University of South Carolina  
College of Arts and Sciences  
Department of Earth and Ocean Sciences  

GEOL 520 – ISOTOPE GEOCHEMISTRY  
Syllabus  

Instructor: Dr. Michael Bizimis  

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Office Hours: TBD, but best to catch me after class.  

NOTE: If you email me a question related to class, please put in front of your message subject “GEOL 520”. This ensures a quicker response.  

Classes Meets: MW 2:30PM-3:45PM, EWSC 209  

Course Description: Understand isotopes and their uses in geosciences. The course will cover the following subjects:  
- Nucleosynthesis, stellar formation, cosmic and solar abundance of the elements.  
- Modes of Radioactive decay.  
- The decay equation and the principle of parent-daughter geochronology.  
- The radiogenic isotope systems: Rb-Sr, Sm-Nd, U-Th-Pb, Lu-Hf, Re-Pt-Os, K-Ar, Ar-Ar.  
- Geochronological applications.  
- Terrestrial elemental reservoirs, processes of their formation and chemical differentiation of the planet.  
- Use of isotopes as tracers for source composition.  
- Short-lived extinct radionuclides (e.g. Sm146-Nd142, Hf-W, Al-Mg, Fe-Ni) and the time scales of the solar system formation and accretion of the earth.  
- “Non-traditional” isotope systems (Fe, Mg, B, Li, etc.) and their uses in geosciences.  

Textbook: Not required but recommended. Several options are available:  
Alan P. Dickin: Radiogenic Isotope Geology  
Gunter Faure and Teresa M. Mensing: Isotopes: Principles and Applications  
Francis Albarede: Geochemistry.  
Other resources: Geochemistry, by William M. White (Cornel) (Textbook
Learning Outcomes: Upon the completion of this course you should be able to:

- Understand the different mechanisms of nucleosynthesis, and how they relate to the composition of the earth and solar system.
- Understand the different mechanisms of radioactive decay and their use in geochronology.
- Gather age information from different radioactive isotopic systems.
- Use extinct radionuclides to determine the different time scales of solar system formation and Earth differentiation.
- Evaluate and select the appropriate isotopic systems to date different types of rocks.
- Compare the isotopic compositions of different terrestrial reservoirs and evaluate parent – daughter fractionations with time and their implications for planetary differentiation and elemental recycling in the earth.
- Use of radiogenic isotopes as present-day tracers of processes (i.e. reservoir mixing).
- Use of Stable isotope systems as tracers of processes.

Grading Policy: There will be 4 take home exams, each counting for 20% of your grade. The exams will be different between the graduate and undergraduate students. The undergraduate students will give 1 presentation and the graduate students will give two (2) 12-15 minute presentation on a topic chosen after consultation with the instructor. The chosen topic will also be the basis for discussion following the presentation. The presentation will count for 15% of the grade and will be evaluated based on AGU standards for student presentations. The subject of the talk and one or two key papers will be given to the class in advance so the rest of the students can participate and ask questions. Overall participation in the class will account for the final 5% of the grade.

This class abides by the academic dishonesty policy of USC that I know you all read and agree with completely as written.
http://www.sa.sc.edu/carolinacommunity/
http://www.sa.sc.edu/carolinacommunity/housing.htm#Academic%20Responsibility

American with Disabilities Acts (ADA) statement: This University and its faculty will make every effort to accommodate any and all students with special needs.
http://www.sa.sc.edu/carolinacommunity/stdev.htm#Disability%20Discrimination

Attendance Policy: None.