

Building and Maintaining a Habitable Planet
Geological Sciences Course (01:460:203), Fall 2013

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Catalog Description: Understanding human-caused environmental changes in the context of Earth's 4.6 billion year history. Geological and human timescales; planetary habitability; planetary, biological, and civilizational flows of energy and entropy; feedbacks between life, the carbon cycle, and climate; the evolution of complex life; human alterations of the Earth system; intelligent life in the Universe.

Course Description

Humanity has become a geological force, reshaping Earth's land, atmosphere, oceans and climate through our activities. Some geologists have proposed that this era of human influence be recognized as a new geological epoch, the Anthropocene. "We are as gods and we HAVE to get good at it," the writer Stewart Brand says, yet "civilization's shortening attention span is mismatched with the pace of environmental problems." How do we reconcile the time scale of news cycles, quarterly reports, and elections with the timescale of our impacts, which will last for tens of thousands if not millions of years?

This course will prepare you to be an informed citizen of our empowered global civilization, able to step outside the realm of short-termism and interpret the environmental changes humanity is effecting today in the context of our planet's 4.6 billion year history. We will address questions such as: Why is the Earth so habitable, while Mars is at best marginally so and Venus totally uninhabitable? How did life evolve to regulate the planet's chemical and energy flows before we arrived on the scene? How does human civilization fit into this long history, and what are the implications of the planetary and human experience for the frequency of intelligent life in the Universe?

Student goals

The fundamental goal of this class is to equip you to interpret the environmental changes humanity is effecting today in the context of the long-term evolution of the planet's climate and biogeochemical cycles.

In this course, you will fulfill the *Natural Sciences* core curriculum requirement by (1) being able to apply the concepts of energy, entropy, evolution, extinction, carbon cycling, and system feedbacks to the Earth system in the planet's past and in the current Anthropocene epoch, and (2) identifying and critically assessing ethical and societal issues related to science, technology, and the global environment.

In this course, you will also fulfill the *21st Century Challenges* core curriculum requirement by analyzing the relationship science & technology have to a contemporary global issue (namely, the human reshaping of the global environment).