GEOL 566 – Geochemistry Seminar – Spring 2017

Topic: Analytical geochemistry

Class Time: TBD suggest *Friday 9-9.50am, Location ZHS B20 weekly,*
Instructor: **Professor Sarah Feakins,** ZHS 223F, 213 740 7168 **feakins@usc.edu**
Office Hours: whenever door is open.
Text: assigned journal reading. **Grading:** Participation 100% **Units**: 1

Goals: The goal of this course is to introduce students to methods in analytical geochemistry in the Department of Earth Sciences at USC. In particular, you will be introduced to my area of expertise and organic geochemistry laboratory facilities. You will also obtain generalizable knowledge about geochemical analyses for other elemental and isotope systems. You will gain an awareness of the instrumentation in the department, and alerted to upcoming developments in instrumentation.

Class philosophy: Analytical techniques in geochemistry will be introduced in a theoretical and practical format in this seminar series. The seminar series will include a mixture of lecture style presentations, lab tours and virtual driving and demonstrations of instrumentation. The guiding philosophy is to build the fundamentals towards practically-applicable knowledge and familiarization with any geochemical techniques and instrumentation, no matter your research area. I will start with teaching the organic geochemical instrumentation used in my laboratory at USC. We will continue with student-led investigations and presentations on different types of instrumentation in other geochemistry labs on campus. If time allows we will continue to instruments not represented at USC, guided by the interests of the participants. We will read and discuss instrument manuals and research papers that provide a foundation and topical papers that push forward the analytical frontiers, including publications appearing during the semester.

Who should take this class: The seminar series is tutorial-style and intended for graduate students in the progressive masters and graduate students in early years of the PhD program or those more senior graduate students looking to build stronger expertize in geochemical instrumentation (say if primarily field-geology trained). The class also welcomes some undergraduate earth science, engineering or chemistry majors who work in geochemistry laboratories in the earth sciences and interested to continue onward to graduate school in geochemistry. Undergraduate participation upon approval.

What you will be responsible for: Showing up each week ready and eager to learn whether in the classroom or on tour through laboratories where you are a guest. In the classroom, you will take turns in leading with a presentation. You will all be responsible for reading each week and being prepared to discuss actively and in depth during class time with your classmates. Discussions will be directed by me to guide learning of concepts and skills that you need.

Sequence of topics:

1. Introduction to Gas Chromatography
2. Introduction to Isotope Ratio Mass Spectrometry

3. Continuous flow, combustion and pyrolysis
4. Standardization, normalization, calibration.
5. Robots, networking and data archiving
6. Elemental analyzers
7. The infra-red revolution: Los Gatos, Picarro – Californian ingenuity.
8. Additional instrument/topics and papers selected to feature other instruments and interests in the department and nearby, and based on participant interests –you drive this part of the course!

Grading: Your grade is based upon assessment of oral participation in this graduate journal reading and discussion seminar as assessed by the instructor. Regular attendance and participation in discussion is expected as this is the only format for assessment.

Academic Integrity: University policies on academic dishonesty are printed in SCAMPUS and SJACS, see http://www.usc.edu/student-affairs/SJACS.

Disability Services: Students requesting academic accommodations based on a disability are required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP when adequate documentation is filed; *please be sure the letter is delivered to the professor as early in the semester as possible*. DSP is open Monday-Friday, 8:30-5:00. The office is in Student Union 301, or (213) 740-0776.

About the Instructor: Sarah Feakins is an Associate Professor of Earth Sciences at USC, running the Leaf Wax Lab in SHS 460, an organic geochemical facility with GC-FID/MS/IRMS capabilities that she established in 2008. Her research program has been supported by USC, WiSE, the US National Science Foundation, American Chemical Society and other sources. She works with collaborators in the department, nationally and internationally – including the UK, Canada, France, Peru, Switzerland, Germany and China. People working in her lab past and present are listed here, including postdocs, graduate and undergraduate researchers earth.usc.edu/feakins/people/. She serves as a member of the IODP Science Evaluation Panel and as an Associate Editor of *Geochimica et Cosmochimica Acta*.

Previously a postdoc at the California Institute of Technology she worked in Alex Sessions' lab as the field of compound specific hydrogen isotopes gathered pace. She obtained her PhD (Geology) in from Columbia University's Department of Earth and Environmental Sciences at Lamont-Doherty Earth Observatory in 2006 working with Peter deMenocal, on Mg/Ca in forams and trace elements in volcanic glass, and obtained her organic geochemical training as a visiting student for two years at the Woods Hole Oceanographic Institution with Timothy Eglinton. Prior to that, she learnt her craft in the dark rooms at the University of Oxford, working with Stephen Stokes on luminescence dating (OSL).

Research webpage: http://earth.usc.edu/feakins/ Publications: Research Gate, Google Scholar.

Via this introductory instrumentation course she seeks to provide an initiation into the world of analytical geochemistry within the Earth Sciences, ready for graduate research and/or industry careers.