

Term Information

Effective Term Autumn 2018
Previous Value Summer 2012

Course Change Information

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

Add the option to offer the course in the hybrid format. We will continue to offer the in-person course as well.

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

To offer flexibility for students while maintaining in-person, hands-on experience in laboratory for all students. All students will have access to the same lecture content whether taken in person or through the hybrid model, and all students are assessed on the same standards.

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)?

None.

Is approval of the request 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 1100
Course Title Planet Earth: How It Works
Transcript Abbreviation Planet Earth
Course Description The materials of the Earth's crust, the processes that produce and modify them, the development of the Earth and its life forms through time, and responsible stewardship of the earth's resources. Not intended for ASC B.S. students.
Semester Credit Hours/Units Fixed: 4

Offering Information

Length Of Course 14 Week, 12 Week, 8 Week, 7 Week, 6 Week, 4 Week
Flexibly Scheduled Course Sometimes
Does any section of this course have a distance education component? Yes
Is any section of the course offered Greater or equal to 50% at a distance
Previous Value No, Greater or equal to 50% at a distance
Grading Basis Letter Grade
Repeatable No
Course Components Laboratory, Lecture
Grade Roster Component Lecture
Credit Available by Exam Yes
Exam Type EM Tests via Office of Testing
Admission Condition Course Yes
Admission Condition Natural Science

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

Prerequisites and Exclusions

Prerequisites/Corequisites

Exclusions Not open to students with credit for EarthSci 100 or GeolSci 100.

Electronically Enforced No

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 40.0601
Subsidy Level General Studies Course
Intended Rank Freshman, Sophomore, Junior, Senior

Requirement/Elective Designation

General Education course:
Physical Science

Course Details

Course goals or learning objectives/outcomes • This course provides a basic introduction to the principles and methods of Earth Science, and its relevance to daily life and the problems of the contemporary world.

Previous Value

Content Topic List

- Origins of universe, solar system, and Earth
- Atoms and minerals
- Igneous, sedimentary, and metamorphic rocks
- Composition and structure of Earth
- Plate tectonics
- Volcanoes
- Earthquakes
- Weathering, soils
- Deep time, relative and absolute age
- Origin of life, history of life, evolution
- Streams and groundwater
- Oceans and atmospheres
- Glaciers, global climate change
- Petroleum and mineral deposits and exploration

Sought Concurrence No

Attachments

- Earth Sciences 1100 Costa.pdf: ASC Tech approval
(Other Supporting Documentation. Owner: Panero,Wendy R)
- syllabus-AU17e.pdf: hybrid syllabus
(Syllabus. Owner: Panero,Wendy R)
- EarthSci100_GEC_Learning_Assessment_Report.pdf: GE Assessment plan
(GEC Course Assessment Plan. Owner: Panero,Wendy R)
- ES1100_syllabus_Sp2018Lower.pdf: in-person syllabus
(Syllabus. Owner: Panero,Wendy R)
- es1100_lab_syllabus.pdf: in-person lab syllabus
(Syllabus. Owner: Panero,Wendy R)

Comments

- The GE assessment plan is unaffected by the format of the lecture instruction; assessment is performed through embedded questions in quizzes and exams equally in person and online. *(by Panero,Wendy R on 01/29/2018 12:42 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Panero,Wendy R	01/29/2018 01:04 PM	Submitted for Approval
Approved	Panero,Wendy R	01/29/2018 01:04 PM	Unit Approval
Approved	Haddad,Deborah Moore	02/04/2018 01:33 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Oldroyd,Shelby Quinn Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler	02/04/2018 01:33 PM	ASCCAO Approval



EARTH SCIENCES 1100

PLANET EARTH: HOW IT WORKS ***(hybrid offering – 50% online)***

School of Earth Sciences

Instructor: Ozeas S. Costa, Jr.
Office: 395 Ovalwood Hall
Telephone: 419-755-4128
E-mail: costa.47@osu.edu
Office hours: Tue 10:00-11:00am, Wed 1:00-2:00pm, Thu 4:00-5:00pm
Class times: Wed 3:00-5:20 pm OR Thu 1:30-3:50 pm
Location: Conard 239 (Geology Lab)
Online access: <http://carmen.osu.edu>
Carmen Connect: <https://carmenconnect.osu.edu/es1100/>

Course Description

GE Category: Natural Science – Physical Science

“Planet Earth: How it Works” is an introductory course describing the fundamental concepts of Geology for non-Science majors. It contains 24 lessons grouped in 7 modules. Module I (Geology and the Scientific Method) explores the definition of geology, its many branches, and the nature of science and the scientific method. Module II (Origin and Evolution of Earth) discusses the formation of the universe, the solar system, and our planet’s internal structure. Module III (Plate Tectonics and the Dynamic Earth) discusses Earth’s internal structure and introduces the theory of plate tectonics, a unifying idea that explains the Earth’s processes. Module IV (Earth Materials: Minerals and Rocks) discusses the materials from which Earth is made, as well as their structure and classification, and how Earth’s internal and external processes interact to produce volcanoes, earthquakes, mountains and oceans. Module V (Geologic Time and the Age of Earth) deals with the geologic time and how geologists calculate the age of rocks and other Earth materials. It also discusses the evolution of life on the planet from a geological perspective. Module VI (Energy Resources) describes the energy resources that the Earth provides us and how they are produced and used. Module VII (Hydrology and Landscape Geomorphology) discusses how water (and the lack thereof) shapes the surface of our planet and help creates a multitude of erosional and depositional landforms.

GE Expected Learning Outcomes

This course provides a basic introduction to the principles, theories, and methods of Earth Science, the relationship between science and technology, the implications of scientific discoveries, and the potential of science and technology to address problems of the contemporary world. It fulfills the learning objectives of the GE Natural Science requirement and provides a laboratory experience for students.

