EVPP 305 - Environmental Microbiology Essentials
Spring 2020
(Updated April 26)

Lecturer:	Dr. Jennifer Salerno
Office:	David King Hall 3024
Office Hours:	Mondays and Fridays, 10:00 a.m. – 12:00 p.m. online
Email:	**jsalerno@gmu.edu**
Lecture Time:	Weekly schedule at your own pace
Lecture Location:	Online (Blackboard)
Text:	Brock Biology of Microorganisms (15th Edition) Madigan et al.*

*Brock is a classic microbiology text with extensive coverage of everything you ever wanted to know about microbes. It also provides good introductory information on the topics that we will focus on. Most environmental microbiology texts assume you have completed an introductory micro class and omit a lot of the basics. The challenge of Brock is that it is very comprehensive, but not organized in a way that you can read it from front to back. Because of that, it will be important for you to work with the readings listed in the syllabus and even look at the index for key words.

On most lecture days we will focus for about 1 hour on the listed topic. For the final class time we will look at some topical and important microbes ("Under the Scope"). Although having more background helps in understanding these microbes, we can all get a lot from these discussions. You can return to the readings, and we can have further discussions later in the semester. This approach hopefully provides a "break" from the intensity of specific lecture material. If you have a particular microbe (e.g. pathogen or disease) of interest let me know and we can put that into the mix. I will add topics to the syllabus as we move through the semester. The syllabus/schedule is subject to change depending on availability of guest speakers/etc. **Please be sure to regularly check BB for the updated syllabus/schedule.**

DATE	TOPIC
Jan 21	Introduction to Environmental Microbiology Ch1, pp1-2, 6-10; Ch20 pp616-617; Ch1, pp11, 18-23
Jan 23	Historical Roots of Environmental Microbiology Ch1, pp24-26 Under the Scope: Anthrax – *Bacillus anthracis* Ch29, pp884-885; Ch31, pp932-933
Jan 28	ASM Microbiology Case Studies
Jan 30	Microbiology of Chesapeake Bay/Potomac River

	Ch20, pp631-633 Under the Scope: Florida's harmful algal blooms
Feb 4	Review of Essential Chemistry, Biochemistry, and Macromolecules Brock does not have this subject separately but look at: Ch3, pp74-75, pp81-85
Feb 6	Microorganisms: Microbial Domains, Prokaryotes, Eukaryotes, Viruses Ch13, pp364-376; Ch2, pp36-39 Under the Scope: *Vibrio vulnificus* (CDC web site)
Feb 11	Prokaryote cytology Ch2, pp36-64 **Selection of Research Topic Discussed**
Feb 13	Prokaryote cytology cont., Eukaryote cytology Ch2, pp36-64, and pp64-70 Under the scope: Hawaiian bobtail squid *Vibrio* symbiosis, pp714-715
Feb 18	Microbial diversity (Select topics from Ch16-18)
Feb 20	Bacterial growth in culture and in nature Ch5 pp137-152, pp158-164
Feb 25	Microbial Metabolism: Fermentation and Respiration Ch3, pp85-95, pp93-95, p93 (Fig. 3.22)
Feb 27	Microbial Metabolism – Chemotrophy and Phototrophy Ch3, pp 95, Ch14, pp393-406
Mar 3	Review for Exam #1
Mar 5	**Midterm Exam #1**
Mar 10	**No class - Spring Break**
Mar 12	**No class – Spring Break**
Mar 17	**No class – Spring Break extended**
Mar 19	**No class – Spring Break extended**

Mar 24	Environmental Microbiology Methods Ch19, pp583-588, pp604-608 ***One-pager Rough Draft Due by the end of the week**
Mar 26	Environmental Molecular Biology Ch19, 591-603; Ch12, pp345-347
Mar 31	Biogeochemistry of Carbon and Nitrogen Ch21, pp651-659, Ch22, pp672-675
Apr 2	Biogeochemistry of Nitrogen (contd.) and Sulfur Ch21, pp651-659
Apr 7	Review
Apr 9	**Midterm exam #2**
Apr 14	Microbial Threats to the Environment: Mercury Methylation Ch21, pp666-670
Apr 16	Wastewater, Drinking Water purification and indicator organisms Ch22, pp680-689, Ch14 418-419; Ch32, pp939-940
Apr 21	The Fungi
Apr 23	Vector borne and zoonotic pathogens Ch31, pp919-931 Water borne pathogens and Global Change Ch32, pp937-943 Fungi and Protist Diseases Ch33, pp958-970, pp929-930, pp931-932
Apr 28	Work on one-pagers
Apr 30	***Submit one-pager to blackboard**
May 7	Submit one-pager presentations (2-minute lightning talks)
May 12	Review for final exam
May 19	**Final Exam Online via Blackboard**

