

GEOL 4/5095 Geobiology Syllabus

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Office Hours: 9:15 -10:15am Thursdays in Heller Hall 221 (LT), 9:30-10:30 Tuesdays SSB 152D (CS)

Lecture: Tu / Th 8:00 - 9:15 am in Heller Hall 114

Course Description: The course will serve as an introduction to the emerging field of geobiology. It will be divided into two basic parts: (1) the origins, evolution and functional roles of microorganisms and organisms on earth; and (2) practical applications and techniques for geobiology research. Discussion will begin with an overview the discipline of geobiology, which will serve as a framework to understanding the roles of microorganisms over earth's geologic history. Following this portion, we will examine modern advances of analytical techniques and applications in geomicrobiology using real world examples from literature and in class research experience.

Required Materials: We will read primary literature in class. Readings will be distributed via Google Drive. Expect ~ 50-100 pages per week.

Attendance: **Mandatory.** To be considered an excused absence, the student must contact both Dr. Brengman and Dr. Sheik prior to missing class. There are no make-ups for unexcused absences. Late work will only be accepted 1 week after the due date for 50% credit. No make-ups will be accepted for credit after the last day of class, April 27th.

(Undergraduate) Course Grade Point Distribution 4095:

Writing assignments	25%
Activities	15%
Poster	20%
Portfolio	40%
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Total	100%

(Graduate) Course Grade Point Distribution 5095:

Writing assignments	15%
Activities	10%
Poster	15%
Portfolio	40%
Research paper	20%
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Total	100%

Expected course-level student learning outcomes (SLOs)

Students completing this course will be able to:

1. Recognize the role of geobiology in the surface evolution of our planet
2. Identify geobiology tools used in research
3. Apply fundamental geobiology tools in research

Students will demonstrate outcomes 1-3 through:

- Writing assignments where students create an abstract of class discussions/readings.
- Problem sets focused on interpreting geobiology techniques presented in research papers.
- Midterm project where students will distill the information from the first 6 weeks of class in a single, 3'x4' electronic poster format designed for audiences ranging from 6-8th grade.
- Final portfolio consisting of a synthesis of course material created from weekly assignments.

Topics for discussion

1. Introduction to Geobiology - a history of ideas
2. Origin of Life - What is life? boundaries, constraints, and definitions
3. Early Earth Environments - transforming a hostile surface to a habitable one (4.5 - 2.5 Ga)
4. Developing a modern world - evolution of continents, oceans, atmospheres, life (2.5 - 1.9 Ga)
5. The rise of eukaryotes - fossil and genetic records (2.1 Ga)
6. Achieving stability - the boring billion and the expansion of eukaryotes (1.7 Ga - 750 Ma)
7. Disruption and disequilibrium as a catalyst for evolution - Neoproterozoic (1000 - 541 Ma)
8. Establishment of familiar environments and crown groups - the Cambrian (541 - 485.4 Ma)
9. The Great Ordovician Biodiversification Event - the GOBE (485.4 - 443.8 Ma)
10. Colonization of land by plants - landscape and ecosystem evolution (443.8 Ma - 298.9 Ma)
11. Earth's greatest mass extinction - the end Permian (298.9 - 251.9 Ma) climate chaos
12. A new family tree - Mesozoic (251.9 - 66. Ma) dinosaur evolution
13. 0.2 Gtons CO₂ injection/year ... lessons for the "Anthropocene"? - PETM (55.5 Ma) carbon
14. The last ice age - the link between climate and life (2.6 Ma - 11,700 years)
15. Modern advances in genomics

***** TBA - field trip and sampling dates, tentative Feb. 10, 17, 24 *****

Abstract guidelines – 1 page, single spaced, 1" margins, Times New Roman, 12 pt. font for text with up to 1 extra page for figures. Figures must include captions and proper citations. Text must be written in paragraph format, with full, complete sentences and correct grammar and expressions. This should be considered a synthesis of the themes present within your assigned readings for the week and will serve as a summary guide for each section of your portfolio.

Portfolio guidelines – The portfolio should include a title page with author information, which should be followed by a preface, Table of Contents, and an outline of the rest of the document. For the body of the material there is no page minimum or maximum, and there are only two requirements: (1) that references be placed where appropriate; and (2) there must be some vehicle for daily/weekly reflection on each topic. You have the creative freedom to express the material that you have learned throughout the course of the semester in any way, but it should represent a complete and evolved collection and synthesis of your thoughts and information you have learned as a direct result of the activities, assignments, and readings in this course.

Weekly assignments: including (but not limited to) group-work, reflection, problem sets, writing, interactive multi-media work, or any combination of the above will be given sporadically throughout the week. The goal of such exercises is to help you learn the topics covered in class in an interactive setting. As attendance is mandatory, late or incomplete assignments will be dealt with according to the attendance policy on the syllabus.

Link to Academic Calendar: http://www.d.umn.edu/calendar/academic_cal.html

Statement on participation by students with disabilities: Individuals who have any disability, either permanent or temporary, which might affect their ability to perform in this class, are encouraged to inform the instructor at the start of the semester. Adaptation of methods, materials or testing may be made as required for equitable participation.

Statement on student academic integrity: Academic dishonesty tarnishes UMD's reputation and discredits the accomplishments of students. UMD is committed to providing students every possible opportunity to grow in mind and spirit. This pledge can only be redeemed in an environment of trust, honesty, and fairness. As a result, academic dishonesty is regarded as a serious offense by all members of the academic community. In keeping with this ideal, this course will adhere to UMD's Student Academic Integrity Policy, which can be found at www.d.umn.edu/assl/conduct/integrity. This policy sanctions students engaging in academic dishonesty with penalties up to and including expulsion from the university for repeat offenders.

“...Subd. 1. Scholastic Dishonesty. Scholastic dishonesty means plagiarism; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, misrepresenting, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis...”

Please refer to the student handbook for information about academic integrity and school policies:

<http://www.d.umn.edu/kirby/PDFs/StudentActivitiesHandbook.pdf>

Statement on student conduct code: The instructor will enforce and students are expected to follow the University's Student Conduct Code (<http://www.d.umn.edu/assl/conduct/code>). Appropriate classroom conduct promotes an environment of academic achievement and integrity. Disruptive classroom behavior that substantially or repeatedly interrupts either the instructor's ability to teach, or student learning, is prohibited. Disruptive behavior includes inappropriate use of technology in the classroom. Examples include ringing cell phones, text-messaging, watching videos, playing computer games, doing email, or surfing the Internet on your computer instead of note-taking or other instructor-sanctioned activities.