Learning Outcome 1: Students explain and recall the basic facts, principles, theories and methods of modern earth science, including: the formation and structure of the Earth; plate tectonics; Earth materials; geologic time; natural hazards; hydrologic cycle; controls on global climate; and human sustainability. Students should be able to describe how the Earth operates as a system and apply the scientific method. ***This fulfills the first objective of the GE Natural Science requirement: Students understand the basic facts, principles, theories and methods of modern science.***

Learning Outcome 2: Students describe and explain the significance of key events in the history of earth science, especially the development of plate tectonic theory. Students should also learn key events in the geological, hydrological, atmospheric and biological history of the Earth. ***This fulfills the second objective of the GE Natural Science requirement: Students understand key events in the development of science and recognize that science is an evolving body of knowledge.***

Learning Outcome 3: Students will be able to discuss the inter-dependence of scientific and technological developments in measuring and modeling physical and chemical aspects of the Earth and the natural environment. ***This fulfills the third objective of the GE Natural Science requirement: Students describe the inter-dependence of scientific and technological developments.***

Learning Outcome 4: Students will explain the ways in which aspects of earth science impact society. Students should be able to describe the relationship between science and societal decision-making pertaining to natural hazards, natural resources, global climate and human sustainability. ***This fulfills the fourth objective of the GE Natural Science requirement: Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.***

Course Textbook (required)

Visualizing Geology, by Barbara Murck, Brian Skinner, and Dana Mackenzie, 2nd ed. (2009 - ISBN 9780470419472) or 3rd ed. (2012 - ISBN 9781118129869), John Wiley & Sons. For more information about the textbook, as well as access to an electronic version, visit: <http://www.wiley.com/WileyCDA/WileyTitle/productCd-EHEP000298.html>

Additional (not required) Textbooks

Essentials of Geology, by Stephen Marshak, 5th Ed. (2016), W. W. Norton & Company, 689 pp., ISBN 0393263398

GEOL 2, by Reed Wicander and James Monroe, 2nd Ed. (2013), Brooks/Cole – Cengage Learning, 422 pp., ISBN 1-133-10874-1

Exploring Geology, by Stephen Reynolds, Julia Johnson, Michael Kelly, Paul Morin, and Charles Carter, 1st Ed. (2008), McGraw-Hill, 575 pp., ISBN 0073135151

The Good Earth: Introduction to Earth Science, by D. McConnell, D Steer, C. Knight, K. Owens, and L. Park, 1st Ed. (2008), McGraw-Hill, 536 pp., ISBN 0073018473

The Earth System, by Lee Kump, James Kasting, and Robert Crane, 2nd Ed. (2003), Prentice Hall, 432 pp., ISBN 0131420593

Earth System Science, by Michael Jacobson, Robert Charlson, Henning Rodhe, and Gordon Orians, 1st Ed. (2000), Academic Press, 527 pp., ISBN 012379370X

Understanding Earth, by J. Grotzinger, T.H. Jordan, F. Press, and R. Siever, 5th Ed. (2007), W.H. Freeman & Company, 579 pp., ISBN 0716766825

Essentials of Geology, by Frederick Lutgens, Edward Tarbuck, and Dennis Tasa, 9th Ed. (2005), Prentice Hall, 504 pp., ISBN 0131497499

Earth Science, by Edward Tarbuck and Frederick Lutgens, 11th Ed. (2006), Prentice Hall, 726 pp., ISBN 0131497510

Technical Requirements

In order to be successful in this class, you will need access to a **reliable computer connected to the Internet**. Below are links to the technical requirements (including hardware and software) for the course. Additionally, we recommend your Internet connection be broadband or better (DSL, Road Runner, etc.). Dialup will NOT likely be adequate to meet your needs. If you do not have access to a computer at home, all of the campus computer labs meet these requirements. For information on campus computer labs: http://www.mansfield.osu.edu/HTML/computer_labs.html

For OSU's minimum hardware requirements, visit: <http://8help.osu.edu/918.html>

Software requirements for this course are:

- Web browser: We strongly recommend using Firefox as your web browser. For a free download (Mac or PC) go to <http://www.mozilla.com>. You may use Internet Explorer, but be aware that there may be some compatibility issues with certain content. Keep your plug-ins up to date to ensure compatibility.
- Free Adobe Acrobat Reader: http://www.adobe.com/go/EN_US-H-GET-READER
- Free Adobe Flash Player: http://www.adobe.com/go/EN_US-H-GET-FLASH
- Word processing software to type assignments: MS Office 365 Pro is now free to all OSU students and is available at: <http://office365.osu.edu/>.
- Anti-Virus software - free to OSU faculty, staff, and students for use on personally owned computers via the OSU Software Downloads page: <http://osusls.osu.edu/>

All course content will be delivered through **Carmen** (the OSU learning management system), including all short-lecture and feature-length videos. Carmen can be accessed from: <https://carmen.osu.edu/>

- Short-lecture videos (from YouTube) are embedded and can be watched directly from Carmen. For technical issues with YouTube videos, please visit the YouTube Help Center at <https://support.google.com/youtube/>. The Carmen support team will not be able to assist with YouTube technical issues. For YouTube privacy guidelines, go to: https://www.youtube.com/static?template=privacy_guidelines.
- Feature-length videos will be available from the OSU Secured Media Library. A link to the assigned feature-length video for each week is provided on Carmen.

You must have an active **OSU Internet Username to access Carmen**. If you are a new student or have never used your OSU Internet Username for Carmen access, you must activate your username here: <https://acctmgt.service.ohio-state.edu/Password.html>

Accessibility Policy

For more information about The Ohio State University's Web Accessibility Policy, please visit <https://www.osu.edu/resources/web/accessibility>. For accessibility on the Carmen/Canvas platform, please visit <https://community.canvaslms.com/docs/DOC-2061>. For information on how to watch YouTube videos using a screen reader, please visit: <https://support.google.com/youtube/answer/189278?hl=en>

Student Support Services

Below are the links to all academic support services available to students:

- Academic services central: <http://mansfield.osu.edu/academics/>
- Academic advising: <http://mansfield.osu.edu/academics/academic-advising/>
- Conard Learning Center: <http://mansfield.osu.edu/academics/conard-learning-center/>
- Disability services: <http://mansfield.osu.edu/academics/disability-services/>
- Bromfield Library and Information Commons: <http://mansfield.osu.edu/blic/>
- Buckeyelink (OSU's online academic center): <https://buckeyelink.osu.edu>

Ohio State Mansfield offer many other student services and resources that can help you succeed. You can find these at <http://mansfield.osu.edu/current-students/>. For services offered by the Columbus campus, go to <http://ssc.osu.edu>.

Course delivery format

The course is delivered using the “flipped classroom” concept where course content is introduced to students through activities done online (outside of class) and “homework” (i.e., concept engagement through discussion, hands-on lab activities and exercises) takes place in the classroom with the help of the instructor. For more information on the “flipped classroom” concept visit this Carmen Wiki article from UCAT:

<https://carmenwiki.osu.edu/display/10081/Understanding+the+Flipped+Classroom>

Online course components:

- PDF handouts of lecture slides (on Carmen)
- Short lecture videos (on Carmen and iTunesU)
- Video library (OSU Secured Media Library)
- Reading and video quizzes (one each per lesson) on Carmen – 30% of final grade
- Discussion forum (on Carmen) – extra points for participation
- Live web-conferencing (Carmen Connect)

Face-to-face (live) course components:

- For recitation, lecture review, group discussion, hands-on lab exercises
- Hands-on lab exercises – 20% of final grade
- Mid-term exam – 20% of final grade
- Final exam – 30% of final grade

Hands-on lab exercises are due AT THE END OF EACH FACE-TO-FACE MEETING. If you have to miss any of these hands-on, collaborative activities, make sure you contact the

instructor BEFORE the face-to-face meeting. An exercise tutorial (containing detailed information to guide you through the hands-on exercises) is available on Carmen at the beginning of every week.

