

# Course Syllabus

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## Earthquakes

GE207 - Spring 2014

Professor Alan Kafka

Department of Earth and Environmental Sciences

Office Hours: T Th 3:30-4:30, Devlin 312

**Lecture:** T Th 1:30-2:45, Devlin 307

This document provides a basic summary of the course. Other course materials will be posted on this BC *Canvas*\* course web site, where you will find much more detail about the course.

\* In this course, we will be using BC's new *Canvas* course management system. This course is one of a number of BC courses this semester that have been chosen as early adopters and testers of the new system, which is planned to replace *Blackboard* in September 2014. **Students should always check *Canvas* for all announcements, updates, and any other information regarding the course.**

### **Description of Course:**

Earthquakes are among the most frightening and devastating of natural hazards, often resulting in catastrophic loss of life and property. Earthquakes are also among the most fascinating of natural phenomena, and analysis of seismic waves generated by earthquakes provides an essential tool for probing the internal structure of our planet. Thus, earthquake seismology is an important component of the science of planet Earth. Although the basic global scale characteristics of earthquakes are well understood in the context of the theory of plate tectonics, considered in detail earthquakes are among the most complex and unpredictable of earth processes.

This course explores earthquake science, including seismology research conducted at Weston Observatory, BC's geophysical research and science education center (located in Weston, MA about 10 miles west of BC's Chestnut Hill campus). The theory of plate tectonics will be presented as a major foundation of our understanding of earthquake processes. We will explore the properties of seismic waves and how seismic waves generated by earthquakes are used to map the structure of the Earth's interior. With that understanding of seismology as a background, we will explore what is known about earthquakes, as well as the major unresolved questions that are still being investigated at the forefront of earthquake science, such as: Will it ever be possible to predict earthquakes, and what can be done to mitigate their tragic effects.

This course is part of the Environmental Systems introductory sequence (GE201-208) for Environmental Geoscience majors and Environmental Studies minors.

### **Textbook and Other Reading Assignments:**

Textbook: *Earthquakes and Geological Discovery*, by Bruce A. Bolt, Scientific American Library, W.H. Freeman, 1993.

Other reading material will be added as the course progresses and will be posted on the *Canvas* course web site.

### **Grades will be based on:**

(1) Two Exams: Mid-Term Exam, April 3, 2014 (30% of course grade); and Cumulative Final Exam, May 10, 2014 (35% of course grade).

(2) Laboratory (20% of course grade).

(3) Final Project Report (15% of course grade)

All students are expected to take exams at the scheduled time unless they have a medical excuse approved by their Dean. Notification prior to any exam being missed is required in order for a makeup exam to be given.

**Lecture Outline:** Below is a tentative list of topics that will be covered this semester. In addition to these topics, we will also explore specific earthquakes of interest throughout the course. Additions and changes to topics and readings will be posted on the *Canvas course* web site.

- Seismic Waves
- Seismology and the Earth's Interior
- The Theory of Plate Tectonics
- Earthquakes and Plate Boundaries
- Earthquake Locations
- Earthquake Faulting Processes
- Earthquake Depths
- Earthquake Magnitude and Seismic Moment
- Earthquake Hazards and Prediction

**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/offices/stserv/academic/integrity.html](http://www.bc.edu/offices/stserv/academic/integrity.html) (<http://www.bc.edu/offices/stserv/academic/integrity.html>). 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.

**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 this Canvas web site.**

**The most current version of the syllabus will always be the version on the web.**