THE LIVING EARTH I
GE180 Course Outline - Fall 2013

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Boston College

Office Hours: T Th 1:30-2:30, Devlin 312
Lecture: T Th 3:00-4:15, Devlin 008
Labs: Days and times to be announced
Professor’s Web Site: www2.bc.edu/alan-kafka

This syllabus provides a basic summary of the course. Other course materials will be posted on the course web site, which is on the BC Blackboard course management system.


Course Summary:

The Earth is an immense and complex system, with processes that are hidden from our direct experience because they occur on scales of space and time that are much larger than our daily (even life-long) experiences. Even though we don’t experience these processes directly, they affect our lives on planet Earth. Our life experiences are intimately intertwined with major global systems and processes, such as global biological and geological cycles, the ocean circulation system, and the global climate system. In this course, our primary focus will be on the large-scale Earth system known as plate tectonics. Plate tectonics, which occurs on a time scale of millions of years, provides a basis for understanding ancient processes that formed Earth’s features, such as oceans, continents, mountains and valleys, and present-day processes that cause natural hazards such as earthquakes and volcanoes. This semester, we will focus on how plate tectonic processes are related to earthquakes, which are a dramatic manifestation of large-scale, long-term geological processes occurring deep within our planet.

Although our primary focus this semester will be on plate tectonics and earthquakes, another important large-scale, long-term process that affects our lives on planet Earth is climate change. Climate change, which occurs naturally on a time scale of thousands to millions of years, has been affected by human activities on a scale of decades to hundreds of years, and will continue to affect our lives and those of future generations. This semester we will explore how plate tectonics and climate change are interrelated, using earthquakes as an example of that interrelation. For the purpose of that exploration, we will summarize the main features of climate change in GE180 this semester, but climate change will be covered in greater detail next semester in Geoscience and Public Policy (GE187). In GE187, we will explore the causes and consequences of climate change more completely than in GE180. But, GE180 is nonetheless self-contained, and will include a sufficient amount of background on climate change to enable us to understand how plate tectonics, climate change and earthquakes are interrelated. You might want to explore the topic of climate change in greater detail next semester, but you don't necessarily have to take GE187 to appreciate GE180 and how climate change is intertwined with our story about plate tectonics and earthquakes.
The following topics will be covered this semester:

- **Plate Tectonics I: Development of a Theory of the Earth** – We will begin with an overview of the theory of plate tectonics, followed by discussion of how this theory was developed. The history of the development of this “theory of the Earth” exemplifies the nature of scientific inquiry, how scientists think and work, and how geoscientists learn about processes that occur on scales of space and time that are much larger than our normal experiences. This slow, inexorable, long-term Earth process that occurs over millions of years of geological time can manifest itself on a very human time scale when, in a matter of minutes, plate tectonic (and other?) forces within the Earth are released in a major earthquake.

- **Climate Change** – We will summarize climate change from the perspective of a long-term process (thousands to millions of years) that affects us on a time scale of decades to hundreds of years, a time scale that humans can experience directly. The purpose of introducing climate change in this course is to provide a background for understanding how plate tectonics and climate change are interrelated, using earthquakes as an example of that interrelation.

- **Seismology I: Earth’s Internal Structure** – Plate tectonics, climate change, and other Earth processes occur within the context of the materials and structure of planet Earth. But humans have never actually seen or touched the Earth’s interior any deeper than just the very shallow portions of the Earth’s crust, a mere 0.2% of the way down to its center. We will explore how seismology, and other geophysical methods, enables us to learn about the internal structure of the Earth and what the Earth is made of.

- **Plate Tectonics II: How the Earth Works** – This part of the course will be a description of our modern-day understanding of how plate tectonics works. We will analyze various types of plate boundaries and how geologic processes are explained by the theory of plate tectonics.