All **reading** and **video quizzes** will be delivered through Carmen. You can take the quizzes anytime during that weekly window. However, once you start the quiz, you will have a limited amount of time to complete it. The amount of time available will vary depending on the number of questions on each quiz. Questions on the reading quizzes will be based on the readings for that particular week (select pages from your textbook + Essential Concepts on Carmen). The reading quiz will assess your understanding of the content (lessons) for that week. Questions on the video quizzes will be based on the assigned video(s) for that week and will assess your understanding of the material in the video.

The **mid-term exam** will cover the lecture material from lessons 1 to 15. The **final exam** is comprehensive and will cover the lecture material from lessons 1 to 22. The date and time of the exams will be posted at the course site on Carmen. There will be NO make-up quizzes or exams unless in exceptional circumstances and ONLY if discussed with the instructor in advance of the date of the quiz or exam. Please get in touch with the instructor if you think a make-up exam will be necessary during the semester.

Course Assignments and Grading Scheme

The following are the course assignments and their contribution to your final grade:

1. Reading quizzes (one per lesson) = 20% of the final grade
2. Video quizzes (one per lesson) = 10% of the final grade
3. Participation in Discussion Forums = extra points (1 per week)
4. Weekly hands-on activities (practice exercises) = 20% of final grade
5. Mid-term exam = 20% of final grade
6. Final exam = 30% of final grade

The course final grade will be determined by the following equation:

$$\mathbf{(RQ*20) + (VQ*10) + (LE*20) + (ME*20) + (FE*30) / 100}$$

Where, **RQ** is the average grade from the reading quizzes (20% of final grade),
VQ is the average grade from the video quizzes (10% of final grade),
LE is the average grade from the lab exercises (20% of the final grade),
ME is the grade from your mid-term exam (20% of the final grade), and
FE is the grade from your final exam (30% of the final grade).

All lab reports, quizzes and exams will be graded from 0 to 100. At the end of the semester, the arithmetic average for each assignment category will be calculated and multiplied by the respective factor weight as described in the formula above. The following grading scheme will be used to submit grades to the Registrar.

93 +	⇒	A	80 – 82	⇒	B-	67 – 69	⇒	D+
90 – 92	⇒	A-	77 – 79	⇒	C+	60 – 66	⇒	D
87 – 89	⇒	B+	73 – 76	⇒	C	0 – 59	⇒	E
83 – 86	⇒	B	70 – 72	⇒	C-			

Course Structure (Outline)

Module I: Geology and the Scientific Method

Essential Concept 1: What is Geology? (week 1)

Essential Concept 2: Earth as a System (week 1)

Essential Concept 3: The Scientific Method (week 1)

Module II: Origin and Early Evolution of the Earth

Essential Concept 4: Geocentrism vs. Heliocentrism (week 2)

Essential Concept 5: The Big Bang and the Modern Universe (week 2)

Essential Concept 6: The Nebular Theory and the Solar System (week 2)

Module III: Plate Tectonics and the Dynamic Earth

Essential Concept 7: The Iron Catastrophe (week 3)

Essential Concept 8: Earth's Internal Structure (week 3)

Essential Concept 9: Wegener's Continental Drift (week 3)

Essential Concept 10: New Evidence for Continental Drift (week 4)

Essential Concept 11: Paleomagnetism and Seafloor Spreading (week 4)

Essential Concept 12: Plate Motion and Plate Boundaries (week 4)

Module IV: Earth Materials: Minerals, Rocks, & Geologic Structures

Essential Concept 13: Characteristics of Earth's Minerals (week 5)

Essential Concept 14: Physical Properties of Minerals (week 5)

Essential Concept 15: Mineral Classification (week 5)

Essential Concept 16: Earth's Mineral Resources (week 5)

Essential Concept 17: Magma and Lava (week 6)

Essential Concept 18: Volcanoes and Plate Tectonics (week 6)

Essential Concept 19: Volcanic Eruptions and Hazards (week 6)

- Essential Concept 20: Magma Cooling and Crystallization (week 7)
- Essential Concept 21: Igneous Intrusions (week 7)
- Essential Concept 22: Igneous Rocks – Formation and Classification (week 7)
- Essential Concept 23: Weathering & the Formation of Sediments (week 8)
- Essential Concept 24: Products of Weathering and Soil Profiles (week 8)
- Essential Concept 25: Erosion, Sediment Transport, Mass Wasting (week 8)
- Week 9 – Mid-Term Exam
- Essential Concept 26: Sediment Transport and Deposition (week 10)
- Essential Concept 27: Sedimentation and Sedimentary Structures (week 10)
- Essential Concept 28: Sedimentary Rock Classification (week 10)
- Essential Concept 29: What is Metamorphism (week 11)
- Essential Concept 30: Types of Metamorphic Rocks (week 11)
- Essential Concept 31: Where Does Metamorphism Happen? (week 11)

Module V: Structural Geology

- Essential Concept 32: Faults and Fault Formation (week 12)
- Essential Concept 33: Earthquakes and Seismic Activity (week 12)
- Essential Concept 34: Earthquake Hazard Assessment (week 12)
- Essential Concept 35: Types of Stress and Deformation (week 13)
- Essential Concept 36: Folds and Fold Formation (week 13)
- Essential Concept 37: Geologic Structure Mapping and Mountain Building (week 13)

Module VI: Geologic Time and the Age of Earth

- Essential Concept 38: Defining the Relative Age of Rocks (week 14)
- Essential Concept 39: Stratigraphic Record and the Age of Earth (week 14)
- Essential Concept 40: A Brief History of Life on Earth (week 14)

Module VII: Energy Resources

- Essential Concept 41: Energy Needs and Sources (week 15)
- Essential Concept 42: Fossil Fuels – Oil, Coal, Natural Gas (week 15)
- Essential Concept 43: Renewable and Alternative Energy Resources (week 15)

Module VIII: Hydrology and Landscape Geomorphology

- Essential Concept 44: The Hydrological Cycle & Earth's Heat Balance (week 16)
- Essential Concept 45: Streams and Rivers – Drainage Patterns (week 16)
- Essential Concept 46: Stream Geomorphology (week 16)

Disability Service Statement

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: mcgregor.40@osu.edu; 419-755-4304; 279 Ovalwood Hall, 1760 University Drive.

Statement on Academic Misconduct

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct (<http://studentaffairs.osu.edu/csc/>), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute "Academic Misconduct."

