GEOL 4700-003/5700-0044 Organic Geochemistry
Syllabus – Spring 2015

Location: **Tuesday and Thursday 9:30 – 10:45, Benson Earth Sciences (BESC 145)**

Instructor: Ass. Prof. Julio Sepúlveda

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Phone: 303-735-6877

Offices: BESC room 246E (Tuesday and Thursday 10:45 – 12:30 or by appointment)
East Campus, RL-1 (INSTAAR), Room 155 (by appointment only)

1. Course description: This course for graduate and upper-division undergraduate students explores the "biomarker concept" as a tool to elucidate biogeochemical and climatic processes in natural systems through four fundamental questions:

a. How can we characterize and classify organic molecules in complex, natural mixtures?
b. What processes control the biosynthesis, transport, transformation, preservation and destruction of organic matter in nature?
c. How can we use lipid biomarkers and their stable isotope composition to study biogeochemical processes in modern and ancient systems?
d. How can biomarkers inform us about Earth's past climate and biota?

2. What is expected of you? This is an introductory and interdisciplinary course that will combine a blend of traditional lectures and student-lead discussions each week. Students are expected to attend lectures, read the weekly assignments and actively participate in classes. The lectures will cover some, but not all, of the materials in the textbook, and will also present information not contained in the textbook derived from journal articles and other sources. Student-lead discussions will include short, individual presentations throughout the semester based on assigned topics relevant to class. A final paper on a topic of your own choice will be due by the end of the semester. **If you are unable to attend a lecture with an assignment (presentation), you must contact me *before* the date**.

3. Learning goals. By the end of this course you will be able to:

- Understand and critically evaluate studies using organic geochemical tools in the natural sciences
- Formulate a well-organized and well-argued research proposal supported by research methods and analytical design to solve scientific problems
- Convey organic geochemical information in oral and written format

4. Recommended Prerequisites: Due to its interdisciplinary format, this course will cover some of the fundamental aspects of organic and isotope geochemistry with a strong focus on the applications in the natural sciences. There are no required prerequisites although intro and/or advanced courses in chemistry, organic chemistry, biogeochemistry, geochemistry, and/or geology are highly recommended in preparation for this course.

5. Required Reading: *Chemical Biomarkers in Aquatic Ecosystems*. T.S. Bianchi & E.A. Canuel. Princeton University Press, 2011. *Introduction to Organic Geochemistry* (2nd ed.). S.D. Killops and V.J. Killops. Blackwell Publishing, 2005 (available as PDF). In addition,

various journal articles for reading and group discussion will be available as PDF files (learn.colorado.edu).

6. Recommended readings: Additional readings to deepen your knowledge in the field.

Echoes of Life: What Fossil Molecules Reveal about Earth History. S.M. Gaines, G. Eglinton, J. Rullkotter. Oxford University Press, 2009.

The Biomarker Guide (Vol. 1 and 2), Biomarkers and Isotopes in Petroleum Systems and Earth History. K. E. Peters, C. C. Walters, J. M. Moldowan. Cambridge University Press. 2007

7. Web access: The course materials, grades and assignments can be found on Desire2Learn (D2L) at mycuinfo.colorado.edu or learn.colorado.edu. You can log on to D2L directly using your CU IdentiKey (colorado.edu/oit/identikey). Please check D2L frequently for important updates

8. Grading: This class will not use mid-term and final exams. Instead, your grade will be determined by a combination of short homework assignments, participation in class discussions (short oral presentations) and a final written and oral presentation of an NSF-style proposal on a topic of your own interest. **The senior undergraduates enrolled in this class will be given additional guidance and differential grading criteria (see below)**.

Weekly assignments: You will be assigned weekly or by-weekly homework based on the topics covered during the previous week (10% of your grade). Your responses to the online homework will be due midnight on Mondays.

Student-lead discussions: You will be assigned individual, short (10 minutes) presentations throughout the semester to kick-start a class discussion (20% of your grade). Presentations will be based on a particular reading and are intended to briefly summarize "hot topics" of a particular subject (e.g., flaws of an organic proxy as a tracer for a given parameter).

NSF-style proposal: **Graduate students** will have the opportunity to write and present an NSF-style research proposal (using NSF guidelines; max. 10 pages including figures) at the end of the course on a topic relevant to your research interests. You will receive guidance to find the most suitable topic and make this experience as helpful as possible for your future career. The evaluation of final papers will be done using the peer-review process in which each student will be assigned one or two papers to review anonymously. There will be two instances where you will be able to evaluate your progress and receive direct feedback before the final paper is due:

a. A one-page project summary will be due on 02/10/2015 (10% of your grade)
b. A draft outline version of the proposal will be due 03/19/2015 (10% of your grade)
c. Your final paper (30% of your grade) will be turned in on 04/23/2015
d. Peer-reviews will be due on 04/30/2015
e. Your final paper will be presented during the first week of May (20% of your grade)

Undergraduate students will have the opportunity to write and NSF-style application for the Graduate Research Fellowship Program (GRFP) on a topic relevant to your future academic/professional interest following the same structure described above. **You will be given additional guidance and differential grading criteria**.

Your final grade will be based on the following assessments:

i) Homework	10%
ii) Oral presentations	20%
iii) NSF Proposal	
Summary	10%
Draft	10%
Final paper	30%
Presentation	20%
Total:	100%

9. Students with disabilities: Students with disabilities who qualify for academic accommodations should obtain a letter from Disability Services (DS) in a timely manner and discuss specific needs with me. DS determines accommodations based on documented disabilities (Contact: 303-492-8671, Willard 322, and colorado.edu/disabilityservices)

10. Religious obligations: Students with conflicts between religious observance dates and course exams or assignments must notify me via email at least two weeks in advance of the event so that reasonable and appropriate accommodations can be arranged.
See full details at colorado.edu/policies/fac_relig.html

11. Classroom behavior policy: Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Classroom behavior policy is at colorado.edu/policies/index.html. Note that pets are not allowed in University buildings, so please do not bring your pet to class.

12. Student honor code: All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Students are allowed to work together on homework problems, but are not allowed to simply copy each other's work. Refer to the CU Honor Code (honorcode.colorado.edu). Students who are found to be in violation of the academic integrity policy will be subject to academic sanctions honorcode.colorado.edu.

13. Discrimination and Sexual Harassment: The University of Colorado policy on Sexual Harassment and the policy on Amorous Relationships apply to all students, staff and faculty (see: http://www.colorado.edu/policies/discrimination.html). Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information and resources available to assist individuals regarding discrimination or harassment can be obtained at colorado.edu/odh.

14. Tentative Schedule (Under construction)