EVPP 305 - Environmental Microbiology Essentials
Spring 2022
(Updated January 20)

COURSE INFORMATION

Instructor:	Dr. Jennifer Salerno
Lecture Time:	Tuesdays, Thursdays 10:30 AM–11:45 AM
Lecture Location:	Horizon Hall 1008
Office:	David King Hall 3024 or Zoom
Office Hours:	Wednesdays, 10 AM – 12 PM or by appointment
Email:	jsalerno@gmu.edu
Text:	Brock Biology of Microorganisms (16th Edition) Madigan et al.*

*Brock is a classic microbiology text with extensive coverage of everything you ever wanted to know about microorganisms. It provides good introductory information on the topics that we will focus on in class. Most environmental microbiology texts assume you have completed an introductory microbiology 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 look at the index for key words.

COURSE DESCRIPTION AND LEARNING OUTCOMES

Knowledge of microbiology is an essential part of an environmental education. Many environmentally important issues have a central microbial component (e.g., biogeochemical cycling, xenobiotic biodegradation, wastewater treatment, drinking water and shellfish contamination, microbially enhanced environmental toxicity, wildlife disease, zoonoses). This course is 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 a general introduction to microbiology with a special focus on the study of the biology, ecology, distribution, and activity of microorganisms in natural and built environments.** It is a first-level course with a laboratory component. Taken together, these courses will provide the foundation for further studies in microbial ecology, aquatic ecology, wildlife disease, 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.

On most lecture days we will focus on the listed topic for about 1 hour. For the final class time we will look at some topical and important microorganisms ("Under the Scope" or "Microbes in the Media"). This approach hopefully provides a break from the intensity of specific lecture material. If you have a particular microbe (e.g. symbiosis, pathogen, or disease) of interest let me know and we can put that into the mix. The syllabus/schedule may be subject to change depending on availability of guest speakers, extenuating circumstances, global pandemics, etc. **Please be sure to regularly check Blackboard for the updated course calendar.**

DATE	**TOPIC**
Jan 25	Introduction to Environmental Microbiology Ch1: 1.1, 1.4-1.6; Ch20: 20.1
Jan 27	History of Environmental Microbiology Ch1: 1.7, 1.11, 1.12, 1.13 Under the Scope: Anthrax – *Bacillus anthracis* Ch32: 32.8
Feb 1	Microbial Ecology of the Chesapeake Bay Ch20: 20.1, 20.9, 20.10 Under the Scope: Florida's harmful algal blooms
Feb 3	Review of Chemistry, Biochemistry, and Macromolecules for Microbiology Ch3: 3.2
Feb 8	Microbial Domains, Prokaryotes, Eukaryotes, Viruses Ch13: 13.1-13.6 Under the Scope: *Vibrio vulnificus* (CDC web site)
Feb 10	Prokaryote Cytology Ch2: 2.1-2.12 ***Selection of Research Topic Discussed**
Feb 15	Eukaryote Cytology Ch2: 2.13-2.15 Under the scope: Hawaiian bobtail squid *Vibrio* symbiosis, Ch 23: 23.10
Feb 17	Microbial Diversity (Select Phlyla from Ch16-18)
Feb 22	Bacterial Growth in Culture and in Nature Ch4
Feb 24	Microbial Metabolism: Fermentation and Respiration Ch3: 3.6-3.9

Mar 1	Microbial Metabolism – Chemotrophy and Phototrophy Ch3: 3.11; Ch14: 14.3-14.6
Mar 3	Review Session
Mar 8	**Midterm Exam #1**
Mar 10	Environmental Microbiology Case Studies
Mar 15	**NO CLASS – SPRING BREAK**
Mar 17	**NO CLASS – SPRING BREAK**
Mar 22	Environmental Microbiology Methods Ch19: 19.1-19.2; 19.9-19.12 ***One-pager Outline Due end of week**
Mar 24	Environmental Molecular Biology Ch19: 19.6-19.8; Ch12: 12.7
Mar 29	**Virtual Guest Lecture:** Manuela Dal Forno Lichen Ch23: 23.1
Mar 31	Biogeochemical Cycles of Carbon, Nitrogen, and Sulfur Ch21: 21.1, 21.3, 21.4, 21.9
Apr 5	Review Session
Apr 7	**Midterm Exam #2**
Apr 12	Microbial Threats to the Environment: Mercury Methylation Ch21: 21.8
Apr 14	Microbial Symbiosis Ch23: 23.13
Apr 19	Wastewater, Drinking Water Purification and Indicator Organisms Ch22: 22.6-22.10; Ch33: 33.1, 33.2 ***One-pager Draft Due**
Apr 21	Microbial Fungi Ch18
Apr 26	Vector borne and Zoonotic Pathogens Ch32: 32.1-32.7
Apr 28	Water borne pathogens and Global Change Ch33: 33.3-33.5 Fungi and Protist Diseases Ch34: 34.1-34.7

