

SIO 102 – INTRODUCTION TO GEOCHEMISTRY – Winter 2022

Geochemistry is the study of the chemical compositions and chemical processes involved in the formation and evolution of the universe, Solar System and Earth. Geochemistry is guided by a range of fundamental principles, including the periodic table of elements and elemental behavior (Goldschmidt's classification). The field of geochemistry spans a wide range of subdisciplines, including isotope geochemistry, cosmochemistry, astrochemistry, organic geochemistry, biogeochemistry etc. This 10-week class will cover aspects of geochemistry, from the formation of the elements to their importance in understanding and potentially combating climate change.

Books and Course Reserve - All content will be provided by the instructor and will be freely accessible.

Primary Instructor: Prof. James Day

Other Instructors: Some may be taught by Prof. Miriam Kastner

Teach Assistant: Kendall Mahony

Classes are from 11:00-12:20pm at VH 100 (links will be on Canvas) with discussion sections 12:30-1:20pm.

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- T Jan. 4 Formation and Abundance of the Elements (Initial Discussion of Term Papers) (Class 1)
- Th Jan. 6 Isotopes and Radioactivity (Class 2)
- T Jan 11 Chemical Evolution of the Solid Earth and Planets, and Meteorites (Class 3) (Discussion)
- Th Jan. 13 The “Geochemical periodic Table” (Class 4) (Problem Set 1 assigned)
- T Jan. 18 Chemical Evolution of the Earth's Core and Mantle (Class 5) (Discussion)
- Th Jan. 20 Chemical Evolution of the Earth's Core and Mantle, continued (Class 6) (Problem Set 1 due)
- T Jan. 25 Chemical Evolution of the Earth Crust and Subduction Zone Processes (Class 7) (Discussion)
- Th Jan. 27 Melting and Subduction Zone Processes (Class 8) (Term Paper Ideas to be Submitted) (Problem Set 2 assigned)

T Feb. 1 The Origin and Evolution of the Ocean (Class 9) (Discussion)

Th Feb. 3 Ocean Chemistry and Processes (Class 10)

T Feb. 8 MID-QUARTER EXAMINATION (Problem Set 2 due)

Th Feb. 10 Hydrothermal Processes and their Geochemical Significance (Class 11)

T Feb. 15 Marine Sediments, Sources, and Significance (Class 12) (Discussion)

Th Feb. 17 Principles of Light Stable Isotope Fractionation (Class 13) (Problem Set 3 assigned)

T Feb. 22 The Light Stable Isotopes O and H and the Hydrologic Cycle (Class 14) (Discussion)

Th Feb. 24 The Global Carbon Cycles; Carbon Isotopes (Class 15) (Problem Set 3 due)

T Mar. 1 Chemical Paleoceanography: Fluid Inclusions and the K/Pg Boundary (Class 16) (Discussion)

Th Mar. 3 Chemical Paleoceanography: Sr Isotopes, Weathering and Tectonics (Class 17) (Problem Set 4 assigned)

T Mar. 8 Atmospheric Chemistry and Evolution of Oxygen: The Ozone Problem and Ice Cores (Class 18) (Discussion)

Th Mar. 10 Atmospheric Chemistry and Evolution of Oxygen: The Ozone Problem and Ice Cores - Summary and Review (Class 19) (Problem Set 4 due) (Term Paper due)

Thursday Mar 17 FINAL EXAMINATION at: 11:30 AM – 2:30 PM