EAS 6216 – Environmental Isotope Geochemistry
TuTh 3:05-4:25, 1229 ES&T

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Goals:
Isotope geochemistry plays an increasingly important role in a wide variety of geological, biological, and environmental investigations. This course is designed to provide an introduction to the principles and applications of isotope geochemistry, and briefly summarize the analytical techniques used in the field. Homework problems will illustrate the applications of isotope geochemistry to real-world environmental problems, while in-class student presentations will enable more in-depth study of a particular isotope system. The students’ interests will help shape the material covered in the course, so the schedule of topics listed below is subject to change.

Required Textbook:

Recommended Textbooks:

Great read:

Grading:
25% Homework
25% Midterm
25% Presentation
25% Final

Class Schedule:

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>8/24</td>
<td>Introduction</td>
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<tr>
<td><strong>PART 1:</strong></td>
<td><strong>RADIOGENIC ISOTOPES</strong></td>
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<tr>
<td>8/26</td>
<td>Nucleosynthesis, physics of the nucleus</td>
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<td>8/31</td>
<td>Making Isotopic measurements – mass spectrometry</td>
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<tr>
<td>9/2</td>
<td>K-Ar and $^{40}$Ar-$^{39}$Ar dating</td>
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<td>9/7</td>
<td>Rb-Sr dating, Sm-Nd dating</td>
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9/9  U-Th-Pb dating – the age of the Earth
9/7  U-series disequilibrium I
9/9  U-series disequilibrium II
9/21 Cosmogenic isotopes
9/23 Radiocarbon dating
9/28 Tritium as a groundwater tracer
9/30 Analytical methods: isotope dilution and ICPMS
10/5  Data analysis for geochemists (Take-home MIDTERM)

**PART 2:**  
STABLE ISOTOPES

10/7  Physical fundamentals
10/12 Stable isotope mass spectrometry
10/14 Raleigh fractionation
10/19 NO CLASS (Fall break)
10/21 Water isotopes in the hydrosphere, atmosphere, and biosphere I
10/26 Water isotopes in the hydrosphere, atmosphere, and biosphere II
10/28 Geothermometry and paleoclimate proxies I
11/2  Geothermometry and paleoclimate proxies II
11/4  Recent advances with triple oxygen isotopes
11/9  Carbon isotopes in the biosphere
11/11 Carbon isotopes in the geologic record
11/16 “Clumped” isotopes: potential and challenges
11/18 Boron isotopes and paleo-pH
11/23 Nitrogen isotopes and the biological pump
11/25 NO CLASS (Thanksgiving)

**PART 3:**  
STUDENTS DECIDE

11/30 Student Presentations I
12/2  Student Presentations II
12/7  Student Presentations III
12/9  Student Presentations IV & Review
12/16 Take-home FINAL EXAM due, 11:30am