

**MICR/MBMB 470: Prokaryotic Diversity**  
**Spring 2017- Syllabus**  
**T/R 9:35-10:50 Lawson Rm 131**  
Department of Microbiology  
Southern Illinois University at Carbondale

**Instructor:** Dr. Kelly Bender, Life Science II, Room 106  
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Office Hours: 11:00 am -12:00 pm T/R or by appointment

- Objectives:**
- 1) To explore the microbiology of the major groups of prokaryotes that catalyze key biogeochemical transformations in nature
  - (2) To contrast the major physiological processes of these organisms and relate them to the ecology of their ecosystems
  - (3) To investigate the microbial ecology of specialized microbial habitats
  - (4) To employ bioenergetic principles to predict the ecology of microbial ecosystems

**Text:** *BROCK BIOLOGY OF MICROORGANISMS*, 14th edition, 2014, Michael T. Madigan, John M. Martinko, Kelly S. Bender, Daniel H. Buckley, and David A. Stahl (Benjamin Cummings/Pearson). **Alternatively, a copy of the textbook has been put on reserve at the library if you do not wish to purchase it.** You may also purchase the electronic version online [www.coursesmart.com; type "9780321897398" into the search field]. Assigned readings from the text (see lecture schedule below) are listed by section number. Additional journal articles may be assigned for some of the lecture topics and these will be announced in class at least a week prior of the associated lecture.

**Grading:** Your grade in MICR 470 is based on: **three** quizzes (30 points each), **two** exams (100 points each), a **final** exam (100 points), and attendance and participation points (40 points). *Your lowest quiz score will be dropped* to make the **total points for the course 400**. Coverage for each quiz will be announced in class at least two periods prior to the quiz. Quizzes will be short-answer format and may also contain some definitions of key terms. Exams will be a mixture of objective (multiple choice/true-false) and essay questions. Quiz and exam essay questions will be at the same level. The final exam will consist of 40 points covering material since the third quiz and 60 points comprehensive and will be entirely objective. **NO MAKE-UP QUIZZES OR EXAMS WILL BE GIVEN**. For optional extra credit (**maximum 30 points**), students may give a presentation on the microbial diversity/ecology of a natural or engineered habitat of their choice (directions for grading criteria for these presentations are outlined on pages 3-4 of this syllabus).

**100-90% (400-360 pts) = A; 89-80% (359-320 pts) = B; 79-70% (319-280 pts) = C;**  
**69-60% (279-240 pts) = D; ≤59% (≤239 pts) = F.**

**Class behavior:** No cell phone use (calls or texting) is permitted during class unless you are looking up material pertaining to the lecture. Phones should also be in silent mode during class. This may seem like common courtesy to most students, but unfortunately it has to be pointed out to some. Although I should not need to remind Jr., Sr., and grads of this: **Students who earn a good grade in MICR 470 typically have a nearly perfect attendance record.**

## MBMB/MICR 470 Schedule

Please note that the dates scheduled for the quizzes and two hourly exams are tentative and will be announced in class at least one week in advance.

**\*\*Partial lecture slides can be downloaded from Desire2Learn <https://online.siu.edu>**

**The following lecture schedule is subject to change without notice.**

Week	Lecture	Date	Topic (Chapter sections)
1	1	1/17	The Prokaryotic Cell Review (2.7-2.12; 3.3-3.13; 5.11-5.16)
	2	1/19	The Prokaryotic Cell Review (2.7-2.12; 3.3-3.13; 5.11-5.16)
2	3	1/24	Appendix 1; Redox chemistry worksheet; Early Earth & Origin of Life (class handout; 12.1)
	4	1/26	Supplemental article 1: Icy Worlds- see D2L; Phylogeny, Evolution, and Systematics (12.2 – 12.5)
3	5	1/31	Supplemental article 2: Eukaryotic-Like Prokaryotes - see D2L; Phylogeny, Evolution, and Systematics (12.6 – 12.10)
	6	2/02	<b>Quiz 1</b> Anoxygenic Photosynthesis (13.1-13.3; 14.4-14.7)
4	7	2/7	Photosynthesis and Autotrophy (13.4-13.5; 14.2-14.3); Supplemental article 3: Carboxysomes - see D2L
	8	2/9	Fermentation and Syntrophy (3.8-3.9; 13.11-13.14; 15.6,15.8;13.15 )
5	9	2/14	Supplemental article 4: Benefits of Fermentation Products- see D2L Anaerobic Respiration: Nitrate, Sulfate/Sulfur, Iron, & Other Acceptors (13.16-13.17; p 456; 13.8; 14.9-14.10; 13.21; 14.14)
	10	2/16	Anaerobic Respiration: continued; Supplemental article 5: Arsenic Metabolism- see D2L
6	11	2/21	<b>FIRST HOURLY EXAM</b>
	12	2/23	Acetogenesis and Methanogenesis (13.19-13.20; 14.18, 16.2;)
7	13	2/28	Sulfur/Iron Oxidation, Nitrifying Bacteria, and Anammox (13.8-13.9; 14.11, 14.15; 13.10; 14.13)
	14	3/02	H <sub>2</sub> Bacteria, Methylophony, N <sub>2</sub> Fixation, and Hydrocarbon metabolism (13.10; 13.7; 14.16; 13.23; 14.17; 3.17; 14.12; 13.22, 13.24)
8	15	3/07	Diversity of <i>Archaea</i> and Select <i>Bacteria</i> (16.1, 16.3, 16.7, 16.9-16.12)
	16	3/9	Supplemental articles 6-7: Ocean <i>Archaea</i> and Extremes of Energetics- see D2L
	-	3/14	<b>Spring Break</b>
	-	3/16	<b>Spring Break</b>
9	17	3/21	<b>Quiz 2</b> Putting it all together: Nutrient Cycles (20.1-20.8)
	18	3/23	Symbiosis (22.3, 22.6-22.8)
10	19	3/28	Symbiosis (22.9-22.14)

