Course Title: Volcanoes and Earthquakes
Course Number: GEOLOGY 306
Credit: 4 credits
Grading Options: Optional for all students

Instructor Contact Information
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WHO MIGHT TAKE THIS COURSE
Online courses such as this one, Volcanoes and Earthquakes, are typically intended for self-motivated learners who don't require the structure of scheduled classes and assignment deadlines. This course is designed for non-science majors, with no previous geology or other science background. I intend to explain or otherwise expose you to everything you need to know for this course, and if there are topics that I gloss over or explain poorly or inadequately, the interactive nature of this format makes it easy to ask for expansion or clarification.

EXPECTATIONS
This is a four credit course, so technically you're expected to put in the equivalent of four classroom hours each week, plus three hours outside class for each one inside: sixteen hours a week total. I know this seems like a lot of time, especially if you are taking a heavy course load and/or have a job or two and/or have a family and/or friends and/or some semblance of a life. But it shouldn't be too onerous. The texts contain many case studies, which read quickly, and part of the time will be spent watching movies, which contain some really dramatic footage, so gather your friends, order a pizza, put up your feet and enjoy yourselves. Part of your time will also be spent deeply engaged in stimulating conversations on fascinating topics in the Discussion Board. Assignments and projects will be absorbing and challenging. You'll soon find yourselves neglecting your other courses, your jobs, your family and friends, even your personal hygiene, as you spend all your time in pursuit of geological enlightenment. You may as well change your major now. Resistance is futile.

TEXTS
The two REQUIRED texts for this course are:
Both these are written by well-respected scientists actively working in their fields, and were recommended to me by a volcanologist and a geophysicist in the UO Department of Geological Sciences.

WHAT TO EXPECT FROM THIS COURSE
1. A clearer idea of what science is, what distinguishes it from other fields of study, how it works, what are its limitations.
   My position is this: Science is a huge part of our modern lives, influencing all aspects of society and government and affecting everything we do, and scientific habits of thought enable us to better evaluate claims in every field of endeavor and improve whatever it is we do. One of the goals of any introductory science course such as this should be for students to leave with a greater familiarity with and better understanding of science, hopefully through some practical experience organizing data, drawing conclusions from data, and applying critical thinking to conclusions based on data (and recognizing when conclusions are not based on any data). Data or observations, interpretations, evidence, hypotheses, critical tests, falsifiability, theories, laws, myth, science: these and other terms have distinct meanings, and they are misused regularly in public discourse. When people throw these terms around you should know what they're talking about, and when they're blowing smoke.
2. A basic understanding of Plate Tectonics.
   The Theory of Plate Tectonics is the currently accepted paradigm, or unifying system of ideas, in Geology simply because it reveals
relationships among, and provides explanations for, a wide range of phenomena on planet Earth, and it has survived repeated testing. Because many aspects of both volcanoes and earthquakes can largely be explained as the results of plate motions and interactions, this course will at a certain extent be a course in applied plate tectonics. Since it is not a tectonics class, you won’t be expected to master the finer details of this subject (although it is fascinating, both as science and as a historical process, a real scientific revolution in recent history). But you will be learning about its effects, and so must understand its general outlines (I’ll try to make this easy as we go along).

3. Familiarity with volcano and earthquake science, especially the processes that make them work.

We will cover the two major topics separately, noting where they overlap, beginning with volcanoes and ending with earthquakes.

With volcanoes we will start with the big picture, where volcanoes occur around the planet. Then we will explore where the stuff comes from that makes volcanoes, the magma. We will spend some time on the varieties of volcanic behavior and their causes and effects, and look at some of the products of volcanoes. Finally, we will discuss volcanic hazards, where volcanoes intersect with life and particularly human history, and current efforts at volcano monitoring.

With earthquakes we will begin with the basic physics of waves, a delightful subject that has applications throughout our lives. We will look closely at seismic waves, how they work, and their causes and effects. We will discuss where they originate around the world, and why that is, and the impact of earthquakes on people around the world. Next, we will focus on current efforts to monitor earthquake-prone areas, create hazard maps, and use this science to reduce the risks of living in these areas. Finally, we will spend some time on the use of earthquake data in investigating the interior of the Earth, the remote sensing necessary to explore the inaccessible parts of the planet and make the plate tectonic story more complete.

COURSE OVERVIEW

Part 1: Volcanology

Week One. Where Volcanoes Occur: Plate Tectonic Settings.
- MORs and MORBs, and other rifts
- Subduction zones volcanoes
- Intraplate volcanoes

Week Two: Where does the magma come from?
- The melting curves of peridotite
- MORBs and pressure release melting
- Subduction Zones and volatile added melting
- Intraplate volcanism and mantle plumes

Week Three: Volcanic behavior.
- Types of eruptions
- Volatiles in magma
- Lava flows
- Explosive Volcanism
- Volcanic Geomorphology

Week Four: Volcanic Products
- Petrology:
  - Intrusive rocks
  - Extrusive rocks
  - Explosive volcanic products
  - Sedimentology and volcanoes
  - Fertility and Wealth

Week Five: Volcanoes and Humanity.
- Volcanoes and The origin of Life
- Volcanism and mass extinction events
Toba and the human genetic bottleneck
Santorini and the collapse of Minoan civilization
Vesuvius, Pompeii, Herculaneum, and the birth of volcanology
Tambora and the Year of No Summer
Volcano Monitoring

Part 2: Earthquakes

Week Six: The Physics of Waves, and Waves in the Earth

Week Seven: Seismic Waves and Geological Faults

Week Eight: Measuring earthquakes and Ground Shaking

Week Nine: Earthquake Prediction and Hazard Mapping

Week Ten: Earthquakes and Geological Science

Remote Sensing and The Earth's Interior

Policies

Student Conduct

The University of Oregon has promulgated a Student Conduct Code which contains important regulations, policies, and procedures pertaining to student life. It is intended to inform students and members of the University community who work with them of students' rights and responsibilities during their association with the institution and to provide general guidance for enforcing those regulations and policies essential to the educational and research missions of the University. The full terms and conditions of the Student Conduct Code are contained in Oregon Administrative Rules Chapter 571, Division 21—University of Oregon. Highlights of the Student Conduct Code are published on the Dean of Students website.

Accessible Education

The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in disability-related barriers to your participation. You are also encouraged to contact the Accessible Education Center (formerly Disability Services) in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu or http://aec.uoregon.edu/students/index.html

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Accessibility

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UO Accessible Education: http://aec.uoregon.edu

Grievance Policy

Information on filing a student grievance may be found at http://uoregon.orgsync.com/org/associatedstudentsofuo/YourRights
UO Acceptable Use of Computing Resources

The guidelines for acceptable use of University of Oregon computing resources may be found at https://it.uoregon.edu/acceptable-use-policy

Respect for Diversity

It is the policy of the University of Oregon to support and value cultural diversity. To do so requires that we:

- Respect the dignity and essential worth of all individuals.
- Promote a culture of respect throughout the University community.
- Respect the privacy, property, and freedom of others.
- Reject bigotry, discrimination, violence, or intimidation of any kind.
- Practice personal and academic integrity and expect it from others.
- Promote the diversity of opinions, ideas, and backgrounds, which is the lifeblood of the university.

SAPP offers practicum experience for students wishing to gain real world career experience and job networking while earning academic credit. Placement sites include community work with children, youth, families, and alcohol and drug treatment and prevention. Every other week students will meet for the practicum class. The practicum class will focus on professional, ethical, and multicultural competencies related to substance abuse prevention and students' practicum sites. The class will also serve as a forum for students to discuss their site experiences, and give and receive feedback.