SWS 5308

ECOLOGY OF WATERBORNE PATHOGENS

Credit Hours: 3
Semester: SPRING 2025
Distance Education sections: asynchronous online delivery only

INSTRUCTOR: Dr. Julie Meyer, CGRC 304, juliemeyer@ufl.edu, (352) 273-8189

OFFICE HOURS: Student hours are available by appointment.

COURSE WEBSITE: https://ufl.instructure.com/courses/

COURSE COMMUNICATIONS: Students may ask questions by contacting the instructor by email or through CANVAS.

REQUIRED TEXTBOOK: None. Reading assignments and materials including lecture videos will be available through CANVAS/UF e-learning. A reading list of the peer-reviewed literature included in this course is found at the end of the syllabus.

MATERIALS AND SUPPLIES FEES: None.

COURSE DESCRIPTION: This course examines common waterborne pathogens from an ecological perspective, including how pathogens survive and are dispersed through the environment outside of human hosts. The course will also cover a variety of methods used to detect pathogens, the evolution of virulence and antimicrobial resistance, drinking water and wastewater treatment, and microbial risk assessment.

PREREQUISITES: SWS4303C/SWS5305C (Soil Microbial Ecology) or MCB 3020 (Basic Biology of Microorganisms) or MCB 3023 (Bacterial and Viral Pathogens) or equivalent.

COURSE GOALS AND/OR OBJECTIVES: The central objective of this course is to foster the student's ability to solve problems related to microbiological quality and safety of

drinking and recreational waters. The development of problem-solving skills will require an in-depth understanding of microbial ecology concepts and methodologies for identifying and characterizing pathogens and their behaviors outside of their human hosts.

By the end of the course, the student will be able to:

- Identify common environmentally transmitted pathogens.
- Recommend appropriate detection methods for human waterborne pathogens.
- Evaluate factors contributing to the spread of environmentally transmitted pathogens.
- Recommend methods to reduce human exposure to waterborne pathogens.
- Create science communication documents to convey course concepts to a general audience.

INSTRUCTIONAL METHODS: This course will include videos, readings, discussions, quizzes, and assignments. All content is delivered asynchronously online.

COURSE POLICIES:

ATTENDANCE/MAKE-UP POLICY: It is the instructor's expectation that each student will keep up with posted lectures, readings, and other assignments. All modules and assignments are open on the first day of the semester, and all due dates are posted at the start of the semester in the syllabus. Therefore, late assignments will not be accepted in the absence of extenuating circumstances. If you have a valid excuse, such as a family or medical emergency, please contact the dean of students' office with documentation of your absence. They will notify your instructors, who will then make appropriate extensions for the missed work. Requirements for make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

EXAM DATES/POLICIES: There will be no midterm or final exams. Instead, students will take weekly quizzes over the course of the semester.

COURSE TECHNOLOGY: All course materials, including recorded lectures, readings, assignments, and quizzes will be administered through CANVAS/UF e-learning. For help with CANVAS, please contact the UF Help Desk:

- http://helpdesk.ufl.edu
- (352) 392-HELP - select option 2

ONLINE COURSE EVALUATION: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing online evaluations via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

UF POLICIES:

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES: Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting disability.ufl.edu/students/get-started. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

UNIVERSITY POLICY ON ACADEMIC CONDUCT: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

CLASS DEMEANOR OR NETIQUETTE: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats.

SOFTWARE USE: All faculty, staff, and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

GETTING HELP:

For issues with technical difficulties for Canvas, please contact the UF Help Desk at:

- http://helpdesk.ufl.edu
- (352) 392-HELP (4357)
- Walk-in: HUB 132

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from the Help Desk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are available at http://www.distance.ufl.edu/getting-help for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit http://www.distance.ufl.edu/student-complaints to submit a complaint.

GRADING POLICIES:

METHODS BY WHICH STUDENTS WILL BE EVALUATED AND THEIR GRADE DETERMINED

The final grade reflects the individual student's mastery and comprehension of the subject material presented during the semester. The grading will not be based on a bell curve. Weighting of assessments is listed in the table below.

