

MICR 423: Geomicrobiology Fall 2018

3 Credit Hours

Course description. This course will focus on the role that microorganisms play in fundamental geological processes. Topics will include an outline of the present understanding of microbial involvement of weathering of rocks, formation and transformation of soils and sediments, genesis and degradation of minerals. Elemental cycles will also be covered with emphasis on the interrelationships between the various geochemical cycles and the microbial trophic groups involved. Prerequisite: MICR 301 and Chemistry 210 and 211. Recommended: GEOL 220, 221 or 222.

Lecture. Life Science II, Room 430, 9:35 – 10:50 Tues and Thurs

Course Goals. At the end of this course you will be able to:

- Intelligently converse with microbiologists, geologists, environmental scientists and engineers about the role microorganisms play in the cycling of elements
- Be familiar with a variety of techniques to identify and characterize microorganisms in any environment
- Relate microbial physiology, genetics, cell structure, and metabolism to the effect, role, or signature that microbes imprint on their surroundings

Instructor

Dr. Scott Hamilton-Brehm

Office

Life Science III, Rm 1009

453-3818

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Office Hours

M 10-12 pm or by
appointment

Strongly suggested textbooks:

- BROCK BIOLOGY OF MICROORGANISMS, 15th edition, 2017, Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley, Matthew W. Sattley, and David A. Stahl (Benjamin Cummings/Pearson).
- Hall BG. Phylogenetic trees made easy: a how-to manual. 2008.

Final Course Grading scale

Grade	Points	Percentage
A	900 - 1000	90-100%
B	800 - 899	80-89%
C	700 - 799	70-79%
D	600 - 699	60-69%
F	0 - 599	0-59%

Lecture Grades. The total amount of points that will be graded for this course is 1000 points. How you earn those points can be from one of the three exams, project exercises, literature review report, and final project.

Course work	Points
3 x Quizzes (100 pnts each)	300
3 x Project exercises (100 pnts each)	300
2 x Literature review report (100 pnts each)	200
Final Project (200 pnts)	200
Total =	1000

Tips for success in this class. COME TO LECTURE! I will not post the lecture slides on D2L. Develop your note taking skills, you are welcome to use your smart phone to take pictures of the slides. Start studying early! Reviewing lecture material as soon as possible after the lecture is the best way to study for this course. The test questions will come almost entirely from the lectures and assigned literature. Use the textbook as a resource to provide further information to support and expand upon lecture material.

Class behavior. No cell phone use (calls or texting) is permitted during class. Phones should also be in silent mode during class. Phone cameras can be used to take pictures of slides.

Computer and software requirements. We expect that students will have access to a laptop or desktop computer for the course for the bio-computational portions of this course. If there are any issues with this requirement please inform instructors immediately so we can make alternative arrangements. Recommended free software to have are Bio-Edit (<http://www.mbio.ncsu.edu/BioEdit/bioedit.html>) and MEGA10 (<http://www.megasoftware.net/>). A high-end compiling computer is available by appointment with Dr. Hamilton-Brehm.

Exams. Quizzes will be given throughout the semester to make sure that lecture material is being followed and that your progress with your project is on schedule. A total of 100 points per quiz will be assigned to them. Quizzes will be composed of short answer questions based on topics covered in lecture.

Geomicrobiology class project. You will receive a USB drive with a FASTA file (a bioinformatics text based format representing nucleotides) saved on it. You are responsible for this USB drive as it contains the information for your MICR423 project. If you lose the drive without a provable excused reason (i.e. “It was in my room, and now it is gone!” vs. “Here is the police report when my backpack was stolen”), your score in MICR423 will be docked 100 points. As the course progresses you will learn how to use software tools, utilize the current state of information, and implement common practices of evaluating a data set. All your work done will be saved onto the USB drive and turned in periodically during the semester for project exercise grades and for the final grade.

Project exercises. Are to check in steps to monitor your progress on your dataset. We will have covered a techniques/principles that can be used on your dataset. Each exercise is worth 100 points. Part of the grade for the project exercises is clear labeling of your files and contents of the data. Please organize and submit them by turning in your thumb-drive.

Exercise #1

Make a maximum likelihood tree of your consortia

Exercise #2

Include reference microorganisms and identify which groups are known to conduct particular metabolisms

Exercise #3

Using your tree identify major geochemistry needs of your consortia

Literature Review report. Write a two page report focusing on one particular clade of your consortia. Base your report on literature that you have read in order to find out more about a particular group of microorganisms. Each report is worth 100 points. The points are based on proper citations, grammar, and content. Please organize and submit them by turning in your thumb-drive.

