

Microbiology 5160 – Geomicrobiology (3 credit hours)

The Ohio State University

Lecture: TBA

Professor

Dr. Michael J. Wilkins, Ph.D.

Grading

(% of final grade)

Textbook (optional)

Introduction to Geomicrobiology

Kurt O. Konhauser

Published by Wiley-Blackwell

ISBN: 978-0-632-05454-1

Published 2006

Class presentations | 20%

Class participation | 30%

Midterm exam | 20%

Final exam | 30%

Other readings (papers, etc.) will be posted
as pdfs on Carmen

Email

wilkins.231@osu.edu

Office hours

After each lecture, Mendenhall Lab 315

Rationale

This class is being offered to educate both high-level undergraduate and graduate students in interdisciplinary research topics that fall under the general area of 'geomicrobiology'. There is an increasing appreciation for the role that microorganisms play in mineralogical and geochemical processes, at both local and global scales. This class will be beneficial for students interested in how microbiology, geochemistry, and mineralogy intersect, and will utilize primary literature to emphasize this rapidly growing scientific field.

Course objectives

In this course students will learn the role of microorganisms in shaping our environment, both in the present day, and over geologic time periods. Course objectives will include:

1. Understanding the physical properties of microorganisms as they relate to respiration, mineral nucleation, and transport of solutes.
2. Understanding the principles of microbial ecology and current knowledge of microbial diversity.
3. Understanding mechanisms via which microorganisms can exist in the absence of oxygen, and how these metabolisms can alter the local and global environment (e.g. sulfide generation, iron oxidation).
4. A focus on microbially-catalyzed cycling of iron and sulfur in the present and the early-earth. This topic will include discussions on microbial iron- and sulfate-reduction, and microbial oxidation of reduced iron and sulfur species.
5. Understanding how microbial metabolism can be harnessed for the *in situ* remediation of contaminant metals and organic compounds.
6. Understanding how microorganisms can accelerate mineral precipitation, and also catalyze the weathering of certain substrates.
7. Understanding the role of microorganisms in early Earth, including the generation of reduced chemical species, and the response to oxygenation of Earth's atmosphere.

Class requirements

Class will be open to rank 4 undergrads and graduate students in the School of Earth Sciences, the Department of Microbiology, the Department of Civil, Environmental, and Geodetic Engineering, and the School of Environment and Natural Resources.

Restrictions on participation are in place due to the advanced interdisciplinary nature of topics for discussion.

Week number	Topic
1	Introduction to Geomicrobiology
2	Microbial distribution in the marine subsurface
3	Microbial life in the terrestrial subsurface
4	Microbial strategies for survival under energy limitation
5	Short- and long-range microbial electron transfer
6	The sulfur cycle
7	Iron reduction and its role on early earth. Midterm exam will be given this week
8	Respiration of other metals
9	Bioremediation
10	Bio mineralization
11	Microbial weathering
12	Microbial mat development
13	Geobiology of the Archean Eon
14	Geobiology of the Proterozoic Eon Final exam will be given this week

*Every attempt has been made to ensure that the information in the syllabus is complete and accurate. However, mistakes such as typographical errors may occur on occasion. Professor Wilkins will address any errors on this syllabus during lecture. The schedule shown above is tentative and will likely change throughout the semester depending on how quickly or slowly we cover the material in class.

Final Grade

Your final grade will be based on a midterm, a final exam, class attendance, and presentations carried out by students over the course of the semester. See the syllabus above for % of each component. Course will be letter-graded using the standard OSU grading scale

A	93-100		A-	90-92		B-	80-82	
B+	87-89		B	83-86		C-	70-72	
C+	77-79		C	73-76				
D+	67-69		D	60-66				
E	0-59							

Attendance. Please let Dr. Wilkins know if you will be absent from a seminar.

Presentations. Over the course of the semester, each student will be expected to lead discussion for one or two papers of their choosing during a 30-minute period. Their ability to develop talking points and direct discussion will account for 20% of the final grade.

Exams

Examinations will consist of multiple choice, short answer, and longer essay questions. All exams will be taken in class. Exam questions will come from material presented in the lecture, and in primary literature discussed during class. Each student must complete the exam on her or his own. You are NOT permitted to receive assistance from anyone else during the exam. You are NOT permitted to take the exams as part of a group. You ARE permitted to use your own lecture notes and slides during the exam. Dr. Wilkins will provide more details about each exam in class.

There are **NO** make-up exams except for valid reasons (e.g., medical excuse). *If you are sick, you MUST have a note signed by your medical doctor (i.e. a licensed physician) and dated the same day as the exam.*

Otherwise, you will receive a zero on the exam. **Dr. Wilkins will determine if your excuse is valid. If you do NOT have a reasonable excuse for missing an exam then you will receive a ZERO for the exam.**

Approved make-up exams will consist of short-answer and essay questions. An approved make-up exam will NOT be administered online.

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (<http://studentaffairs.osu.edu/csc/>).

Students with Disabilities

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901.

<http://www.ods.ohio-state.edu/>

Other

Periodic announcements, primary literature, and some lecture slides will be posted on Carmen <http://telr.osu.edu/carmen/>.

If I need to communicate with the entire class then I will likely send a mass email to all students. I will use your **OSU email account** for this purpose. I realize that many of you have other email accounts through services such as Goggle, Yahoo, or Hotmail. You must remember to check your OSU email account or you may miss important announcements.