

Syllabus: Organic Geochemistry

GEOS 486/586

Fall Semester 2021

Tues/Thurs 11:00-12:15, Gould-Simpson 209

Instructor:

Dr. Jessica Tierney (she/her/hers) – Associate Professor, Geosciences, Gould-Simpson 515,
jesst@arizona.edu.

Office Hours: 1:30 pm after class on Tuesday, and by appointment. Communications concerning class via official UA email address.

Required Text:

Killops & Killops *Introduction to Organic Geochemistry 2nd ed.* (free ebook available here: <https://sites.google.com/site/killopsioig/>) and selections from the scientific literature.

Web site:

The class web site can be found through D2L (<http://d2l.arizona.edu>). At this site you can find all lecture outlines, handouts, assignments, etc. Please look at the announcements box on the home page regularly. This is where I will post anything important regarding changes in schedules, updates to assignments etc. You are responsible for keeping up to date on schedule changes posted at the website.

Course Objectives:

486/586 offers an introduction to and broad overview of the field of Organic Geochemistry – the structure and fate of organic molecules in the geosphere. This is a joint upper level undergraduate, introductory level graduate course for students who have completed basic undergraduate courses in chemistry, geoscience, and biology. Students interested in using organic geochemical techniques in an academic, environmental, or petroleum industry setting will find this course useful as a rigorous introduction to the discipline. Examples of the themes covered in this class include:

- Classes of natural organic compounds and their structures
- Production, preservation, and fate of organic matter
- Organic carbon cycling on Earth
- Carbon cycling and climate change
- Environmental applications and impacts of organic compounds
- Applications of organic geochemistry in petroleum science
- Applications of organic geochemistry in climate science

Learning Outcomes:

Students will:

- Demonstrate an understanding of the Earth's carbon cycle and climate system
- Apply quantitative skills to understand the Earth's energy balance
- Recognize, describe, predict, and analyze Earth system behavior
- Synthesize knowledge about past climate change
- Apply knowledge about past climate change towards understanding future climate change

Course Prerequisites:

Upper division standing with a major in the natural or physical sciences. CHEM II required for 486 participants. Organic chemistry recommended, but not required, for both 486 and 586.

Class format:

This class will be taught in-person in two 75-minute meetings. The first half of the course will provide a general introduction to Organic Geochemistry and will be conducted in lecture format. The second half of the course will focus on applications and will consist of student presentations and group readings of the scientific literature. For participants in 586, students will pursue an independent project in Organic Geochemistry in the laboratory (GS 922) and will schedule time in the lab as needed.

Absence and Class Participation Policy:

Although I will post lecture slides online for your benefit, attending class is critical since much of the learning consists of in-class activities and discussions. If you cannot attend class because of illness or emergency please let me know ahead of time, to the extent possible.

- **IMPORTANT COVID-19 information:** Masks are required in any campus setting where physical distancing is not possible. This includes our classroom. You must wear a mask in class regardless of vaccination status. If you refuse to wear a mask you will be asked to leave the class. Spare masks will be available if you forget your mask.
- If you feel sick in any way (even minor) or think you may have been in contact with someone who may have COVID, stay home. I will work with you to check up on class material remotely. Free testing is available on campus with same-day appointments, visit <https://covid19.arizona.edu/covid19-testing/locations> to schedule one. I encourage you to get tested often to make sure that you don't bring COVID into the class by accident. If you have COVID systems you can schedule a PCR test with Campus health; see <https://covid19.arizona.edu/covid19-testing/locations> for instructions.
- To protect your instructor, fellow students, and your community I strongly encourage you to get vaccinated if you have not already done so. You can get a vaccine for free at Campus Health (<https://health.arizona.edu/covidvaccine>) or at a number of places in and around Tucson (<https://webcms.pima.gov/cms/One.aspx?portalId=169&pageId=669257>)

UArizona's policy concerning Class Attendance, Participation, and Administrative Drops is available [here](#). The UArizona policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable. Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored.

Grading (486):

The final grade in 486 depends on your completion of homework assignments given in the first half of the semester (40%), on your performance on the midterm exam (20%), and on participation in the group reading sessions during the second half of the semester (40%). Final letter grades will be given on a percentage basis, according to a standard curve:

90-100% = A
80-89% = B
70-79% = C
60-69% = D
<60% = E

Grading (586):

The final grade in 586 depends on your completion of 4 homework assignments given in the first half of the semester (30%), on your performance on the midterm exam (20%), on participation in the group reading sessions during the second half of the semester (20%), on an independent study project in the Organic Geochemistry laboratory, which consists of conducting an experiment, writing a short scientific paper/lab report summarizing the results (20%) and giving a short

presentation in class summarizing the results (10%). Final letter grades will be given on a percentage basis, according to a standard curve:

90-100% = A
80-89% = B
70-79% = C
60-69% = D
<60% = E

Final Exam:

There is no final exam for this class.