LECTURE GRADING:

First Mid-term Exam	25%
Second Mid-term Exam	25%
Final Exam	25%
Research one-pager/presentation	25%

Grading Scale:

A+	97-100%
A	93-96%
A-	90-92%
B+	87-89%
B	83-86%
B-	80-82%
C+	77-79%
C	73-76%
C-	70-72%
D	60-69%
F	<60%

Class Goals: Knowledge of microbiology is an essential part of an environmental education. Many environmentally important issues have a central microbial component (eg. biogeochemical cycling, xenobiotic biodegradation, wastewater treatment, drinking water and shellfish contamination, microbially enhanced environmental toxicity). This course in targeted at undergraduate students studying the environment from a natural science or science policy perspective. It is appropriate for those students who have not had previous coursework in microbiology or whose previous experience of microbiology was focused mainly on allied health topics. Previous introductory environmental science coursework is required to get the optimum education from this course. The course is intended as an introduction to microbiology generally with a special focus on the study of the distribution and activity of microbes in the natural and manmade environments. It is a first level course with a laboratory component. Taken together these will provide the foundation for further studies in microbial ecology, aquatic ecology, microbial metabolism or applied/industrial microbiology. The **laboratory portion (EVPP306) is a co-requisite.** EVPP 305 and 306 must be taken in the same semester unless either was previously completed with a passing grade, or you have permission from the instructor.

One-pager and Presentation:

More than ever, it's important for students in the sciences to be able to communicate technical scientific information to diverse audiences with clarity and accuracy. This semester, students will work in groups of two to prepare a "one-pager," essentially a policy brief, on a topic of their choosing related to environmental microbiology and with an intended audience of relevant stakeholders (e.g. resource managers, policymakers, NGOs, the public). We will discuss this over the course of the semester, but check out https://writingcenter.unc.edu/policy-briefs/ for the general idea and structure of a policy brief. It is intended that you will select a subject relevant to this class that interests you and probe that subject deeply – become "experts" on that subject. You will need to decide early in the semester and provide a statement of the topic to the instructor. With permission, you may change that subject later if needed, but that is not the best approach.

As evidence of that expertise each student group will write/design a one-page policy brief. The details of the one pager will be discussed in class. Examples of the topics might include – investigation of indicator organisms in the Potomac River in support of triathlons or a wastewater treatment process or policy to protect aquatic resources from microbial pathogens (Mycobacteriosis in striped bass?), or a zoonotic disease you might encounter in conservation science field trips. You will also be required to present a 2-minute lightning talk on your topic (allowing an additional 3 minutes to field questions). The one pager and presentation are worth 25% of your lecture grade so working on that diligently during the semester is important.

A required list of literature cited will also be provided by each student and included in the one-pager. Use Zotero (http://www.zotero.org/). Instruction is available in the library. The literature cited may include references like newspaper articles and books, but at least 3 sources need to be from the primary literature (i.e. scientific journals). I want to see that you can use the tool to help with your research and writing. You can get individual help in the library if you need it.

Academic Integrity:

Attendance: Attendance at lectures is required. Exam material comes from the lectures so being there is very valuable.

Honor Code: EVPP 305 is governed by the GMU Honor Code. Students are expected to read and adhere to Honor Code. All individuals must do their own work on exams and research paper. **Academic dishonesty will not be tolerated.**

Below are some statements from Mason.

MASON ACADEMIC INTEGRITY STATEMENT:
GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you

will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

Black Board: information about the class will be made available on the Mason Black Board (BB) site. Since the EVPP306 laboratory sections are identical general information for the lab (306) will be on the EVPP305 BB site. Individual lab sections will also have their own BB sites for interacting with the individual instructors.

GMU EMAIL ACCOUNTS
Students must activate their GMU email accounts to receive important University information, including messages related to this class.

OFFICE OF DISABILITY SERVICES
If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. http://ods.gmu.edu

OTHER USEFUL CAMPUS RESOURCES:
WRITING CENTER: A114 Robinson Hall; (703) 993-1200;
http://writingcenter.gmu.edu
UNIVERSITY LIBRARIES "Ask a Librarian"
http://library.gmu.edu/ask
COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): (703) 993-2380;
http://caps.gmu.edu
UNIVERSITY POLICIES
The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university affairs.
OFFICE OF THE OMBUDSMAN: (703) 993-3306;
http://ombudsman.gmu.edu
The Office of the Ombudsman is a confidential, impartial, informal and independent problem-solving and conflict resolution resource for all students of the George Mason University community.
COMPLIANCE, DIVERSITY, AND ETHICS
https://diversity.gmu.edu/
TITLE IX COORDINATOR
https://diversity.gmu.edu/title-ix/who-can-i-call