Earth Science 127/227: Radiogenic and Stable Isotopes

1. Instructor and Course details:
Instructor: James Zachos & Terrence Blackburn
E-mail: jzachos@ucsc.edu; terryb@ucsc.edu;
Office: JZ: A260; TB: A108
Office hours: TB: T&R 9-10; JZ:

Commented [TB1]: Add office hours

Course Hours: MW 10-11:35
Course Location: D236

2. Assignments, reading and student evaluation:
Assignments: 5 problem sets. These short quantitative problems sets are designed to expose students to data manipulation and calculations.

Final evaluation: Term paper and short (<12 minute presentation) that synthesizes and interprets the data collected during the practical lab sessions.

Reading: online readings posted on Canvas.

Grades/Evaluations: based on problem sets, participation in laboratory exercises, final paper.
40% problem sets
40% final paper and presentation
20% Midterm exam

Notes about assignments:
1) All problems sets are due a week after they are assigned. Late assignments will be accepted with points 10% deduction per day.
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.

Notes on Final paper:
1. Goal: provide students an opportunity to synthesize the different data types (stable and radiogenic isotopes) to interpret the history recorded by the provided samples.

3. Learning outcomes and course work requirements
Learning outcomes: Student will be provided with the skills and background required to interpret and apply both radiogenic and stable isotopic data.

Course work requirements: Students should be prepared to dedicate up to 15 hours a week (on average) towards this class. Laboratory modules will require students to dedicate (additional) time to sample preparation and data acquisition. Reduction of real, large data sets is time-consuming.

4. Diversity statement:

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me privately during my office hours or by appointment, preferably within the first two weeks of the quarter. At this time, I would also like us to discuss ways we can ensure your full participation in the course. I encourage all students who may benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu.

5. Weekly schedule:

	Topic	Instructor	Assignment (S-stable; R-radiogenic)	In-class Exercise	127 Reading	Exams
1-Apr	Class introduction, Nucleosynthesis, Isotope Properties, Notation, Fractionation I	JZ+TB			FM Chap 1;	
3-Apr	Nucleosynthesis, Isotope Properties, Notation, Fractionation II	JZ			Mook Chap 2 & 3.pdf	
8-Apr	Hydrogen & Oxygen Isotopes, & Hydrologic Cycle I	JZ	Pset S1:		Mook Chap 4 (pg. 49-54);	
10-Apr	Hydrogen & Oxygen Isotopes, & Hydrologic Cycle II	JZ			Mook Chap 7.2 &7.4 (pg.101-123)	
15-Apr	Carbon Isotopes & Carbon Cycle I	JZ	Pset S2:		Mook Chap 7.1 (pg. 89-101);	
17-Apr	Carbon Isotopes & Carbon Cycle II	JZ			FM Chap 28 (pg. 803-808)	
22-Apr	Radiogenic isotopes, introduction. Age equation	TB	Pset R1: abundances	Parent decay	White Ch 2 p29-33	
24-Apr	Rb-Sr system	TB			White Ch 2 p43-47	
29-Apr	Mass spectrometry	TB	finish in class exercises	Fractionation + isotope dilution	White Ch 4 p104-113	
1-May	U-Pb geochronology	TB	Pset R2: age calcs	Concordia	White Ch 3 p65-74	
6-May	U-series	TB			White Ch 3 p74-84	
8-May	Sm-Nd System.	TB	Pset R3: U-series+Sm-Nd		White Ch 2 p48-56	
13-May	Introduce final projects. Background, goals, lab schedule.	TB+JZ				
15-May	Midterm examination	TB+JZ				In class e
20-May	Lab time: Data oxygen, carbon	TB+JZ			Mook Chap 11 (pg. 179-190);	
22-May	Lab time: Sample preparation U/Sr	TB+JZ			Mattey Mass Spec Basics (pg. 154-165)	
27-May	*Memorial day No class*	NA				
29-May	Lab time: Data collection Sr or U.	TB+JZ				
3-Jun	Lab time: Data reduction	TB+JZ				
5-Jun	final presentations	TB+JZ				Final Pre
	Finals week (no meetings)	NA				

* All readings on Canvas