

## **Whole Earth Geochemistry – SIO251/155 (4 units)**

An overview of the geochemistry of the solid Earth aimed at both SIO graduate students (but particularly those in the Earth Section - GS, GP and MC&G curricular groups) as well as UCSD/SIO M.S./B.S students who have taken SIO-102 (Introduction to Geochemistry).

### **Recommended Texts**

- An Introduction to our Dynamic Planet (editor: N. Rogers) Cambridge University Press. The text covers many basic concepts presented in class. It will be supplemented by a more advanced text:
- Geochemistry by William M. White Wiley-Blackwell (paperback edition, 2013)

### **Additional Reading Texts**

The following textbooks also cover segments of class material. They are on reserve at the SIO Library:

- Albarede, F. (2009) Geochemistry – An Introduction. Cambridge University Press.
- Allegre, C. J. (2008) Isotope Geology. Cambridge University Press.
- Lunine, J.I. (1999) Earth: Evolution of a habitable world. Cambridge University Press.
- Taylor, S.R. (1998) Destiny or Chance: Our solar system and its place in the cosmos. Cambridge University Press.

### **Grading**

Evaluation will be by final and mid-term exams, class presentations (1 per student) and homeworks (4 problem sets – every 2 weeks). Marks will be divided as follows: Final exam (45%); mid-term exam (15%); Class Presentation (10%) and Homeworks (30%).

Lectures are 50 minutes (Monday and Wednesday) and a student presentation/discussion session will be held on Friday. Grading by letter grade, except by consent of instructor.

### **Location & Class material**

All classes will be held at SIO (Vaughan Hall) room 100 at 1pm (MWF).

All lecture presentations (Powerpoints) and homework assignments/presentation materials are available by Dropbox.

## Class Syllabus

### Week 1: Monday 30 March

- Monday: Lecture 1 - The Terrestrial Planets I  
Wednesday: Lecture 2 - The Terrestrial Planets II (Earth – a unique planet)  
Friday: Paper presentation & First Problem Set

### Week 2: Monday 6 April

- Monday: Lecture 3 - Nucleosynthesis  
Wednesday: Lecture 4 - Meteorites  
Friday: Paper Presentation I

### Week 3: Monday 13 April

- Monday: Lecture 5: Planetary Accretion  
Wednesday: Lecture 6: Earth Differentiation  
Friday: Paper Presentation II; Second Problem Set

### Week 4: Monday 20 April

- Monday: Lecture 7 - The Moon  
Wednesday: Lecture 8 - The early Earth  
Friday: Paper Presentation III & Homework solutions

### Week 5: Monday 27 April

- Monday: Mid-term Exam  
Wednesday: Lecture 9 - Radioactivity & Age of the Earth  
Friday: Paper Presentation IV; Third Problem Set

### Week 6: Monday 4 May

- Monday: Lecture 10 - The Earth's Mantle  
Wednesday: Lecture 11 – Basaltic Magmatism  
Friday: Paper Presentation V

### Week 7: Monday 11 May

- Monday: Lecture 12 – Mantle Plumes and the Lower Mantle  
Wednesday: Lecture 13 – Composition of the Continental Crust  
Friday: Paper Presentation VI; Fourth Problem Set

### Week 8: Monday 18 May

- Monday: Lecture 14 – Island Arc Volcanism I  
Wednesday: Lecture 15 – Island Arc Volcanism II  
Friday: Paper Presentation VII

### Week 9: Monday 25 May

- Monday: University Holiday

Wednesday: Lecture 16 – The Water Cycle on Earth

Friday: Paper Presentation VIII & Homework Solutions

Week 10: Monday 1 June

Monday: Lecture 17 – Volcanic Degassing

Wednesday: Guest Lecture

Friday: Review Session

Exam Week: Monday 8 June

tba: Final (11:30-2:30pm)