EVPP 305 - Environmental Microbiology Essentials
Spring 2021
(Updated Nov. 17)

COURSE INFORMATION

Instructor:	Dr. Jennifer Salerno
Lecture Time:	Tuesdays, Thursdays 10:30 – 11:45 AM
Lecture Location:	Blackboard (Zoom)
Office:	Blackboard (Zoom)
Office Hours:	Mondays, 10 AM – 12 PM or by appointment
Email:	jsalerno@gmu.edu
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 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, 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.

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. symbiont, 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 26	Introduction to Environmental Microbiology Ch1, pp1-2, 6-10; Ch20 pp616-617; Ch1, pp11, 18-23
Jan 28	Historical Roots of Environmental Microbiology Ch1, pp24-26 Under the Scope: Anthrax – *Bacillus anthracis* Ch29, pp884-885; Ch31, pp932-933
Feb 2	Microbiology of the Chesapeake Bay 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 9	Environmental Microbiology Case Studies
Feb 11	Microorganisms: Microbial Domains, Prokaryotes, Eukaryotes, Viruses Ch13, pp364-376; Ch2, pp36-39 Under the Scope: *Vibrio vulnificus* (CDC web site)
Feb 16	Prokaryote Cytology Ch2, pp36-64 **Selection of Research Topic Discussed**
Feb 18	Eukaryote Cytology Ch2, pp36-64, and pp64-70 Under the scope: Hawaiian bobtail squid *Vibrio* symbiosis, pp714-715
Feb 23	Microbial Diversity (Select Phlyla from Ch16-18)

Feb 25	Bacterial Growth in Culture and in Nature Ch5 pp137-152, pp158-164
Mar 2	Microbial Metabolism: Fermentation and Respiration Ch3, pp85-95, pp93-95, p93 (Fig. 3.22)
Mar 4	Microbial Metabolism – Chemotrophy and Phototrophy Ch3, pp 95, Ch14, pp393-406
Mar 9	Review Session
Mar 11	**Hour Exam #1**
Mar 16	Environmental Microbiology Methods Ch19, pp583-588, pp604-608 ***One-pager Rough Draft Due end of week**
Mar 18	Environmental Molecular Biology Ch19, 591-603; Ch12, pp345-347
Mar 23	**Guest Speaker:** Manuela Dal Forno Lichen
Mar 25	Biogeochemistry of Carbon and Nitrogen Ch21, pp651-659, Ch22, pp672-675
Mar 30	Biogeochemistry of Nitrogen (contd.) and Sulfur Ch21, pp651-659
Apr 1	Review Session
Apr 6	**Hour exam #2**
Apr 8	Microbial Threats to the Environment: Mercury Methylation Ch21, pp666-670
Apr 13	The "Good" Microbes: Coral Microbiome and Symbiosis Ch23, pp718-720 Reading: https://www.annualreviews.org/doi/10.1146/annurev-micro-102215-095440
Apr 15	Wastewater, Drinking Water Purification and Indicator Organisms Ch22, pp680-689, Ch14 418-419; Ch32, pp939-940

Apr 20	The Fungi
Apr 22	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 27	Class presentations (2-minute lightning talks) *__One-pager Due__
Apr 29	Review for final exam
May 6	**Final Exam 10:30 AM – 1:15 PM (online)**

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

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

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 main concern is that you act as professionally as possible and do not mistakenly act in manner that could be interpreted negatively. 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 and rather simple 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. A simple listing of books or articles is not sufficient. 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.

What does academic integrity mean in this course specifically? 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.

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 synchronous meeting times.

COURSE RECORDINGS

All of our 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).

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.
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/