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered

an “excuse” for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct. If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University’s Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me or the Office of Student Affairs (Tel: 419-755-4034; E-mail: hight.6@osu.edu) or check the following sources of information:

The Committee on Academic Misconduct: <http://oaa.osu.edu/coam/home.html>

Preserving Academic Integrity: <http://oaa.osu.edu/coam/ten-suggestions.html>

Student Conduct

The code of student conduct (CSC) is established to foster and protect the core missions of the university, to foster the scholarly and civic development of the university's students in a safe and secure learning environment, and to protect the people, properties and processes that support the university and its missions. Learn more about the CSC at:

http://studentaffairs.osu.edu/resource_csc.asp. Students who violate faculty expectations may be subject to the code of conduct. For mental health and other behavioral related concerns, contact Student Life at 419-755-4317 and ask for an appointment with the Chief Student Life and Retention Officer. As a responsible community member, do not allow others to act inappropriately and impact the community.

Discrimination

The Ohio State University at Mansfield is committed to providing a learning, working and living environment that promotes personal integrity, civility and mutual respect in an environment free of discrimination of any type. This includes students creating a hostile environment for other students. To file a complaint, contact Student Life at 419-755-4317 and ask for an appointment with the Chief Student Life and Retention Officer; or Human Resources at 419-755-4047 and ask for an appointment with the Chief Human Resources Officer, who will connect you with the appropriate Columbus Offices.

Title IX and Sexual Misconduct

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 such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find more information and the appropriate resources at <http://titleix.osu.edu/>.

HOW TO REPORT

Reports of sexual misconduct can be made to one of the following individuals:

- TITLE IX Investigator:
Donna L. Hight, Ph.D., Chief Student Life and Retention Officer
419-755-4317 / hight.6@osu.edu
- CAMPUS POLICE DEPARTMENT
Sgt. Jeff Hoffer
419-755-4210 / hoffer.30@osu.edu
- CAMPUS SEXUAL ASSAULT ADVOCATE
Sarah Metzger
419-565-2489 / smetzger@thedvshelter.com

Notice of an incident to the officials listed above, other than the Campus Sexual Assault Advocate, is considered official notice to the university. You can expect reports received by these individuals to be investigated and properly resolved through administrative procedures. Information will be shared only as necessary with investigators, witnesses, and the accused individual. The Campus Sexual Assault Advocate is considered a confidential resource.

For support without immediate investigation, please contact Student Advocacy at 614-292-111 (<http://advocacy.osu.edu/sexual-violence/>) or the local Domestic Violence Shelter at 419-774-5840 (<http://www.thedvshelter.com/>).

Drop/Withdrawal Statement

It is the student's responsibility to know the deadlines for dropping a course or withdrawing from the University. Term drop & withdrawal deadlines can be found at: <http://registrar.osu.edu> (click on the current term under "Important Dates" and scroll down to ADD/DROP/WITHDRAW DEADLINES). If you receive financial aid, you should

always talk with a financial aid specialist prior to adjusting your schedule. If you stop attending a course but do not drop it, you risk receiving a failing grade which could negatively affect your GPA and your financial aid status. You can call 419-755-4317 to set up an appointment with an academic advisor or a financial aid specialist in 104 Riedl Hall.

Retention Statement

The Ohio State University-Mansfield is committed to the success of students. If you are having academic or personal difficulties, you can contact the Student Life and Retention Services or Darla Myers at 419-755-4036, for referral resources.

The Writing Center

The Writing Center (<http://english.mansfield.ohio-state.edu/writing/>) provides free individual writing consultation for students of all writing abilities and in any course or field of study. The Writing Center assists students in the production of writing assignments and in the development of best writing practices. You are welcome to use Writing Center services on a walk-in basis, or by appointment. They are located on the first floor of Ovalwood Hall (OV-136). The computer classrooms (Ovalwood 114, 120, 131, and 135) are available for writing and research when they are not in use as classrooms.

The Writing Center Director is James Snyder; his office is OV-136A, and he can be contacted at snyder.524@osu.edu or 419-755-4371. Visit or e-mail the Writing Center at mans-writingcenter@osu.edu. The Writing Center is also available during extended hours. Contact them to schedule an appointment.

EARTH SCIENCES 1100 – PLANET EARTH: HOW IT WORKS
THE OHIO STATE UNIVERSITY, Spring Semester 2018

Lecture T, H 11:10-12:30; Mendenhall Lab (ML) Rm 100 / Lab **one time each week**; ML Rm 149 or 155



Professor

Dr. S. K. Lower
 Email: ProfessorSKLowerES1100@gmail.com
 Phone: 614-292-1571
 Office hrs: in ML100 before or after lecture

Grades

Midterm Exam = 25%
 Final Exam = 25%
 Reading Quiz = 22.5%
 Attendance Quiz = 7.5%
 Laboratory = 20%

Textbook and lab manual

(1) Throughout the semester, assigned readings will be posted on Carmen or distributed during lecture.
 (2) Earth Sciences 1100 Lab Manual by Bancroft (ISBN 9780738079554).

Week #	Week of...	Topics: lecture topics subject to change, exact dates of quizzes & exams will be announced during lecture, so come to class!	Lecture reading assignment
1	Jan 8	Introduction: syllabus, powers of 10; metric system, periodic table, scientific method, pseudoscience, origin of science (birth of astronomy)	See Canvas
2	Jan 15	Origin of Universe: Galileo, Newton, test of astrology, telescope, big bang, stars, electromagnetic radiation, light year.	See Carmen
3	Jan 22	Origins of planets: birth of solar system & Earth, comets, asteroids.	See Canvas
4	Jan 29	solar system, plate tectonics: periodic table, bonds, states of matter, minerals, rocks	See Carmen
5	Feb 5	Plate tectonics: structure of the Earth, movement of plates, volcanoes, earthquakes, hot spots	See Canvas
6	Feb 12	volcanoes, earthquakes, time (relative vs. absolute age), nucleus of atom, isotope,	See Carmen
7	Feb 19	Time: radioactive decay, half-life, determining age	See Canvas
8	Feb 26	Evolution: classification of life, biomolecules, genes, eukaryotes, prokaryotes Possible MIDTERM EXAM this week, exact date announced in lecture	See Carmen
9	Mar 5	natural selection, evolution vs. creationism, brief history of life on Earth, possibility of ET Possible MIDTERM EXAM this week, exact date announced in lecture	See Canvas
10	Mar 12	<i>OSU SPRING BREAK (no classes)</i>	See Carmen
11	Mar 19	finish evolution, if necessary; Energy: production of electricity, fossil fuels (coal, oil), energy reserves	See Canvas
12	Mar 26	peak oil, mining, fracking	See Carmen
13	Apr 2	Global climate change: weather vs. climate, atmosphere, water cycle	See Canvas
14	Apr 9	glaciers, sea level	See Carmen
15	Apr 16	greenhouse effect, CO ₂ , carbon sequestration	See Canvas
Finals Week	April 30	COMPREHENSIVE FINAL EXAM on Monday April 30; 10:00am-11:45am (this time is set by the Registrar)	
*Every attempt has been made to ensure that the information on the syllabus is complete and accurate. However, mistakes such as typographical errors may occur on occasion. Professor Lower will address any errors on this syllabus during lecture.			

