

## **Earth Science 127: Radiogenic Isotopes, Spring 2016**

Instructor: Terrence Blackburn  
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Office hours: M&W; 12:30-1:30

Course Hours: MWF 11:00-12:10  
Course Location: EMS D226

Assignments: five problem sets. Data reduction exercises. (many of the latter will be done in class.

Exam: Final, take home

Grades/Evaluations are based on problem sets, laboratory exercise exams and class participation:

- 60% problem sets/ lab exercises
- 20% final (take home) examination
- 20% class participation

Required texts: Online text; Isotope Geochemistry by W.M. White;  
<http://www.geo.cornell.edu/geology/classes/Geo656/656notes09.html>

Online at: Non-White readings will be posted at eCommons

Additional reading: Dickin, Radiogenic Isotope Geology (on reserve at library but also online at: <http://www.onafarawayday.com/Radiogenic/>);

Learning outcomes: Student will be provided with the necessary background to comprehend and interpret isotopic data. Students will explore how time-sensitive data can be applied to reconstruct geologic timescales

Course work requirements: Students should plan to spend an average of 15 hours a week on this course per week. 3.5 Hours will be spent in lecture. The remaining time will be reserved for class readings, to be completed prior to lecture and homework sets.

Notes about assignments:

- 1) We will work through several examples in class. Feel free to work on homework collaborating in groups.
- 2) All work turned in for grading should be neat and easy to read. Copy calculations for clarity, if needed, showing all necessary steps. All plots should be generated using a computer. Text answers should be typed where possible.

- 3) Complete reading *prior* to class discussion. If concepts are unclear, ask questions in class and visit with instructor or teaching assistant during office hours.

### Lecture, Reading and Assignment List

25-Mar	Introduction to radiogenic isotopes	
28-Mar	Atomic Structure, Nucleosynthesis, Elemental Abundances	White #1&2
30-Mar	Radioactive decay, geochronology, age equation	White #3
1-Apr	Rb-Sr system.	White #5
4-Apr	Isochron dating Method	White #3 P-set #1
6-Apr	Mass Spectrometry and Data reduction (lecture)	White #10 p106-end
8-Apr	Mass Spectrometry + Sr analysis (Lab day 1-Neptune or TIMS)	P-set #2
11-Apr	Mass Spectrometry and Data reduction in class exercise	
13-Apr	U-Pb System overview	eCommons;
15-Apr	U-Pb System (zircon dating)	
18-Apr	U-Pb System (meteorites, Pb isotopes)	P-set #3
20-Apr	Lab day 2 (TIMS)	
22-Apr	Lab 2 data reduction	P-set #4
25-Apr	Lab day 3 LA-ICPMS	
27-Apr	Thermochronology overview	eCommons
29-Apr	Thermochronology (U-Th)/He dating	
2-May	Thermochronology (applications)	
4-May	K-Ar and Ar-Ar dating	White #4
6-May	K-Ar and Ar-Ar dating (applications)	
9-May	U-Series-overview	White #7
11-May	U-Series-corals	eCommons
13-May	U-Series-volcanics	
16-May	U-Series-comminution	
18-May	Lab day 4	P-set #5
20-May	Lab day 4 Data reduction	
23-May	Re-Os	White #8
25-May	Lu-Hf	White #8
27-May	Extinct Radionuclides	White #9
30-May	Memorial day	
1-Jun	Sr-chemostratigraphy	eCommons
3-Jun	Sr-chemostratigraphy	