MAR 301 - Environmental Microbiology

Lectures – TBA
Laboratory – TBA

Required Text: *Brock - Biology of Microorganisms 14th Edn.* by Madigan, Martinko, Bender, Buckley & Stahl
T.A.s: TBA

Course Description: Microbiological mediation of natural processes in marine, freshwater, soil, and groundwater habitats, as well as public health issues and microbial potential for remediation of pollutants. Lectures include a survey of taxonomic and metabolic diversity, elementary cell biology, nutrition, environmental controls on physiology and adaptations, biogeochemical cycles, and modern methods of sampling and analysis. Labs introduce students to fundamental microbiological methods currently used in environmental, public health, and clinical settings. Not for credit in addition to MAR 302 or BIO357.

This course has an associated fee. Please see www.stonybrook.edu/coursefees for more.

Prerequisites: BIO 202; CHE 131 or 141

Course Learning Objectives: Introduce students to the microbial world, gain appreciation for centrality of microbes to ecosystem function and develop basic laboratory skills for handling and characterizing microorganisms

Course Requirements: Text Book, Mandatory Attendance, 1 mid-term exam (100 pts), 4 quizzes (25 pts each), 6 homework questions and problems (10 pts each), final exam (100 pts) and laboratory reports (200 pts)

Lab Requirements: Mandatory Attendance (no make-ups for lab), Lab coat, Safety goggles, Sharpie permanent marker

Class Resources: Text, Blackboard, Library, Internet

1. Introduction - *Chapter 1*
2. Cell Structure and Function – *Sections 2.1-2.12*
3. Cell Structure and Function – *Sections 2.13-2.22*
4. Microbial Metabolism – *Sections 3.1-3.13*
5. Molecular Microbiology - *Chapter 4*
6. Microbial Growth & Control – *Sections 5.1-5.10*
7. Quiz #1 – Microbial Growth & Control – *Sections 5.11-5.19*
8. Metabolic Regulation – *Chapter 7*
9. Genetics of Bacteria & Archaea - *Chapter 10*
10. Microbial Evolution & Systematics – *Chapter 12*
11. Metabolic Diversity of Microorganisms –*Sections 13.1-13.10*
12. Metabolic Diversity of Microorganisms –*Sections 13.11-13.24*
13. **Quiz #2** - Functional Diversity of Bacteria - *Sections 14.1-14.13*

15. **Mid-Term Exam**


   a. Diversity of Archaea - *Chapter 16*

17. Diversity of Eukaryotic Organisms – *Chapter 17*

18. Viruses and Virology – *Chapter 8*

19. Microbial Genomics - *Chapter 6*

   a. **Quiz #3** – Methods in Microbial Ecology- *Chapter 18*

20. Microbial Ecosystems – *Chapter 19*

21. Nutrient Cycles - *Chapter 20*

22. Microbiology of the Built Environment - *Chapter 21*

23. Microbial Symbioses - *Chapter 22*

24. Epidemiology - *Chapter 28*

25. **Quiz #4** - Water-Borne and Foodborne Diseases - *Chapter 31*

26. Vectorborne and Soilborne Diseases – *Chapter 30*

27. **Final** TBA
DISABILITY SUPPORT SERVICES (DSS) STATEMENT: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website:  http://www.stonybrook.edu/ehs/fire/disabilities  

ACADEMIC INTEGRITY STATEMENT: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

CRITICAL INCIDENT MANAGEMENT: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.

CLASSROOM ETIQUETTE:
We have a zero tolerance policy for use of cell phones or other electronic communication devices during lectures, labs, quizzes and exams. Out of courtesy for your fellow students and your instructors, and in the interest of maximizing classroom productivity, the following rules of conduct are in force during our lecture and lab sessions:

1. Cell phones will be powered down and appropriately stowed before class commences.
2. Computers may only be used for note-taking in lecture, all superfluous applications must be closed, and wi-fi access to the internet must be disabled prior to class commencing, unless special permission is granted.
3. In lab, no electronic devices on the benches for your protection
4. In lecture, eating is forbidden in the classroom. Beverages are allowed.
5. In lab, food and beverages are forbidden for health and safety reasons.
6. While in lecture, students are not permitted to leave and re-enter the class room for any reason, except for a fire alarm. Use the bathroom prior to class. Exiting class to place or receive a phone call will be considered a breach of our agreement and you will not be permitted back into the classroom.
Section 2 and Section 1. TBA


Office Hours and contact information: Prof. Aller and TAs (before or after labs or by appointment) Prof. josephine.aller@stonybrook.edu

Note: It is critical that you attend all labs (no make ups)! Exercises started on one week often require observation and/or manipulation at the beginning of the next lab and before a new exercise is begun. Exercises are done in groups of 4, but EVERYONE must keep their own notes and INDIVIDUALLY complete lab reports. These exercises are designed to make you think about your observations and data. You will likely not find the answers by ‘googling’ the questions. Be sure to reread the exercises and introductions to the exercises when answering questions for lab write-ups.

Team work is critical for efficiently completing lab exercises making it essential for everyone to try to get to lab on time. There is a lounge across the hall which you can use to meet with team members, prepare for lab, eat lunch, etc. Note: There is a canteen in the Dental School which you pass on the way to lab.

Other important rules:
1. ABSOLUTELY No long hair, no scarves in lab. They are sources of contamination first of all and secondly, they are potential fuel for fires. Hair and scarves must be tied back out of the way. REMEMBER your scrunchie!

2. You must wear a lab coat to help prevent cross contamination and protect your street clothes from stains/dyes. We have a box of clean lab coats to borrow, however you may bring your own if you prefer.

2. No cell phones in lab (OR ON DURING LECTURE). If you need to make or receive an IMPORTANT call, you may go across the hall or outside.

3. In case of an emergency or you are ill and you will be late or not able to come to lab, you are responsible for notifying your lab partners and me or your TA. In special circumstances you can attend the alternate lab day. While we don’t want you to come with a fever or in a contagious state, missing a whole week puts you and your team at a disadvantage so you need to coordinate with your partners.

Schedule of laboratory Exercises.
1. Introduction, Safety, Basic Lab Techniques - *Exercises 1&2*

2. Microscopy - *Exercises 4, 5, 6. READ sections 2.1-2.4 in text*

3. Bacterial Staining - *Exercises 7, 9, 10, 12*

4. Fungi - **Read** Intro pg. 231 *Exercise 4 (Brock) Protozoa Exercise 33 (CS) Nematode Trapping*

5. Microbiology of Water *Exercises 48A, 49A*

6. Microbiology of Soil - *Exercises 49B, 50A* and continuation of water studies *Exercise 48B*

7. Continuation of soil studies Exercise 50B and continuation of water studies. Begin *Exercise 48C. Oxidation of Sulfur in Soil Exercise 6*

8. Bacterial Genetics (will continue over the next 3-4 labs) *Exercises 54, 55, 56*
   Continuation of water studies *Exercise 48D* and continuation of Sulfur Oxidation in Soil *Exercise 6*

9. Observe 54, 55, 56 and re-inoculate 55. Continuation of Sulfur Oxidation in Soil *Exercise 6*

10. Observe 55, continue 6. Begin Biochemical Activities *Exercise 21*


12. Examination of Nutritional Requirements of Bacteria by Comparison of Media for Cultivation *Exercise 13*