Textbook, assigned readings, and laboratory manual

- (1) There is no required textbook. However, many students find it useful to read a textbook that complements the lecture. A good “companion textbook” is Earth: Portrait of a Planet by Marshak. This text, or other suitable, introductory Earth Science textbooks, are available in the OSU library for free!
- (2) While there is no required textbook, **required readings** will be posted on Carmen or distributed during lecture. **Read these articles** as exam & quiz questions will come from the assigned reading material.
- (3) *Earth Sciences 1100 Lab Manual* by Bancroft (ISBN 9780738079554). All sections use the same lab manual. Purchase from the campus bookstore (<http://ohiostate.bncollege.com>). You may also be able to buy from the Student Book Exchange (<http://www.sbx-osu.com/>). You **must buy a NEW** lab manual.

Laboratory (see above for % of final grade; lab syllabus & guidelines will be provided by your lab TA)

Go to lab EACH WEEK! The lab is an important part of this course. If you fail the lab then Dr. Lower reserves the right to give you a failing grade for this course. A lab Teaching Assistant (TA) will oversee your progress in the lab and assign your lab grade. You must attend your assigned laboratory and work on the problems during the lab. **Read the lab exercise before coming to the lab.** *The lab exercise for a given week will not always correlate to the lecture material for the same week*

Midterm exam and final exam (see above for % of final grade)

Exam questions include true/false, multiple choice, fill in the blank, ordering, and/or short answer. **Exams will be taken on-line through CARMEN.** You will NOT come to the classroom to take the exam. Rather, you take the exam from a location that you choose. This location must have a **RELIABLE** internet connection. A significant number of exam questions will come from material presented in lecture. Additional questions will be drawn from the assigned readings. Each exam will consist of about **50-60 questions**. Each student must complete the exam on her or his own. **You are NOT permitted to receive assistance from anyone else during the exam. You are NOT permitted to take the exams as part of a group.** You ARE permitted to use **your own** lecture notes and slides during the exam. Dr. Lower will provide more details about each exam in class. We will NOT meet for lecture on the days of the midterm exam and final exam. There are **NO** make-up exams **even if your internet goes down!** *If you are sick, you MUST have a note signed by a medical doctor (i.e. a licensed physician) and dated the same day as the exam,* otherwise you will receive a zero.

Quizzes (see above for % of final grade)

Quizzes will be announced during lecture. Quizzes may include (i) attendance or pop quizzes during lecture and (ii) quizzes over assigned readings that will be taken on Carmen. One attendance quiz will be dropped from your final grade calculation (e.g., if you miss class due to illness). There are **NO** make-ups for the assigned reading quizzes. For reference, past ES1100 classes have had between 10 and 15 quizzes (pop quiz + reading quiz), or about one quiz per week.

Final grades follow the University grading scale:

A 93.00 to 100.00	A- 90.00 to 92.99	
B+ 87.00 to 89.99	B 83.00 to 86.99	B- 80.00 to 82.99
C+ 77.00 to 79.99	C 73.00 to 76.99	C- 70.00 to 72.99
D+ 67.00 to 69.99	D 60.00 to 66.99	

An overall score of 59.99 or lower is a failing grade

***Calculate your final grade using the information provided on this syllabus. Do NOT rely on Carmen Canvas as the grade displayed on Carmen may not conform to the guidelines presented in this syllabus.**

GEC Category and Expected learning outcomes

This course fulfills GEC Category 2, Breadth, Natural Science, and provides a laboratory experience for students. Natural Science coursework fosters students' understanding of the principles, theories, and methods of modern science, the relationship between science and technology, the implications of scientific discoveries and the potential of science and technology to address problems of the contemporary world.

1. Students understand the basic facts, principles, theories and methods of modern science.
2. Students learn key events in the history of science.
3. Students provide examples of the inter-dependence of scientific and technological developments.
4. Students discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

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/>).

Students with Disabilities

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is in 150 Pomerene Hall, telephone 292-3307, TDD 292-0901; <http://slds.osu.edu>

Other: (i) Check Carmen several times a week: <https://carmen.osu.edu>. (ii) If you have a question, you should see Professor Lower before/after class. Alternatively, you may send an email to the Gmail account set up specifically for this class: ProfessorSKLowerES1100@gmail.com. **Questions that Professor Lower**

receives through the gmail account will typically be answered at the beginning of lecture (so come to lecture). If you have a private matter, see Dr. Lower in person either before/after class (or send an email to Lower.9@osu.edu). (iii) Dr. Lower may communicate with the entire class using email. He will use students' **OSU email addresses** for this purpose. Many of you have other email accounts through services such as Goggle, Yahoo, or Hotmail. Remember to check your OSU email account for important announcements, which may also be posted on Carmen (i.e. check Carmen too).

Earth Sciences 1100 Common Laboratory Syllabus

Labs do NOT meet during the first week of classes. Professor Lower will announce the date of the first labs during lecture (so come to lecture).

A lab syllabus will be distributed by a Lab Teaching Assistant (TA) at your first lab meeting.

See Carmen for a list of TAs for Professor Lower's ES1100 class. Take note of which TA is teaching your lab during your first lab meeting. The head TA for the lab is Max Wheeler (wheeler.1010@buckeyemail.osu.edu).

If you have a question or issue related to the lab, then you should first contact your lab TA. If your lab TA cannot answer your question or resolve a lab-related problem, then you may contact Professor Lower.

ES 1100 Lab
Dr. Alsdorf
Mendenhall Laboratory - Room 155
Monday - 1020 am

Instructor: Max Wheeler

Email: wheeler.1010@osu.edu

Office Hours: Before and after Class or by appointment

Lab Objectives

- To become familiar with the scientific process, geologic concepts and terminology, and the tools used by practicing earth scientists
- To become a “trained observer”
- To appreciate the interdisciplinary nature of earth science

Attendance

- You must attend lab every week
- A valid excuse and documentation are required to make-up an absence
- If you know you will be missing a lab, please let me know ASAP so we can arrange for you to attend another lab section (at the discretion of that TA)
- If you miss a lab without a valid excuse, you will receive a 0

Grading

- Lab is worth 20% of your total ES1100 grade
- Your lowest lab grade will be dropped
- Late assignments will not be accepted – labs must be turned in at the end of each lab period
- One self-guided make-up lab is available, to replace a 0 or a low grade