- **Seismology II: Earthquakes and Earthquake Hazards** – We will explore earthquakes and earthquake hazards from the point of view of what we have learned about plate tectonics, seismology, and climate change. We will consider what can and can’t be done to mitigate the tragic effects of large earthquakes that occur in areas that have high population density, and/or have been affected by environmental degradation that can worsen the devastation wrought by earthquakes.

- **Possible Additional Topics** – If time allows, we will also discuss some additional topics, such as the age of the Earth, and/or the Earth’s gravity and magnetic fields.

**Grades will be based on:**

1. Two in-class exams: These two exams will count for a total of 50% of the course grade (25% each). Tentative dates for in-class exams: October 17, 2013 and November 12, 2013.
2. **Cumulative Final Exam (25% of course grade):** December 16, 2013 at 12:30 PM. You are required to be here on the day of the Final Exam. If your travel plans, or any other personal plans, are such that you can not be here for the Final Exam, you will not be able to take this course.
3. Laboratory: 20% of course grade.
4. Class Participation: 5% of course grade. (See Online Class Participation Exercise below.)
“What’s gonna be on the test?”

Please don’t ask us, “What’s gonna be on the test?” As we approach each exam, you will be updated online and in lecture as to what topics will be covered on that exam. Each exam will cover all lectures, labs, and readings related to the topics announced for that exam. Much of the course (including participation in the Online Class Participation Exercise, described below) is designed to help you to assimilate, integrate, and summarize the course material and discern for yourself (with the help of your Teaching Assistant and student colleagues) the best way for you to study that material.

**Being able to discern for yourself what to study for a test is part of what you are expected to master as a student in this course.** If you are uncomfortable with this level of uncertainty, this is probably not a good course for you. If you are thinking of asking us any variation on the question “What’s gonna be on the test?”, re-read the above two paragraphs.

**Online Class Participation Exercise:**

In this course, we will be using an online discussion of potential exam questions as a medium for enhancing interaction among the many students in this large class.

As educational colleagues in this class, you will be given the opportunity to collaboratively write and discuss potential questions for the exams in this course. This component of the course is intended to enhance the learning experience in GE180 in three ways: (1) to make the course more personal and interactive in spite of the large number of students, (2) to help you study for the exams in this course, and (3) to experiment with new web-based technology in an effort to make the exams in this course a better assessment of what you are learning.

All exam questions will either be “objective”, such as: Multiple Choice, True/False, Fill-in-the-blank, etc., or very short essay questions (no more than 50 words, or roughly two sentences).

Class participation grades will be based primarily on this online discussion of potential exam questions, and will count for 5% of course grades, which will range from 0 points (students who rarely contributed) to 5 points (students who were major contributors). Other web-based interactive exercises might also be added to the course as the semester progresses and participation in any such additional exercises will be included as part of your participation grade.

To access this online exercise, go to the Blackboard website for this course, and click on Discussions.
Academic Integrity:

Boston College values the academic integrity of its students and faculty. It is your responsibility to familiarize yourself with the university’s policy on academic integrity, which can be found at www.bc.edu/publications/ucatalog/policy.shtml#integrity. Violation of academic integrity will be reported to your class dean and judged by the academic integrity committee in your school. If you are found responsible for violating the policy, penalties may include a failing grade as well as possible probation, suspension, or expulsion, depending on the seriousness and circumstances of the violation.

Disability Services at BC:

If you are a student with a documented disability seeking reasonable accommodations in this course, please contact Kathy Duggan, (617) 552-8093, dugganka@bc.edu, at the Connors Family Learning Center regarding learning disabilities and ADHD, or Paulette Durrett, (617) 552-3470, paulette.durrett@bc.edu, in the Disability Services Office regarding all other types of disabilities, including temporary disabilities. Advance notice and appropriate documentation are required for accommodations.

Students are responsible for knowing all of the information in this syllabus. There may be corrections or addenda to what is written here, and if so they will be posted on the course Blackboard website. The most current version of the syllabus will always be the version on the web.