Late Homework Policy:

Homework due dates are given on the class schedule and are due in class that day. It is easiest to turn the homework in on paper because there are drawing exercises, but it is OK to take photos and submit it through D2L as well, just let me know if that is your plan. For 586, turn in your project lab report to the Dropbox on the d2l class website. Late homework will be marked off 10% per day, excluding weekends and holidays. Homework turned in more than 5 days late will not receive points. If you feel you have a compelling reason for turning work in late (illness or emergency), you may petition me via email for an exception.

Requests for incompletes (I) and withdrawal (W) must be made in accordance with University policies which are available at <http://catalog.arizona.edu/2015-16/policies/grade.htm#I> and <http://catalog.arizona.edu/2015-16/policies/grade.htm#W> respectively.

Honors Credit:

Students wishing to contract this course for Honors Credit should email me to set up an appointment to discuss the terms of the [Honors Contract](#).

Class Schedule:

The following table outlines the basic trajectory and topics of the course. The course schedule is subject to change, based on the interests of the students, current events, or to ensure certain topics receive sufficient time and attention. Please refer to a separate document, "Course Schedule", on D2L for a detailed and up-to-date list of lecture topics, exams, homework, and dates.

Topic	Week
Introduction to Organic Geochemistry	1
Carbon and Life	1
Structures and nomenclature of organic compounds	2-3
Preservation and degradation of organic matter	4
Geomolecules: diagenesis, catagenesis, metagenesis	4-5
Overview of analytical methods in organic geochemistry	3-6
Organic geochemical stratigraphy –source indicators	7
Organic geochemical stratigraphy – maturity indicators	7
Biomarkers as indicators for climate and environment	8
Halocarbons and other organic pollutants	8
MIDTERM EXAM	9
Applications of organic geochemistry in petroleum science	10
Applications of organic geochemistry in environmental science	11-12
Applications of organic geochemistry in climate science	13-14
586 participants: laboratory project report due	14

586 participants: laboratory project presentations	15
FINAL RESEARCH PROPOSAL DUE	16

Classroom Behavior Policy:

To foster a positive learning environment, please do not text or surf the web during lecture and discussion. Please refrain from disruptive conversations with people sitting near you during lecture. Students who continue to disrupt despite being asked to cease behavior will be asked to leave class and may be reported to the Dean of Students.

Threatening Behavior Policy:

The UA Threatening Behavior by Students Policy [prohibits threats of physical harm](#) to any member of the University community, including to one's self.

Accessibility and Accommodations:

My goal is that learning experiences be as accessible as possible. Please contact the Disability Resources Center (520-621-3268) (<http://drc.arizona.edu/>) to ensure that you establish reasonable accommodations for the class. You may also discuss any learning barriers directly with me via so that we can assess how my course requirements and activities may impact your ability to fully participate.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Code of Academic Integrity:

The guiding principle of academic integrity is that your submitted work must be your own.

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. For homework assignments, it is allowable to work with another classmate but the written answers should be in your own words (i.e. not copied between students).

Students must adhere to the [UA Code of Academic Integrity](#). Conduct prohibited by the Code consists of all forms of academic dishonesty, including, but not limited to: cheating, fabrication, facilitating academic dishonesty, and plagiarism. Any attempt to commit an act prohibited by these rules shall be subject to sanctions.

Make sure you understand what constitutes plagiarism. The University Libraries have some [excellent tips for avoiding plagiarism](#). If there is evidence of plagiarism in your work, you will receive a zero on the assignment and it will be reported to Dean's office per official University of Arizona policy, no exceptions. Assignments or exams that are identical or nearly identical will be treated as evidence for academic dishonesty on the part of all students involved. Extensive or repeated evidence of plagiarism or other forms of academic dishonesty may result in a reduction in course grade, a failing grade, a permanent notation on your transcript, or a recommendation for suspension or expulsion to a University Hearing Board, which may impose other sanctions.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in sanctions. Additionally, students who use D2L or UArizona email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

Nondiscrimination and Anti-harassment Policy:

The University is committed to creating and maintaining an environment free of discrimination:
<http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Additional Resources for Students:

- UA Academic policies and procedures are available at: <https://catalog.arizona.edu/policies>
- Academic advising: If you have questions about your academic progress this semester, or your chosen degree program, please note that advisors at the [Advising Resource Center](#) can guide you toward university resources to help you succeed.
- Life challenges: If you are experiencing unexpected barriers to your success in your courses, please note the [Dean of Students Office](#) is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at 520-621-2057 or DOS-deanofstudents@email.arizona.edu.
- Physical and mental-health challenges: If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520-621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

Confidentiality of Student Records: University policies are available [here](#).

Subject to Change Statement:

Information contained in the course syllabus and course schedule, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.