MAR 302
MARINE MICROBIAL ECOLOGY

Prof. Gordon T. Taylor (Endeavour 161, 632-8688; gordon.taylor@stonybrook.edu)
[office hours = TBA or by appointment]

Prof. Josephine Aller (Dana 101, 632-8655; josephine.aller@stonybrook.edu)
[office hours = TBA or by appointment]

TEXT: *Brock - Biology of Microorganisms* by Madigan, Martinko, Bender, Buckley & Stahl 14th Edn.

SUPPLEMENTARY READINGS: Reprints or pdfs (TBA - to be assigned)

**TOPICS**

**Introduction & History of Microbiology (GT)**
1. Cell Structure and Function (GT)  
   *Chp 1*
2. Cell Structure and Function (GT)  
   *Sect 2.1-2.12*
3. Evolution & Systematics (GT)  
   *Chp 12*
4. Functional Diversity of Bacteria (GT)  
   *Sect 12.1-12.13*
5. Functional Diversity of Bacteria (GT)  
   *Sect 12.14-12.24*
6. Archaea (GT)  
   *Chp 16*
7. Viruses (JA)  
   *Chp 8*
8. Protists (JA)  
   *Chp 17*
9. Metabolic Diversity of Microorganisms (JA)  
   *Sect 13.1-13.10*
10. Metabolic Diversity of Microorganisms (JA)  
    *Sect. 13.11-13.24*
11. Symbiosis (JA)  
    *Sect. 22.11-22.14, 22.8-22.13*
12. Microbial Central Metabolism (GT)  
    *Chp 3*
13. Microbial Reproduction (GT)  
    *Chp 5*
14. Growth, Productivity, and Habitat (GT)  
    *Sect. 19.1-19.5, 19.8-19.13*
15. Substrate Utilization and Decomposition - Techniques (JA)  
    *Chp 18*
16. Techniques Part 2 (JA)  
    *Chp 18*
17. Trophodynamics (GT)  
    *TBA*
18. Nutrient Cycling (GT)  
    *Sect. 20.1-20.6, TBA*
19. Biofilms & Air-Sea Interface (GT)  
    *TBA*
20. Habitats - Pelagic - POM and Marine Snow (GT)  
    *TBA*
21. Benthic - Marshes and Mangroves (JA)  
    *TBA*
22. Anoxic Water Columns (JA)  
    *TBA*
23. Polar Communities (GT)  
    *TBA*
    *TBA*
25. Benthic – Coral Reefs (JA)  
    *TBA*

**Learning Objectives:**

- Explain the evolution, diversity, and importance of micro-organisms in the sea.
- Learn the phylogenies, physiologies, biochemistry, ultrastructure and ecological functions of each major microbial group (viruses, bacteria, fungi, protozoans, algae).
- Recognize the role of these micro-organisms in many of the elemental (geochemical) cycles of the oceans.
- Compare the microbial ecology of major marine habitats.
In this survey course, students will become familiar with the evolution, diversity, and importance of micro-organisms in the sea. Students will gain understanding of phylogenics, physiology, biochemistry, ultrastructure and ecological functions of each major microbial group (viruses, bacteria, fungi, protozoans, algae). Particular emphasis is placed on understanding the role of micro-organisms in the main elemental (geochemical) cycles of the oceans. Course provides in-depth exploration of the microbial ecology of most major marine habitats.

**Course Requirements**

♦ Class Attendance !! Habitually absent students fare poorly in this class.
♦ Read assignments before class and then again after.
♦ Take your own detailed notes! Don’t rely on Blackboard postings as they will be incomplete.
♦ 2-4 Homework assignments from text (25 pts. each)
♦ 2 Midterm Exams – fill-ins, matching, short essays, diagrams (100 pts. each)
♦ 1 Final Exam – same format and non-comprehensive (100 pts. each)
♦ 1 Paper – 10 pg paper on Marine Microbiological Envrionment, Process or Concept (100 pts.) Fulfills upper division writing requirement.
♦ 10-12 Abstracts during latter half of the semester – 1-2 paragraphs summarizing your readings (see attached) (10 pts. each);

**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 (631) 632-6748 or http://studentaffairs.stonybrook.edu/dss/. They will determine with you what accommodations 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 instance of academic dishonesty to the Academic Judiciary. 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/

You are responsible for being familiar with and for adhering to the standards referred to in this document. Any violation can be taken as a deliberate act of cheating and will be actionable. Instances of plagiarism in this course will be referred to the Academic Judiciary for action. Information on the penalties and procedures that will be followed for plagiarism and other types of academic dishonesty is available on the Academic Judiciary page.

**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, and/or inhibits students' ability to learn.
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 ALL our class sessions. Consider them our social contract.

1. Cell phones will be powered down and appropriately stowed before class commences – no exceptions!

2. Computers may only be used for note-taking, 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. Abuse of this privilege will result in ban on classroom computer use – period!

3. Eating is forbidden in the classroom. Only beverages are allowed in class.

4. While lecture is in session, students are not permitted to disrupt lecture by leaving and re-entering the class room for any reason, except bursting bladders or bowels, severe nausea or a fire alarm. Arrive at class prepared to sit attentively for the next 80 minutes without distractions. Exiting class to respond to a call or text will be considered a breach of our contract and you’ll be asked to leave. Enough said.
Required Format for Abstract from Assigned (TBA) Readings

Your Name: ____________________________ Date: ____________

Subject Area from Syllabus (e.g., Anoxic Basins)

Full Citation in following format:
Taylor, G. T. and J. Aller {all authors} (2015) {publication year}. Why microbes rock {paper title}. Ecology {journal name}, 34 {volume}: 215-234 {inclusive pages} or DOI or weblink.

