



EARTH SCIENCES 100

PLANET EARTH: HOW IT WORKS

School of Earth Sciences

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Course Description

"Planet Earth: How it Works" is an introductory course describing the fundamental concepts of Geology for Science and non-Science majors. It contains 25 lessons grouped in 8 modules. Module I introduces the science of Geology and its related disciplines. It discusses how geology has changed over the years in response to a greater understanding of the processes that has shaped (and continues to influence) our planet. Module II deals with the formation of the universe, the solar system, and our planet. It also discusses the Earth's internal structure. Module III introduces the theory of plate tectonics, a unifying idea that explains the Earth's processes. Module IV discusses the Earth materials (minerals and rocks), their structure and classification. Module V will discuss how Earth's internal and external processes interact to produce volcanoes, earthquakes and mountain chains. Module VI deals with the Geologic time and how Geologists calculates the age of rocks and of the Earth. It also discusses the evolution of life on the planet from a Geological perspective. Module VII describes the energy and mineral resources that the Earth provides us. Finally, Module VIII discusses how water (and the lack thereof) shapes the face of our planet and help creates a multitude of landforms, from fertile river floodplains to inhospitable deserts of sand and ice.

Learning Objectives

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. It 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 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.***

Recommended Texts

Visualizing Geology, by Barbara Murck, Brian Skinner, and Dana Mackenzie, 1st Ed. (2008), John Wiley & Sons, 524 pp., ISBN 0471747270

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 David McConnell, David Steer, Catharine Knight, Katharine Owens, and Lisa Park, 1st Ed. (2008), McGraw-Hill, 536 pp., ISBN 0073018473

Essentials of Geology, by Stephen Marshak, 2nd Ed. (2007), W. W. Norton & Company, 545 pp., ISBN 0393928152

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

Earth Science: Understanding Environmental Systems, by Edgar Spencer, 1st Ed. (2002), McGraw-Hill, 544 pp., ISBN 0072341467

Disability Statement

Any student who feels s/he may need an accommodation based on the impact of a disability should contact Michelle McLane at the Office of Disability Services to discuss her or his specific needs. You can contact Michelle by calling 419-755-4304 or visit her at C-100E Conard Learning Center in order to coordinate reasonable accommodations. Alternatively you can contact me privately to discuss your needs.

Course Assignments and Grading Scheme

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

1. Weekly lab reports (theoretical and practical exercises) = 30% of final grade
2. Two quizzes = 15% (each) of the final grade
3. Final exam = 30% of final grade
4. Participation = 10% of final grade

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

$$(L*30) + (Q1*15) + (Q2*15) + (F*30) + (P*10) / 100$$

Where, **L** is the average mark of all individual lab reports (30% of final grade),

Q is the mark from your quizzes (each 15% of final grade),

F is the mark of your final exam (30% of the final grade), and

P is the assigned percentage (minimum of 0 and maximum of 10) for participation in course activities.

The following grading scheme will be used to submit grades to the Registrar through Carmen.

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

All lab reports, quizzes and final exam will be graded from 0 to 100 and the grade will be multiplied by the respective factor weight as described above.

Course assignments and quizzes, as well as the PowerPoint lectures, will be available to students through Carmen, the OSU course management system (please contact me ASAP if you are not familiar with Carmen). Assignments and lecture slides will also be available for download from the course website (<http://www.mansfield.ohio-state.edu/~ocosta/GS100/GS100.htm>).

PowerPoint lectures will be available for download about one day (24 hours) before the class is held. **Students are welcome to print a handout of the PowerPoint slides and bring it to class to help them in taking notes.**

Lab reports are due AT THE END OF EACH LAB. If you have to miss any of the labs make sure you contact the instructor BEFORE the lab date.

All quizzes will be delivered through Carmen. Detailed instructions will be available in the course link in 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.

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/resource_csc.asp), 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. You can also talk to Donna Hight at 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 web page:
(<http://oaa.osu.edu/coam/home.html>)

Ten Suggestions for Preserving Academic Integrity:
(<http://oaa.osu.edu/coam/ten-suggestions.html>)

Eight Cardinal Rules of Academic Integrity:
(<http://www.northwestern.edu/uacc/8cards.html>)

The Writing Center

The Writing Center (writingcenter@osu.edu) 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 at Conard 201 and Conard 211. Visit us or e-mail the Writing Center at writingcenter@osu.edu. The Writing Center is also available during extended hours on-line - e-mail the center or visit <http://english.mansfield.ohio-state.edu/writing/> to arrange an on-line consultation.

Course Structure (Outline)

The class schedule is updated frequently. For the most updated version of the schedule go to <http://www.mansfield.ohio-state.edu/~ocosta/GS100/schedule.htm>

Module I: From Geological Sciences to Earth System Science

Lesson 1: *The Realm of Geology*

Module II: Origin and Early Evolution of the Earth

Lesson 2: *Earth's Origins*

Lesson 3: *Planets of the Solar System*

Lesson 4: *Earth's Internal Structure*

Module III: Plate Tectonics and the Dynamic Earth

Lesson 5: *Wegener's Continental Drift*

Lesson 6: *Sea-floor Spreading*

Lesson 7: *Plate Motion and Plate Boundaries*

Module IV: Earth Materials: Minerals and Rocks

Lesson 8: *Mineral Structure and Classification*

Lesson 9: *Rocks and Rock Classification*

Lesson 10: *Magma and Igneous Rocks*

Lesson 11: *Sediments, Soils, and Sedimentary Rocks*

Lesson 12: *Sedimentary Structures*

Lesson 13: *Depositional Environments*

Lesson 14: *Heat, Pressure, and Metamorphic Rocks*

Lesson 15: *The Rock Cycle*

Module V: Tectonic Activity of a Dynamic Planet

Lesson 16: *Volcanoes*

Lesson 17: *Earthquakes*

Lesson 18: *Orogeny (Mountain Building)*

Module VI: Geologic Time and the Age of Earth

Lesson 19: *Defining the Relative Age of Rocks*

Lesson 20: *Stratigraphic Record and the Age of Earth*

Module VII: Earth's Resources

Lesson 21: *Energy Resources of the Earth*

Lesson 22: *Mineral Resources of the Earth*

Module VIII: Hydrology and Landscape Geomorphology

Lesson 23: *The Hydrological Cycle*

Lesson 24: *Streams and Rivers: The Geology of Running Water*

Lesson 25: *Mass Movements and Landslides*