Expectations

- You must purchase Exercises for Earth Sciences 1100 [2016] and bring it with you to each lab.
- You must complete the lab using the sheets provided in the manual, not on a separate sheet of paper. Failure to turn in labs completed from the manual will result in a warning at the first occurrence, and the loss of 15% of your lab grade for that day for each subsequent occurrence.
- Along with your lab manual bring to each lab: a pencil with an eraser, and a calculator
- It is highly recommended that you read the introduction to each week’s lab prior to the lab period – this will enable you to complete the lab more quickly
- Come to lab on time – The beginning of each lab is spent discussing what you need to complete the lab effectively
- I highly recommend working in groups, but each student is responsible for contributing to the group’s completion of the lab, and must turn in their own assignment
- Silence cell phones during lab

If you have any type of disability that you think may hinder your ability to succeed in this lab, please come see me and we can discuss appropriate accommodations

Lab Schedule

Date	Lab #	Topic
January 22	1	Exercise 1: Intro to Geoscience & Field Trip 1
January 29	2	Exercise 4: Plate Boundaries
February 5	3	Exercise 2: Minerals
February 12	4	Exercise 3: Rock Identification
February 19	5	Exercise 7: Topographic Maps
February 26	6	Exercise 6: Absolute and Relative Dating
March 5	7	Exercise 5: Volcanoes and Hotspots
March 12	No Labs: Spring Break	
March 19	8	Exercise 8: Streams and Flooding
March 26	9	Exercise 9: Oceans and Waves
April 2	10	Exercise 10: Water History of the South Oval
April 9	11	Exercise 11: Paleoclimate
April 16	12	Exercise 12: Fossils of Ohio

**GEC COURSE ASSESSMENT PLAN AND REPORT FOR
EARTHSCI 100: The PLANET EARTH: HOW IT WORKS**

JANUARY, 2009

PREPARED BY LINDSAY SCHOENBOHM FOR THE SCHOOL OF EARTH
SCIENCES

I. ABSTRACT

This document details the assessment plan and report for EarthSci 100: The Planet Earth: How it works. Course goals and objectives for ES100 were revised during Winter 2008 to align them more closely with GEC goals and objectives (Appendix A). During Fall 2008, direct testing with embedded questions (Appendix B) was implemented across all four concurrent sections of EarthSci100 to assess whether learning objectives were being met. Results of the assessment were analyzed in December of 2008. Students met the goal of a score of 75% or higher for 8 of the 9 questions, but with significant standard deviation indicating differences in uniformly meeting learning objectives 1 and 3 across all four sections. Faculty will meet in 2009 to assess ways to improve student learning and to reassess the evaluation method. Evaluation will be repeated yearly. In future, methods for assessing the lab sections will be developed as well.

II. COURSE DESCRIPTION

EarthSci 100, *The Planet Earth: How it Works*, meets the University's Natural Science GEC requirement and provides a laboratory experience for undergraduates. This course provides a basic introduction to the principles and methods of Earth Science and explores its relevance to problems of the contemporary world. The course bulletin accurately describes EarthSci 100 as: "the materials of the Earth's crust, the processes that produce and modify them, and the development of the Earth and its life forms through time." The syllabus for this course (section V) includes a goals statement for GEC Natural Science courses and lists core learning objectives for EarthSci 100, which describe how this course meets the GEC goals and objectives for this category.

Three regular and one night section of this course are taught each regular year quarter and one section is taught each summer for a total of ~1800 students per year. The lecture sections are taught primarily by regular faculty in the department, or occasionally by adjunct faculty or lecturers. Lecture sections are divided into lab sections of 20-24 students each and are taught by GTAs. GTAs attend a mandatory training session each fall and weekly preparation meetings led by the head GTA and are overseen by the coordinator for this course, Dr. Lindsay Schoenbohm. The chair of the graduate committee, Dr. Berry Lyons, oversees collection of student Faculty lecture sections are evaluated with standard SEIs. Labs were recently rewritten (winter and spring of 2007) to drive active student learning through jigsaw exercises, work with equipment such as wave tanks and stream tables and use of GIS and spreadsheet computer software. The revised lab book is published by Hayden-McNeil (ISBN: 978-0-7380-3054-8).

III. LEARNING OUTCOMES ASSESSMENT PLAN

A. Appendix A outlines both core and specific learning objectives for EarthSci 100, which are in agreement with the learning goals and objectives of the Natural Science GEC. The method of embedded testing will be used to evaluate whether this course is meeting its objectives. Appendix B gives the 9 multiple choice questions written to test Objectives 1, 2, 3 and 4. Each test question relates directly to a course and GEC learning objective (as indicated by section heading) and to specific subcategories of Earth Science (as indicated in italics below each question) to ensure breadth of coverage. These questions have been approved by the faculty of the School of Earth Science.

B. Our goal in this assessment is that 75% of students give the correct answer for the embedded multiple-choice test questions, averaged across all sections. Questions for which fewer than 75% of students give a correct answer will be pinpointed as areas of weakness.

C. Assessment will be implemented during Fall 2008, and in each subsequent Fall Quarter, even after assessment goals have been met. The faculty instructors for all four lecture sections, encompassing up to 560 students, will incorporate the embedded questions into the multiple choice component of exams they are already administering. As exam dates and content are determined by the individual faculty, it will also be left to them to decide when and in what order each question appears in each exam. Students will not be informed that these questions are different in any way. Data for each question will be forwarded to Dr. Schoenbohm and combined anonymously. Each question will be evaluated against the metric for success described above.

E. If results are not satisfactory of any of the 9 embedded test questions, Dr. Schoenbohm will organized a meeting during the winter or spring of 2009 with faculty to plan, as a group, ways to adjust delivery methods to improve student learning or to decide whether the test questions instead need to be adjusted in terms of scope, subject or wording.

F. The embedded test question procedure will be repeated every Fall Quarter to test for improvement and ensure that the course continues to meet GEC goals and learning objectives. We will also explore ways to assess the labs in future faculty and GTA meetings.

IV. LEARNING OUTCOMES ASSESSMENT REPORT:

A. The learning assessment was carried out during Fall Quarter, 2008 as described above.

B. Results from this assessment exercise are summarized in Table 1. Scores were collected for 519 students. It was necessary to calculate a weighted average score from the individual section scores because of the variation in student numbers.

Our assessment goal of a score of 75% or higher was achieved for each question except for Question 3. However, scores for Questions 2, 4 and 7 are below 80% and each has a large standard deviation, indicating that student learning was not uniformly achieved across all four sections. Three of the four questions with which students had problems (Questions 2, 3 and 4) were designed to test learning objective 1: the basic understanding of the facts, principles, theories and methods of modern science. Question 7 tests learning objective 4: the interdependence of science and technology. Changes to be made based on these areas of weakness are described in section D below.

TABLE 1.

Question Number	1	2	3	4	5	6	7	8	9
Average Score	96%	78%	68%	75%	86%	93%	78%	96%	93%
Standard Deviation	2%	15%	9%	21%	10%	4%	13%	1%	5%

C. The data gathered in this assessment will be shared with the Director of the School of Earth Science and with other faculty in the school. No information will be released that could tie specific instructors to scores for their sections.