Final Report. Prepare a 15-20 minute power point talk on your consortia. Make sure include citations of literature that you used to derive the conclusions you are making. Use all material that you wish from class to explain what potentially your consortia is metabolically doing in the environment. The final report is worth 100 points and successfully turning in your USB drive with all data, reports, trees, power point presentation, and PDF reference literature is worth 100 points. The points will be based on clarity of the presentation, the depth of research on the consortia, and capacity to answer questions regarding the data. Please organize and submit them by turning in your thumb-drive.

MICR423 Lecture Schedule Fall 2017			
WEEK	DATE	Topic	Events
1	Aug 21 st , 23 rd	Origin of atoms, Early Earth, and Prokaryotic cell review	
2	Aug 28 th , 30 th	Phylogeny, evolution, and bioinformatic software	
3	Sept 4 th , 6 th	Carbon cycling	Project exercise #1 due 6th
4	Sept 11 th , 13 th	Thermodynamics and Redox	Exam 1 on 13th
5	Sept 18 th , 20 th	Microbial metabolism	
6	Sept 25 th , 27 th	Oxygen cycle and photosynthesis	Project exercise #2 due 27th
7	Oct 2 nd , 4 th	Sulfur cycle	Lit review #1 due 4th
8	Oct 9 th , 11 th	Nitrogen cycle Phosphorus cycle	Exam 2 on 11th
9	Oct 16 th , 18 th	Biominaleralization and Metal cycles	Dr. Lefticariu guest lecture, Oct 18th
10	Oct 23 rd , 25 th	Microbial weathering	Dr. Brooks guest lecture, Oct 23rd
11	Oct 30 th , Nov 1 st	Methanogenesis, methanotrophy, acetogenesis	Dr. Daniel Hummer?
12	Nov 6 th , 8 th	Viruses and subsurface life	Project exercise #3 due 8th
13	Nov 13 th , 15 th	Life on other planets	Dr. Potter McIntyre guest lecture Nov 15th
14	Nov 20 th , 22 nd	Thanksgiving, no class this week	
15	Nov 27 th , 29 th	Presentations start	Exam 3 on 27th and Lit review #2 due on 29th
16	Dec 4 th , 6 th	Presentations	
17	Dec 10 th to 14th	Turn in any remaining USB Drives	

UNIVERSITY SUPPORT

Emergency procedures.

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at <http://www.bert.siu.edu>, Department of Safety's website <http://www.dps.siu.edu/> (disaster drop down) and in Emergency Response Guideline pamphlet.

Instructors will provide guidance to students in the classroom in the event of an emergency affecting your location. **It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.** The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.

Academic Dishonesty

The Student Conduct Code of SIU clearly spells out the University policy on Academic Dishonesty.

Definition of Academic Dishonesty

We define academic dishonesty to mean turning in material created by someone else and representing it as your own work or permitting others to represent your work as their own.

Penalty for Academic Dishonesty

- First offense: from a zero on the specific lab/assignment/project/exam to course grade of F.
- Second offense: from course grade of F to suspension from the school.
- Third offense: permanent suspension from the school.

Records of academic dishonesty will be maintained in the student's file in the school advisor's office, as well as in a master academic dishonesty file in the school director's office. When an incidence of academic dishonesty occurs, the faculty member will meet with the school director to discuss the situation and determine the appropriate penalty.

Syllabus Attachment

Fall 2018

MISSION STATEMENT FOR SOUTHERN ILLINOIS UNIVERSITY CARBONDALE

SIU embraces a unique tradition of access and opportunity, inclusive excellence, innovation in research and creativity, and outstanding teaching focused on nurturing student success. As a nationally ranked public research university and regional economic catalyst, we create and exchange knowledge to shape future leaders, improve our communities, and transform lives.

IMPORTANT DATES *

Semester Classes Begin:.....**08/20/2018**
Last day to add full-term course (without Dean's signature):**08/26/2018**
Last day to withdraw from the University with a full refund:.....**08/31/2018**
Last day to drop a full-term course for a credit/refund:.....**09/02/2018**
Last day to drop a full-term course (W grade, no refund):.....**10/28/2018**
Final examinations:**12/10–12/14/2018**

Note: Please verify the above dates with the Registrar calendar and find more detailed information on deadlines at <http://registrar.siu.edu/calendars>. For add/drop dates that apply to shorter-than-full-term courses, please look at the Schedule of Classes search results at <http://registrar.siu.edu/schedclass/index.php>