May 3	Class presentations (3-minute lightning talks)
May 5	Class presentations (continued) Review for final exam
May 17	**Final Exam 10:30 AM – 1:15 PM**

PARTICIPATION AND MAKE-UP WORK

While participation is not part of your grade, **attendance at synchronous class sessions is important because we will use this time to for class discussions, to go over project ideas, and for in class activities.** If a schedule conflict arises preventing you from attending class, please just let me know. Synchronous classes will be recorded and posted on Blackboard. If you anticipate being unable to turn in an assignment on time, please contact me. I recognize that "life happens" (we are in the middle of a pandemic after all!) and with ample notice, I can offer flexible solutions that are reasonable and within my limits.

ASSIGNMENTS AND GRADING

Weekly Quizzes	20%
First Mid-term Exam	20%
Second Mid-term Exam	20%
Final Exam	20%
One-pager/presentation	20%

There will be two mid-term exams and a final (the final will not technically be cumulative but will still depend on knowledge acquired throughout the semester). Your final project will be a one-pager and presentation (described below).

Undergraduate Regular 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%

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, students, 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, including the grading rubric, will be discussed in class. Examples of the topics might include indicator organisms related to beach closures, a wastewater treatment process, biofuels, or policies to protect aquatic resources from microbial pathogens (e.g., mycobacteriosis in striped bass) or climate change (e.g., coral bleaching). 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

Mason is an Honor Code university; please see the Office for Academic Integrity (https://oai.gmu.edu/) 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. The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code with clear guidelines regarding academic integrity. Three fundamental principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using the appropriate format for this class. Plagiarism is the equivalent of intellectual theft and

cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.

Another aspect of academic integrity is the free play of ideas. 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.

Sharing of instructor-created materials, particularly materials relevant to assignments or exams, to public online "study" sites is considered a violation of Mason's Honor Code. Some kinds of participation in online study sites violate the Mason Honor code: these include accessing exam or quiz questions for this class; accessing exam, quiz, or assignment answers for this class; uploading of any of the instructor's materials or exams; and uploading any of your own answers or finished work. Always consult your syllabus and your professor before using these sites.

BASIC COURSE TECHNOLOGY REQUIREMENTS

Activities and assignments in this course will regularly use the Blackboard learning system (https://mymason.gmu.edu) as well as web-conferencing software (Blackboard Collaborate / Zoom). Therefore, a desktop or laptop computer with a functional camera, microphone, and reliable internet access (consistent 1.5 megabits per second download speed or higher) are required to participate in this course. In an emergency, students can connect through a telephone call, but video connection is the expected norm. A mobile phone with a camera may also enhance student learning in terms of photographing lab activities and sharing them with the class.

STUDENT USE OF ELECTRONIC DEVICES

Please be respectful of your peers and your instructor and do not engage in activities that are unrelated to the class during meeting times.

COURSE RECORDINGS

Any synchronous meetings in this class will be recorded to provide necessary information for students in this class. Recordings will be stored on Blackboard and will only be accessible to students taking this course during this semester.

PRIVACY

Student privacy is governed by the Family Educational Rights and Privacy Act (FERPA). Students must use their MasonLive email account to receive important University information, including communications related to this class. I will not be able to respond to messages sent from or send messages to a non-Mason email address. https://registrar.gmu.edu/ferpa/

DIVERSITY AND INCLUSION

Diversity is one of George Mason University's core values (Mason Diversity Statement: https://stearnscenter.gmu.edu/knowledge-center/general-teaching-resources/mason-

diversity-statement/). As instructors of this course, we seek to create a learning environment that fosters respect for all people. We welcome and value individuals and their differences, including gender expression and identity, race, economic status, sex, sexuality, ethnicity, national origin, first language, religion, age, and ability. We encourage all members of the learning environment to engage with the material personally, but to also be open to exploring and learning from experiences different than their own.

