



ES204 Aug 3:0

Origin and evolution of the Earth

Instructor

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Department: Centre for Earth Science

Course Time: Tue., Thurs., 2:00-3:30 PM

Lecture venue: CEaS lecture hall

Detailed Course Page:

Announcements

Brief description of the course

This course is about understanding the origin and evolution of our planet years using: 1) geochemical and isotopic data from Earth-rocks and extra-terrestrial rocks (meteorites) and 2) geophysical and observational data. The course covers a wide range of topics from the Big Bang to climate change and tries to reconstruct the 4.6 billion years history of our solar system and Earth. It is designed for students, with or without any background in Earth science, who are interested in knowing more about our planet.

Prerequisites

Basic knowledge of physics, chemistry and math and curiosity about how the Earth works.

Syllabus

A wide range of topics are covered starting with the origin of nuclides in different astrophysical settings, formation of our solar system, accretion and differentiation of planets and their time constraints. The basics of long-lived and short-lived radioactive systems as well as stable isotope fractionation are introduced to the student. This is followed by understanding the bulk composition of the Earth and distribution of different elements inside the planet, principles of mantle-melting, compositional variability of erupted lavas and their

link to tectonic settings, mantle convection, recycling of surface rocks into the Earth's deep interior and the link between the compositional evolution of the Earth's mantle and its effect on atmospheric composition over time. The last few lectures delve on evolution of the Earth's surface conditions including composition of the oceans and surface temperature over Earth history.

Course outcomes

For the student with no prior Earth science knowledge: fundamental concepts related to the origin and evolution of our planet

For the student with prior Earth science knowledge: improved understanding of Earth processes, introduction to cosmochemistry

Grading policy

3 exams covering 70% of the grade

Final presentation and term paper covers 20% of the grade

Assignments cover 10% of the grade

Assignments

Resources

Book: How to build a habitable planet by C Langmuir and W. Broecker

Multiple research papers/reviews on the different topics covered