FALL SEMESTER HOLIDAYS

Labor Day Holiday 09/03/2018
Thanksgiving Break 11/17—11/25/2018

DIVERSITY

Southern Illinois University Carbondale's goal is to provide a welcoming campus where all of our students, faculty and staff can study and work in a respectful, positive environment free from racism and intimidation. *For more information visit:* <http://diversity.siu.edu/#>

DISABILITY SUPPORT SERVICES

SIU Carbondale is committed to providing an inclusive and accessible experience for all students with disabilities. Disability Support Services coordinates the implementation of accommodations. If you think you may be eligible for accommodations but have not yet obtained approval please contact DSS immediately at 618-453-5738 or disabilityservices.siu.edu. You may request accommodations at any time, but timely requests help to insure accommodations are in place when needed. Accommodations and services are determined through an interactive process with students and may involve consideration of specific course design and learning objectives in consultation with faculty.

MILITARY COMMUNITY

There are complexities of being a member of the military community and also a student, and military and veteran related developments can complicate academic life. If you are a member of the military community and in need of accommodations please visit Veterans Services at <http://veterans.siu.edu/>

STUDENT MULTICULTURAL RESOURCE CENTER

The Student Multicultural Resource Center serves as a catalyst for inclusion, diversity and innovation. As the Center continues its work, we are here to ensure that you think, grow and succeed. We encourage you to stop by the Center, located in the Student Services Building Room 140, to see the resources available and discover ways you can get involved on the campus. *Visit us at* <https://smrc.siu.edu/>

SALUKI CARES

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For Information on Saluki Cares: call(618) 453-2461, email siucares@siu.edu, or <http://salukicare.siu.edu/>

SAFETY AWARENESS FACTS AND EDUCATION

Title IX makes it clear that violence and harassment based on sex and gender is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here:
<http://safe.siu.edu>

MORRIS LIBRARY HOURS: <http://libguides.lib.siu.edu/hours>

ADVISEMENT: <http://advisement.siu.edu/>

SIU ONLINE: <https://online.siu.edu/>

WITHDRAWAL POLICY ~ Undergraduate only

Students who officially register for a session must officially withdraw from that registration in a timely manner to avoid being charged as well as receiving a failing grade for those classes. An official withdrawal must be initiated by the student, or on behalf of the student through the academic unit, and be processed by the Registrar's office. For the proper procedures to follow when dropping courses and when withdrawing from SIU visit: <http://registrar.siu.edu/students/withdrawal.php>

INCOMPLETE POLICY~ Undergraduate only

An INC grade may be assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments for the course. An INC must be changed to a completed grade within one full semester (undergraduates), and one full year (graduate students), from the close of the term in which the course was taken or graduation, whichever occurs first. Should the student fail to complete the remaining course requirements within the time period designated, the incomplete will be converted to a grade of F and such grade will be computed in the student's grade point average. *For more information visit:* <http://registrar.siu.edu/grades/incomplete.php>

REPEAT POLICY

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit more than once. For students receiving a letter grade of A, B, C, D, or F, the course repetition must occur at Southern Illinois University Carbondale. Effective for courses taken Summer 2013 or later, only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned.

This policy will be applied to all transferrable credit in that only the last grade will be used to calculate grade point average. Only those courses taken at the same institution are considered repeats under this policy. *See full policy at* <http://registrar.siu.edu/students/repeatclasses.php>

SIU's EARLY WARNING INTERVENTION PROGRAM (EWIP)

Students enrolled in courses participating in SIU's Early Warning Intervention Program might be contacted by University staff during a semester. More information can be found at the Core Curriculum's Overview webpage: <http://corecurriculum.siu.edu/program-overview/>

EMERGENCY PROCEDURES

We ask that you become familiar with **Emergency Preparedness @ SIU**. Emergency response information is available on posters in buildings on campus, on the Emergency Preparedness @ SIU website, and through text and email alerts. *To register for alerts visit:* <http://emergency.siu.edu/>

CENTER FOR LEARNING AND SUPPORT SERVICES

Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website:

Tutoring : <http://tutoring.siu.edu/>

Math Labs <http://math.siu.edu/courses/course-help.php>

WRITING CENTER

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit:
<http://write.siu.edu/>

GRADUATE POLICIES

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please refer to the graduate catalog at <http://gradschool.siu.edu/about-us/grad-catalog/>

Need help with an issue? Please visit SALUKI SOLUTION FINDER at <http://solutionfinder.siu.edu/>

PLAGIARISM

See the Student Conduct Code <http://srr.siu.edu/student-conduct-code/>