Summary: TWO paragraphs maximum (≤ 1 page), which must include:

♦ type of paper, i.e. literature review, field study, laboratory study, theoretical study
♦ location of study (if appropriate)
♦ most significant findings
♦ authors’ major points (take home messages)
♦ two new terms you learned and their definition
♦ aspect that most interested you, the reader

ABSTRACT IS DUE EXACTLY ONE WEEK AFTER LECTURE ON THAT TOPIC!
Upper Division Writing Requirement
School of Marine and Atmospheric Sciences
This form is for the use of majors in ENS, MAR and MVB.

Please submit 2 papers, each accompanied by a SEPARATE completed form, to satisfy the upper division writing requirement. Papers and forms must be received by the end of the semester prior to the semester you plan to graduate.

Requirement: Two papers written for upper division classes in your major. One paper should be about 5 pages and the other about 10 pages. For one of these you may use a cluster of shorter papers. If there is a question about what papers may be used to fulfill the requirement, contact the undergraduate director. Late requests will be entertained but may delay graduation clearance.

Part I - to be completed by student
Name: ___________________________ ID #: ______________________________

Expected date of graduation: _______ _______
Month/ Year

Material Submitted (check one):

☐ Term Paper (or approved cluster of papers)
  o Title of paper or cluster __________________________
  o Course number _______ Instructor ____________

  o I hereby state that the above listed papers were written by me, in full accordance with University rules governing authorship and plagiarism

_____________________________ ____________________
Signature of Student Date

Part II- to be completed by Course Instructor

The above-named student has submitted the listed material in my course (please check the appropriate block below and sign.)

☐ Approved: The writing sample meets with my approval for the completion of the upper division writing requirement of the ENS, MAR or MVB major.

☐ Deferred: The writing sample should be evaluated by the undergraduate program director

_____________________________ ____________________
Signature Print Last Name Date

Part III- to be completed by Undergraduate Programs Director

_____ approved _____ tabled (see comments) _____ rejected

Comments: _______________________________________________________________________________

_____________________________ ____________________
Signature Print Last Name Date
Upper Division Writing Requirement
School of Marine and Atmospheric Sciences

This form is for the use of majors in ENS, MAR and MVB.

The advanced writing component for the major in ENS, MAR or MVB requires approval in writing by the undergraduate director of two papers written for upper division courses in the major. Typically these papers will be term papers (and may be written for classes including internships, readings or research). One paper is typically 5 pages and the second is about 10 pages in length. Several shorter papers may be combined to satisfy the requirement for one of the papers. Lab reports for upper division courses may be used by permission (see undergraduate director).

Students who wish to use material from a participating course should obtain the necessary upper division writing requirement form from:

1. The SoMAS education office (Endeavor 105/107)
2. The SoMAS web page (http://www.somas.stonybrook.edu/education/)

This form should be presented to the course instructor at the time of submission of the material. The course instructor will provide a special evaluation of the writing (in addition to a grade) and send the completed form to the Undergraduate Program Director. Materials from other courses may be used if they include a suitable writing component. They must be submitted to the undergraduate programs director together with the form signed by the instructor.

Students are urged to submit appropriate materials in their junior year, or by the end of their next-to-last term, in order to allow for evaluation and possible remedial effort. Later submissions are considered but may delay graduation. If material is rejected, the student is urged to attend the Writing Center or to get other assistance before resubmitting the paper or material from another course.

Examples of acceptable courses:

- BIO 353: Marine Ecology
- BIO 386/ENS 311: Ecosystem Ecology and the Global Environment
- ENS 301: Contemporary Environmental Issues and Policies
- ENS 312: Population, Technology and the Environment
- ENS 443: Environmental Problem Solving
- MAR 302: Marine Microbiology and Microbial Ecology
- MAR 303: Long Island Marine Habitats
- MAR 308: Principles of Instrumental Analysis
- MAR 320: Limnology
- MAR 333: Coastal Oceanography
- MAR 334: Remote Sensing of the Environment
- MAR 336: Marine Pollution
- MAR 340: Environmental Problems and Solutions
- MAR 346: Marine Sedimentology
- MAR 349: Introduction to Biological Oceanography
- MAR 366: Plankton Ecology
- MAR 370: Marine Mammals
- MAR 371: The Biology and Conservation of Marine Birds and Sea Turtles
- MAR 375: Marine Mammal and Sea Turtle Rehabilitation (discuss w/ undergrad director use of group paper)
- MAR 380: Ichthyology
- MAR 384: Diseases of Aquatic Organisms
- MAR 385: Principles of Fishery Biology and Management
- MAR 388: Tropical Marine Ecology
- MAR 392: Waste Management Issues
- MAR 394: Environmental Toxicology and Public Health
- Papers written for topics course, directed study or undergraduate research (XXX 487) or internships (XXX 488) may also be submitted if approved by the instructor of record.

Other courses may also be accepted by permission of undergraduate director. In particular courses from your upper division concentration in the Environmental Studies major are generally acceptable.

If you are doing a double major and have had your writing requirement approved by another department, contact the undergraduate director for instructions on how to have that approval credited toward your major.