



## **EARTH SCIENCES 203**

### ***ENVIRONMENTAL GEOSCIENCES***

#### *School of Earth Sciences*

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#### **Course Description**

This course examines several major Earth's surface processes that have a direct, often sudden and violent, impacts on human systems. Basic principles and concepts in Geology, Climatology, Oceanography, and Ecology are integrated to provide the basis for understanding the interactions between humans and natural hazards. And the need for such understanding has never been clearer. In the past 25 years alone, the number and cost of natural disasters and catastrophes have grown at an exponential rate. Some of the most recent include: heat waves in Europe (2003 and 2006) and in the US (Chicago 1995) that combined killed over 50,000 people; the massive earthquake and tsunami in the Indian Ocean, which killed over 200,000 people in eleven countries; destructive earthquakes in China (2008) and Pakistan (2005), which together killed over 110,000 people; the Atlantic hurricane season of 2005, which includes Katrina and Wilma, that caused over 30 billion in damages; the eruption of Nevado del Ruiz (Colombia, 1985), which ended the lives of over 25,000 people; the long and severe drought in Australia, the worst on record, that is ongoing since 2003; among others. This course seeks to explain the Earth processes behind these events, how they interact with the human environment, and how we can better adjust to their effects. Topics to be discusses include: volcanic eruptions; earthquakes and tsunamis; climate change; extreme weather events; flooding; drought; heat waves; wildfires; tropical cyclones and hurricanes; mass wasting and landslides; subsidence and soils; erosion and coastal hazards.

### **GEC Expected Learning Outcomes**

This course fulfills the learning objectives of the GEC Natural Science requirement (Category 2. Breadth Areas; A. Natural Sciences: Physical Sciences) and provides a laboratory experience for students. Natural Sciences 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.

Learning Objective 1: Students understand and explain the natural processes behind natural hazards, disasters and catastrophes, including: plate tectonics and internal processes; behavior and composition of magma; fault formation and rock stress; the hydrologic cycle; controls on global climate; the relationship between soils and vegetation, and human sustainability. ***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 occurrence of key events in Earth's recent history, in particular those of catastrophic nature, and what roles science has played in dealing with them. ***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 fields such as emergency preparedness, hazard monitoring, and climate modeling and forecasting. ***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 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 Textbook**

Natural Hazards, 2<sup>nd</sup> Ed. (2008), by Edward Keller and Robert Blodgett, Pearson Prentice Hall, 488 pp., ISBN 0132318644

### **Additional Suggested Reading**

Environment: The Science Behind The Stories, 3<sup>rd</sup> Ed (2008), by Jay Withgott and Scott Brennan, Pearson Benjamin Cummings, 681 pp., ISBN 0805395733

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

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

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

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

Understanding Earth, 5th Ed. (2007), by J. Grotzinger, T.H. Jordan, F. Press, and R. Siever, 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. Three quizzes = 10% (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:

$$(L*30) + (Q1*10) + (Q2*10) + (Q3*10) + (F*30) + (P*10) / 100$$

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

**Q** is the mark from your quizzes (each 10% 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 (in-class and extra-class).

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/faculty/ocosta/ES203/ES203.htm>).

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](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."

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).

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](mailto: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](mailto: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 ([writingcenter@osu.edu](mailto:writingcenter@osu.edu)). <http://english.mansfield.ohio-state.edu/writing/>

### **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/faculty/ocosta/ES203/schedule.htm>

**Lesson 1: Introduction to Natural Hazards**

**Lesson 2: Volcanic Hazards**

**Lesson 3: Natural Hazards from Earthquakes**

**Lesson 4: Natural Hazards from Tsunamis**

**Lesson 5: Climate and Climate Change**

**Lesson 6: Extreme Weather Events**

**Lesson 7: Flood Hazards**

**Lesson 8: Drought Hazards**

**Lesson 9: Hazards from Heat Waves**

**Lesson 10: Wildfire Hazards**

**Lesson 11: Tropical Cyclones and Hurricanes**

**Lesson 12: Mass Wasting and Landslides**

**Lesson 13: Subsidence and Soils**

**Lesson 14: Coastal Hazards**