D. The key finding of this study is that EarthSci 100 is weakest in meeting learning objectives 1 and 3, and that there are significant variations among sections. The variation in scores is not surprising given the broad scope of this course: faculty are intentionally given significant leeway in determining course content, in order to best capitalize on their widely differing areas of primary expertise. To address shortcomings in our stated goals, Dr. Schoenbohm will organize a meeting with all interested faculty during the winter or spring of 2009. We will discuss ways in which the EarthSci 100 curriculum may be unified, where possible. We will also share best practice ideas for improving delivery of information to students. We will also re-evaluate the embedded test questions to ensure that they truly reflect the broad range of topics addressed by EarthSci 100 faculty instructors each quarter.

E. The embedded test question assessment will be repeated every Fall Quarter to ensure progress toward meeting course goals. Faculty meetings will be held every winter or spring after which satisfactory results are not obtained.

In addition to this method of assessment, we feel it is also important to evaluate student learning in lab sections, particularly given the number of changes we have made to lab exercises over the last few years. We will explore ways to assess student learning in the lab sections in the upcoming faculty meeting. The embedded test question method may work here as well. Questions could be embedded in either a lab final or in individual labs. It may be more appropriate to use short-essay questions here, which will necessitate development of grading rubrics. We hope to glean additional ideas from other GEC courses as their reports become available through this evaluation process.

V. SYLLABUS:
EARTH SCIENCE 100
Planet Earth: How it Works

Quarter, Year

Lecture: schedule and room

Labs: rooms



Instructor Name

Office Number; Office Phone; Email

Office hours

Required Textbooks

McConnell's (2007) **The Good Earth**.

Campus Bookstores: ISBN: 0078160634

Schoenbohm's (2008) **Exercises for Earth Sciences 100**

Campus Bookstores: ISBN: 978-0-7380-3054-8

GEC CATEGORY, LEARNING GOALS AND OBJECTIVES: This course fulfills GEC Category 2: Breadth; A. Natural Sciences: Physical Sciences and provides a laboratory experience for students. Natural Science coursework fosters students' understanding of the principles, theories, and methods of modern science, the relationship between science and technology, the implications of scientific discoveries and the potential of science and technology to address problems of the contemporary world.

COURSE GOALS: This course provides a basic introduction to the principles and methods of Earth Science, and its relevance to daily life and the problems of the contemporary world.

LEARNING OBJECTIVE 1: Students explain and recall the basic facts, principles, theories and methods of modern earth science, including: the formation and structure of the earth; principles of plate tectonics; composition of and interrelationship among earth materials; geologic time; hazards such as earthquakes, tsunamis, volcanic eruptions, and floods; the hydrologic cycle; controls on global climate; and human sustainability. Students should be able to describe how the earth operates as a system and apply the scientific method. This fulfills the first objective of the GEC Natural Science requirement: *Students understand the basic facts, principles, theories and methods of modern science.*

LEARNING OBJECTIVE 2: Students describe and explain the significance of key events in the history of earth science, especially pertaining to the development of plate tectonic theory. Students should also learn key events in the geological, hydrological, atmospheric and biological history of the earth. This fulfills the second objective of the GEC Natural Science requirement: *Students learn key events in the history of science.*

LEARNING OBJECTIVE 3: Students will be able to discuss the inter-dependence of scientific and technological developments in measuring and modeling physical and chemical aspects of the earth and environment. This fulfills the third objective of the GEC Natural Science requirement: *Students provide examples of the inter-dependence of scientific and technological developments.*

LEARNING OBJECTIVE 4: Students will explain the ways in which aspects of earth science impact society. Students should be able to describe the relationship between science and societal decision-making pertaining to natural hazards, natural resources, global climate and human sustainability. This fulfills the fourth objective of the GEC Natural Science requirement: *Students discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.*

COURSE DESCRIPTION:

Lectures

Specific information provided by instructor

Laboratory

The lab accounts for 25% of your overall grade in the class. A TA will run your labs and assign the lab grade. You must attend your assigned lab. If you have an unavoidable conflict or an emergency arises, you must get permission from your own TA and the TA of the other section to temporarily switch lab sections. You must also provide a doctors note or other documentation for your absence.

Labs are designed to be self-instructional and doable in the 2 hour lab period. However, to make this happen, *you MUST read through the lab exercise before the lab period.* Labs will be turned in to the TA at the end of each lab period Therefore you must have your own lab book and you must bring it to class.

Should you need additional help with material in lab, you should see your TA during his or her office hours or by special appointment. Some TA's will hold their office hours in ML 274 (Carman Room, open from 8AM to 5PM, Monday through Friday.), where you will be able to get general help with geological lab problems from any of the TA's on duty.

Exams

Specific information provided by instructor, including dates

Grading

Specific information provided by instructor, including dates for any assignments, percentages assigned to various requirements and a grading scale

Class Attendance Policy

Specific information provided by instructor

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://studentaffairs.osu.edu/info_for_students/csc.asp).”

Students with Disabilities

“Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu/>

Lab and Lecture Schedule

Specific information provided by instructor

APPENDIX A: COURSE GOALS AND LEARNING OBJECTIVES

EARTHSCI 100: THE PLANET EARTH: HOW IT WORKS

COURSE GOALS: This course provides a basic introduction to the principles and methods of Earth Science, and its relevance to daily life and the problems of the contemporary world. This course fulfills the learning objectives of the GEC Natural Science requirement and provides a laboratory experience for students.

LEARNING OBJECTIVE 1: Students explain and recall the basic facts, principles, theories and methods of modern earth science, including: the formation and structure of the earth; principles of plate tectonics; composition of and interrelationship among earth materials; geologic time; hazards such as earthquakes, tsunamis, volcanic eruptions, and floods; the hydrologic cycle; controls on global climate; and human sustainability. Students should be able to describe how the earth operates as a system and apply the scientific method. This fulfills the first objective of the GEC Natural Science requirement: *Students understand the basic facts, principles, theories and methods of modern science.*

LEARNING OBJECTIVE 2: Students describe and explain the significance of key events in the history of earth science, especially pertaining to the development of plate tectonic theory. Students should also learn key events in the geological, hydrological, atmospheric and biological history of the earth. This fulfills the second objective of the GEC Natural Science requirement: *Students learn key events in the history of science.*

LEARNING OBJECTIVE 3: Students will be able to discuss the inter-dependence of scientific and technological developments in measuring and modeling physical and chemical aspects of the earth and environment. This fulfills the third objective of the GEC Natural Science requirement: *Students provide examples of the inter-dependence of scientific and technological developments.*

LEARNING OBJECTIVE 4: Students will explain the ways in which aspects of earth science impact society. Students should be able to describe the relationship between science and societal decision-making pertaining to natural hazards, natural resources, global climate and human sustainability. This fulfills the four objective of the GEC Natural Science requirement: *Students discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.*

APPENDIX B: EMBEDDED TEST QUESTIONS

EARTHSCI 100: THE PLANET EARTH: HOW IT WORKS

Embedded Questions: multiple choice questions that test GEC objectives to be included in exams (correct answers shown in bold)

LEARNING OBJECTIVE 1: students understand the basic facts, principles, theories and methods of modern science.

