, and (3) use those concepts to understand plate tectonics, volcanism, climate, and other processes at the Earth surface.

GE RATIONALE

The following section discusses how each individual GE expected learning outcome will be met in most or all of the: (a) course objectives, (b) readings, (c) topics, and (d) weekly assignments

GE Physical Sciences ELO1: Students understand the basic facts, principles, theories and methods of modern science.

- Laboratory activities focus on fundamental principles of the scale and age of the Earth, and the modern theory of Plate Tectonics.
- The above topics are addressed through pre-reading of the laboratory assignment, hands-on activities, and quantitative exercises.

GE Physical Sciences ELO2: Students understand key events in the development of science and recognize that science is an evolving body of knowledge.

- Laboratory activities explore the development of the theory of plate tectonics using many of the same datasets used to for the discovery of the theory, as well as additional exercises exploring the age of the Earth and modern tools for age dating.
- The above topics are addressed through pre-reading of the laboratory assignment, hands-on activities, and quantitative exercises.

GE Physical Sciences ELO3: Students describe the inter-dependence of scientific and technological developments.

- Laboratory activities explore techniques such as GPS both for every-day navigation as well as for the demonstration of present-day plate motion. Other exercises explore modern radiometric age-dating techniques to establish the age of the Earth as well as the timing of more recent (1Ma) climate change history.
- The above topics are addressed through pre-reading of the laboratory assignment, hands-on activities, and quantitative exercises.

GE Physical Sciences ELO4: Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

- Laboratory activities explore the pros and cons of the historical, environmental, socio-economic, ethical and moral impacts of mineral exploration, development of GPS by the military industrial complex, climate change impacts on human societies, and natural hazards.
- The above topics are addressed through pre-reading of the laboratory assignment, hands-on activities, and quantitative exercises.

EXPECTED LEARNING OUTCOMES (ELOS)

The following table presents the general topics addressed throughout the course and how each topic aligns with the GE Natural Science (Physical Science) category expected learning outcomes in general terms.

						EXISTING GE Expected Learning Outcomes				NEW GE Foundation Expected Learning Outcomes					
Topic #	Topic List	# of Weeks	Course ELO 1	Course ELO 2	Course ELO 3	PS ELO 1	PS ELO 2	PS ELO 3	PS ELO 4	1.1	1.2	1.3	2.1	2.2	2.3
0	Preassessment, introduction	0													
1	Scientific Method, basic numerical skills	1		x		x	x			x	x	x	x		x
2	minerals	1	x		x	x			x	x		x			x
3	geologic time	1		x	x	x	x	x	x	x	x	x			x
4	rocks and rock cycle	1	x		x	x		x		x		x			x
5	Fossils	1		x	x	x				x	x	x			x
6	Plate tectonics	1	x	x	x	x	x	x	x	x	x	x	x		x
7	Hotspots	1	x	x	x	x	x			x	x	x	x		x
8	Ground water	1	x		x	x		x	x	x		x	x	x	x
9	Geodesy	1	x	x	x	x		x	x	x	x	x	x		x
10	Natural Hazards	1	x	x	x	x	x	x	x	x	x	x	x	x	x
11	Paleoclimate	1			x	x	x	x	x	x	x	x		x	x
12	Earthquakes	1		x	x	x		x	x	x	x	x		x	x
13	Coastal processes	1		x	x	x				x		x		x	x

PS ELO 1: Students understand the basic facts, principles, theories and methods of modern science.
PS ELO 2: Students understand key events in the development of science and recognize that science is an evolving body of knowledge
PS ELO 3: Students describe the inter-dependence of scientific and technological developments.
PS ELO 4: Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contempo
Students will demonstrate competency in the hands-on aspects of basic earth sciences principles, including
Course ELO 1: the identification and categorization of rocks and minerals
Course ELO 2: use and construction of maps to solve geological problems,
Course ELO 3: analysis of Earth's physical processes.

New Foundation ELO

GOAL 1 Successful students will engage in theoretical and empirical study within the natural sciences, while gaining an appreciation of the modern principles, theories, methods,
- 1.1 Explain basic facts, principles, theories and methods of modern natural sciences; describe and analyze the process of scientific inquiry
- 1.2 Identify how key events in the development of science contribute to the ongoing and changing nature of scientific knowledge and methods
- 1.3 Employ the processes of science through exploration, discovery, and collaboration to interact directly with the natural world when feasible, using appropriate tools, model

GOAL 2 Successful students will discern the relationship between the theoretical and applied sciences, while appreciating the implications of scientific discoveries and the potenti
- 2.1 Analyze the inter-dependence and potential impacts of scientific and technological developments
- 2.2 Evaluate social and ethical implications of natural scientific discoveries
- 2.3 Critically evaluate and responsibly use information from the natural sciences

COURSE ASSESSMENT STRATEGY

Two techniques will be used to assess the extent to which the course satisfies expected learning outcomes (ELOs) associated with the Natural Science (Physical Science) category. These will include:

(1) A direct method to asses student performance with respect to the ELOs. The first week of lab includes a module for pre-assessment of the GE ELOs to assess pre-existing knowledge and capabilities for each GE ELO using selected questions from the Geoscience Concept Inventory (Libarkin & Anderson, 2006) and the Climate Change Concept Inventory (Libarkin et al., 2018), in which points are awarded to students entirely based on participation. The same questions are given again at the end of the relevant lab assignment, and improvement will be tracked as a cohort basis.