GENDER IDENTITY AND PRONOUN USE

If you wish, please share your name and gender pronouns with us and how best to address you in class and via email. You may also choose to update your chosen name and pronouns here: https://registrar.gmu.edu/updating-chosen-name-pronouns/

DISABILITY ACCOMMODATIONS

Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with your instructor. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu | Phone: (703) 993-2474

SEXUAL HARASSMENT, SEXUAL MISCONDUCT, AND INTERPERSONAL VIOLENCE

Clearly, none of the above will be tolerated in this course. George Mason University is committed to providing a learning, living and working environment that is free from discrimination and a campus that is free of sexual misconduct and other acts of interpersonal violence in order to promote community well-being and student success. We encourage students who have been sexually harassed, assaulted or subjected to sexual misconduct to seek assistance and support. University Policy 1202: Sexual Harassment and Misconduct speaks to the specifics of Mason's process, the resources, and the options available to students.

As a faculty member and designated "Responsible Employee," I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per university policy 1412. If you wish to speak with someone confidentially, please contact the Student Support and Advocacy Center (703-380-1434) or Counseling and Psychological Services (703-993-2380). You may also seek assistance from Mason's Title IX Coordinator (703-993-8730; titleix@gmu.edu).

SAFE RETURN TO CAMPUS STATEMENT

All students taking courses with a face-to-face component are required to follow the university's public health and safety precautions and procedures outlined on the university Safe Return to Campus webpage (https://www2.gmu.edu/safe-return-campus). Similarly, all students in face-to-face and hybrid courses must also complete

the Mason COVID Health Check daily, seven days a week. The COVID Health Check system uses a color code system and students will receive either a Green, Yellow, or Red email response. **Only students who receive a "green" notification are permitted to attend courses with a face-to-face component.** If you suspect that you are sick or have been directed to self-isolate, please quarantine or get testing. Faculty are allowed to ask you to show them that you have received a Green email and are thereby permitted to be in class.

Students are required to follow Mason's current policy about facemask-wearing. As of August 11, 2021, **all community members are required to wear a facemask in all indoor settings**, including classrooms. An appropriate facemask must cover your nose and mouth at all times in our classroom. If this policy changes, you will be informed; however, students who prefer to wear masks either temporarily or consistently will always be welcome in the classroom.

OTHER USEFUL GMU RESOURCES:

ACADEMIC ADVISING
https://advising.gmu.edu/
ASSISTIVE TECHNOLOGY INITIATIVE
https://ati.gmu.edu/
COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): (703) 993-2380
https://caps.gmu.edu/
DISABILITY SERVICES
https://ds.gmu.edu/
INTERNATIONAL PROGRAMS AND SERVICES
https://oips.gmu.edu/
LEARNING SERVICES
https://learningservices.gmu.edu/
LESBIAN, GAY, BISEXUAL, TRANSGENDER, QUEER, AND QUESTIONING RESOURCES
https://lgbtq.gmu.edu/
OFFICE OF DIVERSITY, INCLUSION, AND MULTICULTURAL EDUCATION
https://odime.gmu.edu/
OFFICE OF THE OMBUDSMAN: (703) 993-3306
https://diversity.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.
POLICE CADET SAFETY ESCORTS: (703) 993-2810
https://police.gmu.edu/programs-and-services/police-cadets/escorts/
STUDENT HEALTH SERVICES
https://shs.gmu.edu/
STUDENT SUPPORT AND ADVOCACY CENTER
https://ssac.gmu.edu/
UNIVERSITY CAREER SERVICES

https://careers.gmu.edu/
UNIVERSITY LIBRARIES “Ask a Librarian”
https://library.gmu.edu/ask
UNIVERSITY WRITING CENTER: (703) 993-1200
https://writingcenter.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.
MASON NON-DISCRIMINATION POLICY
https://universitypolicy.gmu.edu/policies/non-discrimination-policy/
ADDITIONAL STUDENT SUPPORT RESOURCES
https://stearnscenter.gmu.edu/knowledge-center/knowing-mason-students/student-support-resources-on-campus/