EAS 656 Isotope Geochemistry

Syllabus Spring 2000

Professor: William M. White
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Office Hours: TBA
Text: WMW Lecture Notes
Grades: 30% Prelim
40% Final
30% Problems Sets (there will be 5 to 7)

Information on the course lecture notes and problem set solutions are posted on the World Wide Web at:
http://www.geo.cornell.edu/geology/classes/geo656/656home.html

Part I: Radioactive and Radiogenic Isotope Geochemistry
A. Physical Fundamentals
1. Introduction, Physics of the Nucleus Jan 20
2. Physics of the Nucleus, Radioactive Decay Jan 22
3. Nucleosynthesis and the Origin of the Elements Jan 24

B. Geochronology
4. Equations of Radioactive Decay and Radiogenic Growth Jan 27
5. Geochronology I: The K-Ar System Jan 29
6. Geochronology II: The Rb-Sr System Jan 31
7. Geochronology III: Sm-Nd Feb 3
8. Geochronology IV: U-Th-Pb Feb 5
9. U-Th-Pb continued Feb 7
10. Short-lived Isotopes of the U-Th Decay Series Feb 10
11. Lu-Hf, Re-Os & Other Decay Systems Feb 12
12. Geochronology VI: Cosmogenic Isotopes ($^{14}$C, $^{36}$Cl, $^{10}$Be, etc.) Feb 14
13. Cosmogenic Isotopes, continued Feb 17
15. Analytical Methods Feb 21

C: Radiogenic Isotope Geochemistry
16. Isotope Geochemistry of the Earth’s Mantle I Feb 24
17. Sr Isotope Chronostratigraphy & Seawater Geochemistry Feb 26
18. Isotope Geochemistry of the Earth’s Mantle II Feb 28
19. Mantle and Whole Earth Geochemical Models Mar 3
20. Evolution of the Mantle and Crust Mar 5
22. Evolution of the Continental Crust II Mar 10
23. Magma Sources in Subduction Zones Mar 12
   PRELIM EXAM Mar 14
   SPRING BREAK
24. Cosmochemistry and Cosmochronology Mar 24
25. Cosmochemistry and Cosmochronology II Mar 26

Part II: Stable Isotope Geochemistry
A: Fundamentals
27. Physical Fundamentals I Mar 31
28. Physical Fundamentals II Apr 2
29. Geothermometry and Isotopes in the Hydrosphere and Atmosphere Apr 4
30. Isotope fractionation in the Biosphere Apr 7

B: Igneous and Hydrothermal Systems
31. Stable Isotopes in Igneous Systems I: Indicators of Assimilation Apr 9
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32  Stable Isotopes in Igneous Systems II: Crustal Recycling  Apr 11
33  Hydrothermal Systems and Ore Genesis  Apr 14
34  Hydrothermal Systems and Ore Genesis II  Apr 16

C: Low Temperature Applications
35  Applications to Archeology and Paleontology  Apr 18
36  Stable Isotopes and Hydrocarbons  Apr 21
37  Paleoclimatology  Apr 23
38  Paleoclimatology II  Apr 25
39  Evolutionary Models of the Biosphere, Hydrosphere, and Atmosphere  Apr 28
40  Evolutionary Models II  Apr 30
41  Catch-up and Review  May 2

Final Exam: Wed May 14,  9:00-11:30 AM