(2) An indirect method to track student knowledge, learning experience and perceptions in the form of a student survey (pre and post-tests) given at the beginning of course and at the end of course. Relevant survey questions are the same both times. Changes in the answers from beginning to end of the semester characterize the impact of the course on its students and serve as a guide for adjustments to course contents, organization, etc. The survey questions will be repeated each semester. These questions will include a survey on whether students are taking lab and lecture classes concurrently, attitudes towards science and the scientific process.

http://dbserc.pitt.edu/Assessment/Assessments-Geological-Sciences

GE Expected Learning Outcomes	**Methods of Assessment** **Direct methods are required. Additional indirect methods are encouraged.*	**Level of student achievement expected for the GE ELO.** *(for example, define percentage of students achieving a specified level on a scoring rubric)*	**What is the process that will be used to review the data and potentially change the course to improve student learning of GE ELOs?**
ELO 1 Students understand the basic facts, principles, theories and methods of modern science.	**1.** Pre- and post-testing of relevant Geoscience Concept Inventory and Climate Change Concept Inventory questions. Pre and Post tests are identical to check gains in understanding of material. **2.** End of Semester Self-Assessment Questionnaire (10 questions) were students indicate which of the following responses they feel better represents their knowledge on end of course goals (see syllabus): *Extremely well/very well/adequately well/not very well/not at all*	**1.** The expectation is that 80% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections, and that 90% of students improve their performance from the pre-testing **2.** The expectation is that 80% of students report the level of "adequately well" or better	Standardized questions for which fewer than 80% of students give a correct answer will be pinpointed as areas of weakness. To address weaknesses instructor will analyze the instructional materials and craft changes. While the lab activities are designed to be stand-alone activities with prerequisite understanding presented by the lab instructor during the introduction, of particular concern is differential performance of students arising from differences in the lecture-based course of enrollment, including content in those courses and sequencing of material as it may differ across courses. Student pre- and post-testing results and end-of-course self-assessment responses will be broken out by lecture-based course of enrollment and assessed.
ELO 2 Students learn key events in the development of science and recognizes that science is an evolving body of knowledge.	**1.** Pre- and post-testing of relevant Geoscience Concept Inventory and Climate Change Concept Inventory questions. Pre and Post tests are identical to check gains in understanding of material. **2.** End of Semester Self-Assessment Questionnaire (10 questions) were students indicate which of the following responses they feel better represents their knowledge on end of course goals	**1.** The expectation is that 80% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections, and that 90% of students improve their performance from the pre-testing **2.** The expectation is that 80% of students report the level of "adequately well" or better	

	(see syllabus): *Extremely well/very well/adequately well/not very well/not at all*		
<u>ELO 3</u> Students describe the inter-dependence of scientific and technological developments.	**1.** Pre- and post-testing of relevant Geoscience Concept Inventory and Climate Change Concept Inventory questions. Pre and Post tests are identical to check gains in understanding of material. **2.** End of Semester Self-Assessment Questionnaire (10 questions) were students indicate which of the following responses they feel better represents their knowledge on end of course goals (see syllabus): *Extremely well/very well/adequately well/not very well/not at all*	**1.** The expectation is that 80% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections **2.** The expectation is that 85% of students achieve 80% or higher based on grading rubric. **3.** The expectations is that students would increase their knowledge per goal by at least 25%. **4.** The expectation is that 100% of students will feel they have achieved the goal at the level of "adequately well" or better	
<u>ELO 4</u> Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.	**1.** Pre- and post-testing of relevant Geoscience Concept Inventory and Climate Change Concept Inventory questions. Pre and Post tests are identical to check gains in understanding of material. **2.** End of Semester Self-Assessment Questionnaire (10 questions) were students indicate which of the following responses they feel better represents their knowledge on end of course goals	**1.** The expectation is that 80% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections **2.** The expectation is that 85% of students achieve the level of "acceptable" or better **3.** The expectations is that students would increase their knowledge per goal by at least 25%.	

	(see syllabus): *Extremely well/very well/adequately well/not very well/not at all*	**4.** The expectation is that 100% of students will feel they have achieved the goal at the level of "adequately well" or better.	

Example questions:

GE ELO 1 (and course ELO 2&3; Libarkin & Anderson, 2006, question 65):

The map below shows the position of the Earth's continents and oceans today. The gray areas represent land, and the white represents water. Which of the following best explains why the ocean basins look the way they do?

(A) Meteor impacts caused the ocean basins to form this way
(B) Continents moving caused the ocean basins to form this way
(C) The Earth cooling caused the ocean basins to form this way
(D) The Earth warming caused the ocean basins to form this way

GE ELO 2 evolving body of knowledge (and course ELO 3)

Before acceptance of the theory of plate tectonics, the distribution of similar fossils of either side of the Atlantic ocean was explained by
(A) land bridges spanning the continents that species could walk across
(B) ability of species that normally lived on land to swim across the oceans
(C) it could not be explained
(D) the species evolved independently on different continents

GE ELO 3 (and course ELO 1&3; Libarkin & Anderson, 2006, question 4):

Which technique for determining when the Earth first formed as a planet is most accurate?
(A) Comparison of fossils found in rocks
(B) Comparison of layers found in rocks
(C) Analysis of uranium found in rocks
(D) Analysis of carbon found in rocks
(E) Scientists cannot calculate the age of the Earth

GE ELO 4 (and course ELO 2&3; Libarkin et al., 2018, question 16):

Which of the following can be caused by climate change? CHOOSE ALL THAT APPLY.

A. Climate change can cause food shortages.
B. Climate change can cause changes in temperature.
C. Climate change can cause water shortages.
D. Climate change can cause changes in weather.
E. I do not know.