	20	3/30	Methods in Microbial Ecology (18.1-18.5)
11	21	4/04	Methods in Microbial Ecology (18.6-18.11)
	<b>22</b>	<b>4/06</b>	<b>SECOND HOURLY EXAM</b>
12	23	4/11	Introduction to Ecosystems and Biofilms (19.1-19.5)
	24	4/13	Examples of other ecosystems- see notes
13	25	4/18	**Presentations: human/host ecosystems
	26	4/20	**Presentations: Marine ecosystems (ocean surface, tidal flats, deep-sea, methane seeps, estuaries.....)
14	<b>27</b>	<b>4/25</b>	<b>Quiz 3</b> **Presentations: Freshwater ecosystems (lakes, rivers, swamps, bogs.....)
	28	4/27	**Presentations: Terrestrial ecosystems (rocks and soil, prairie, forest, tundra.....)
15	29	5/02	**Presentations: Extreme environments (deserts, hot springs, glaciers, mine drainage.....)
	30	5/04	Finish up presentations; review topics for final exam; evaluations

**\*\*\*FINAL EXAM: Thursday May 11<sup>th</sup> from 8:00-10:00 am\*\*\***

### **\*\*Student presentations**

Consider an ecosystem of your choice (**see Chapter 19-21 for ideas**), discuss it with your instructor, and have your presentation placed on the lecture schedule. The ecosystems currently listed are guiding examples only; your own ideas are highly welcome. Sign-ups are due by March 31th, 2016.

#### Potential topics

- Marine ecosystems: ocean surface, tidal flats, deep-sea, methane seeps, estuaries, anoxic basins, etc.
- Freshwater ecosystems: lakes, rivers, swamps, bogs, etc.
- Terrestrial ecosystems: rocks and soil, prairie, forest, tundra, etc.
- Extreme environments: deserts, hot springs, glaciers, deep subsurface, mine drainage, etc.
- Built environments: landfills, wastewater treatment reactors, bioremediation, etc.
- Food ecosystems, agricultural systems, aquaculture, etc.

Presentations should be ~15 min in length, in PowerPoint or equivalent format, and include the following:

- introduction of the ecosystem (~3 min)
- comprehensive list of roles and functions held by microorganisms in this ecosystem (~3 min)
- more elaborate explanation of 1 or 2 of these microbial functions and interactions (~9 min)
- summary

Prepare a presentation outline for posting on D2L, due at least 2 days before your talk.

Student presentations will be rewarded with up to 30 bonus points, based on the following criteria:

- quality of content
- visual and oral presentation

- classroom discussion, knowledge of related material
- quality and timely submission of the outline

Note that good presentations will be considered course content and, thus, are relevant material to be tested on in the final exam.

***Emergency Procedures Statement.*** *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 [www.bert.siu.edu](http://www.bert.siu.edu), Department of Safety's website [www.dps.siu.edu](http://www.dps.siu.edu) (disaster drop down) and in Emergency Response Guideline pamphlet. Know how to respond to each type of emergency.*

*Instructors will provide guidance and direction 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.*

**IMPORTANT DATES \***

<u>Semester Class Begins:</u> .....	<b>01/17/2017</b>
<u>Last day to add full-term course</u> (without Dean's signature): .....	<b>01/22/2017</b>
<u>Last day to withdraw from the University with a full refund:</u> .....	<b>01/27/2017</b>
<u>Last day to drop a full-term course for a credit/refund:</u> .....	<b>01/29/2017</b>
<u>Deadline to apply to graduate at the end of this term:</u> .....	<b>04/2/2017</b>
<u>Final examinations:</u> .....	<b>5/8–5/12/2017</b>
<u>Commencement:</u> .....	<b>5/13/2017</b>

Note: For more detailed information on the above deadlines, please visit <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>

**SPRING SEMESTER HOLIDAYS**

Martin Luther King Jr.'s Birthday Holiday 01/16/2017  
Spring Break 3/11–3/19/2017

**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>

**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/>

**DISABILITY POLICY**

Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must contact DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements. <http://disabilityservices.siu.edu/>

**PLAGIARISM**

Student Conduct Code <http://srr.siu.edu/student-conduct-code/>  
Guidelines for Faculty [http://pvcaa.siu.edu/\\_common/documents/Plagiarism/Guide%20to%20Preventing%20Plagiarism.pdf](http://pvcaa.siu.edu/_common/documents/Plagiarism/Guide%20to%20Preventing%20Plagiarism.pdf)

**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>

**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) 453-1492, email [siucares@siu.edu](mailto:siucares@siu.edu), or <http://salukicare.siu.edu/>

**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/>

**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 Grinnell Commons, to see the resources available and discover ways you can get involved on the campus. Visit us at <http://inclusiveexcellence.siu.edu/>

**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/>

**AFFIRMATIVE ACTION & EQUAL OPPORTUNITY**

Our office's main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. For more information visit: <http://diversity.siu.edu/#>

**MILITARY COMMUNITY**

There are complexities of being a member of the military community and also a student. Drill schedules, calls to active duty, complications with GI Bill disbursement, and other unforeseen 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/>

Additional Resources:

**ADVISEMENT:** <http://advisement.siu.edu/>  
**SIU ONLINE:** <https://online.siu.edu/>  
**SALUKI SOLUTION FINDER:** <http://solutionfinder.siu.edu/>  
**MORRIS LIBRARY HOURS:** <http://libguides.lib.siu.edu/hours>