1. Science...

- A) as a method, entails formulating, testing and evaluating hypotheses.
- B) as a body of knowledge, cannot be revised if new information strongly challenges its accepted principles.
- C) as a body of knowledge, may undergo revision as new data come to light.
- D) Both A and B are true.
- E) Both A and C are true.**

Question addresses application of the scientific method.

2. Arrange the following from largest to smallest in terms of the percentage of the total mass of Earth.

- A) Lithosphere, Biosphere, Mesosphere.
- B) Outer Core, Inner Core, Mantle, Lithosphere.
- C) Inner Core, Outer Core, Crust, Mantle.
- D) Mantle, Outer Core, Inner Core, Crust.**

Question addresses structure of Earth and Earth materials.

3. Which volcanoes are most likely to erupt explosively and why?

- A) Strato- because the magma is more viscous than in shield volcanoes**
- B) Strato- because the magma is less viscous than in shield volcanoes
- C) Shield- because the magma is less viscous than in strato volcanoes
- D) Shield- because the magma is more viscous than in strato volcanoes

Question addresses earth materials and hazards.

4. Approximately what percent of water on the planet is contained in the oceans?

- A) 36%
- B) 54%
- C) 70%
- D) 97 %**

Question addresses the hydrologic cycle.

LEARNING OBJECTIVE 2: Students learn key events in the history of science.

5. Alfred Wegener proposed the theory of _____ in 1912.

- A) Sea floor spreading
- B) Evolution
- C) Continental drift**
- D) Radiometric dating

Question addresses key events in the history of science (also addresses objective 1, specifically plate tectonics).

6. How is the geologic time scale sub-divided into smaller units?

- A) Based on equal time intervals
- B) Based on major events in Earth history**

Question addresses key events in the history of Earth (also addresses objective 1, specifically geologic time).

LEARNING OBJECTIVE 3: Students provide examples of the inter-dependence of scientific and technological developments

7. We know the outer core of Earth is liquid because:

- A) P waves are reflected back to the surface when they hit the crust-mantle boundary.
- B) S waves cannot travel through a liquid, and there is an S-wave shadow on the opposite side of Earth from a big earthquake.**
- C) Molten (liquid) iron is found in kimberlite pipes.
- D) P waves travel faster than S waves.

Question addresses technology (geophysical methods) (also addresses objective 1, specifically Earth structure).

8. Computer models of Earth's climate system:

- A) can be made infinitely complex, and therefore can perfect predictions for the future.
- B) are limited by our understanding of Earth's system and by technology, but can be used to understand general processes and make reasonable predictions.**
- C) show conflicting results, and therefore should not be trusted.

Question addresses data modeling (also addresses objective 1, specifically global climate).

LEARNING OBJECTIVE 4: Students discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

9. Science provides absolute answers to ethical or moral societal dilemmas.

- A) True
- B) False**

Arts and Sciences Distance Learning Course Component Technical Review Checklist

Course: Earth Sciences 1100 Planet Earth: How It Works

Instructor: Ozeas S. Costa Jr.

Summary: Distance Hybrid Course Offering (DH)

Standard - Course Technology	Yes	Yes with Revisions	No	Feedback/ Recomm.
6.1 The tools used in the course support the learning objectives and competencies.	✓			<p>The tools used in this course support the learning objectives and competencies in the following ways.</p> <ul style="list-style-type: none"> • In class practice exercises (hands-on) • Reading comprehension quizzes (timed) • Video quizzes (timed) • Discussion board posts
6.2 Course tools promote learner engagement and active learning.	✓			<p>Students will engage with the course materials and instructor on a weekly basis in the following ways to promote active learning.</p> <ul style="list-style-type: none"> • Carmen • Carmen Connect • Secure media library • YouTube
6.3 Technologies required in the course are readily obtainable.	✓			<p>All technologies being used for this course are readily obtainable through the Carmen LMS and/or a web browser.</p> <ul style="list-style-type: none"> • Carmen • Carmen Connect • Secure media library • YouTube <p>YouTube videos are embedded within the Carmen LMS.</p>
6.4 The course technologies are current.	✓			<p>All technologies being used for this course are current and available through the Carmen LMS and/or a web browser. YouTube videos are embedded within the Carmen LMS.</p>
6.5 Links are provided to privacy policies for all external tools required in the course.	✓			<p>A link has been provided to the privacy policy for YouTube. YouTube is the only external tool being used in this course.</p>
Standard - Learner Support				
7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it.	✓			<p>A link has been provided in the "Technical Requirements" section of the syllabus for the</p>

				technical support available for YouTube.
7.2 Course instructions articulate or link to the institution's accessibility policies and services.	✓			a
7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.	✓			b
7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them.	✓			c
Standard – Accessibility and Usability				
8.1 Course navigation facilitates ease of use.	✓			Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.2 Information is provided about the accessibility of all technologies required in the course.	✓			A link has been provided in the syllabus for the accessibility information available for YouTube (screen reader).
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	✓			Recommend that resources be developed to address any requests for alternative means of access to course materials.
8.4 The course design facilitates readability	✓			Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.5 Course multimedia facilitate ease of use.	✓			All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of use by being available through a standard web browser.

Reviewer Information

- Date reviewed: 9/26/2107
- Reviewed by: Mike Kaylor

Notes:

- On page 4 of the syllabus, you reference the students having to purchase MS Office. MS Office 365 Pro is now free to all OSU students. Please update your syllabus accordingly with this information\link. It is now included in their email. <https://ocio.osu.edu/blog/community/2015/08/18/free-microsoft-office-for-ohio-state-students>
- On page 5 of the syllabus under “Online Course Components” you mention the video library and external sites. These sites will need to be explicitly listed on the syllabus in order to complete the syllabus review.

^aThe 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 via email immediately so that we can privately discuss options. You are also welcome to register with Student Life Disability Services to establish reasonable accommodations. 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. **Consider putting text for the accessibility statement in BOLD 16 pt font.**

^bAdd to the syllabus this link with an overview and contact information for the student academic services offered on the OSU main campus. <http://advising.osu.edu/welcome.shtml>

^cAdd to the syllabus this link with an overview and contact information for student services offered on the OSU main campus. <http://ssc.osu.edu>. Also, consider including this link in the “Other Course Policies” section of the syllabus.