Assessment Weights	
Assignments (5 assignments, 3-10 points each)	30%
Paper Discussions (13 discussions, 10 points each)	30%
Graded quizzes (14 quizzes, 10-20 points each)	40%
Total	100%

GRADING SCALE:

91-100%	A
89-90.9%	A-
85-88.9%	B+
83-84.9%	B
79-82.9%	B-
75-78.9%	C+
73-74.9%	C
69-72.9%	C-
65-68.9%	D+
63-64.9%	D
59-62.9%	D-
below 58.9%	E

INFORMATION ON CURRENT UF GRADING POLICIES FOR ASSIGNING GRADE POINTS:

Current UF Grading policies are found here:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

COURSE SCHEDULE:

Week	Topic	Assignment Due Dates
1	Course Orientation	Course Orientation Quiz due 1/19 Introductions Discussion due 1/19
2	Module 1 Pathogens & Outbreaks	Quiz 1 due 1/26 Paper Discussion 1 due 1/26
3	Module 2 Culture-Dependent Detection Methods	Quiz 2 due 2/2 Paper Discussion 2 due 2/2
4	Module 3 Culture-Independent Detection Methods	Quiz 3 due 2/9 Paper Discussion 3 due 2/9 Escape Room due 2/9
5	Module 4 Water, Soil, and Air as Microbial Habitats	Quiz 4 due 2/16 Paper Discussion 4 due 2/16
6	Module 5 Rhizosphere and Phyllosphere	Quiz 5 due 2/23 Paper Discussion 5 due 2/23
7	Module 6 Biofilms	Quiz 6 due 3/2 Paper Discussion 6 due 3/2 Photo Scavenger Hunt #1 due 3/2
8	Module 7 Evolution of Virulence	Quiz 7 due 3/9 Paper Discussion 7 due 3/9
9	Module 8 Acquisition of Antibiotic Resistance	Quiz 8 due 3/16 Paper Discussion 8 due 3/16
10	Spring Break – no class	No assignments due
11	Module 9 Biological Control of Pathogens	Quiz 9 due 3/30 Paper Discussion 9 due 3/30
12	Module 10 Drinking Water and Wastewater	Quiz 10 due 4/6 Paper Discussion 10 due 4/6 Photo Scavenger Hunt #2 due 4/6
13	Module 11 Food Safety	Quiz 11 due 4/13 Paper Discussion 11 due 4/13
14	Module 12 Pathogens and Environmental Change	Quiz 12 due 4/20 Paper Discussion 12 due 4/20
15	Module 13 Risk Assessment and Science Communication	Quiz 13 due 4/27 Paper Discussion 13 due 4/27 Sci Comm Assignment due 4/27

READING LIST:

Mapili, K., Rhoads, W. J., Coughter, M., Pieper, K. J., Edwards, M. A., Pruden, A. (2022). Occurrence of opportunistic pathogens in private wells after major flooding events: A four-state molecular survey. *Science of The Total Environment, 826,* 153901.

Meinersmann, R. J., Berrang, M. E., Bradshaw, J. K., Molina, M., Cosby, D. E., Genzlinger, L. L., & Snyder, B. J. (2019). Recovery of thermophilic campylobacter by three sampling methods from river sites in northeast Georgia, USA, and their antimicrobial resistance genes. *Letters in Applied Microbiology, 71(1)*, 102–107.

Armstrong, G. L., MacCannell, D. R., Taylor, J., Carleton, H. A., Neuhaus, E. B., Bradbury, R. S., Posey, J. E., & Gwinn, M. (2019). Pathogen genomics in public health. *New England Journal of Medicine, 381(26)*, 2569–2580.

Metcalf, J. S., Banack, S. A., Wessel, R. A., Lester, M., Pim, J. G., Cassani, J. R., & Cox, P. A. (2020). Toxin analysis of freshwater cyanobacterial and marine harmful algal blooms on the west coast of Florida and implications for Estuarine Environments. *Neurotoxicity Research, 39(1)*, 27–35.

Jechalke, S., Schierstaedt, J., Becker, M., Flemer, B., Grosch, R., Smalla, K., & Schikora, A. (2019). Salmonella establishment in agricultural soil and colonization of crop plants depend on soil type and plant species. *Frontiers in Microbiology, 10*, 967.

Rumbaugh, K. P., & Sauer, K. (2020). Biofilm dispersion. *Nature Reviews Microbiology, 18(10)*, 571–586.

Denamur, E., Clermont, O., Bonacorsi, S., & Gordon, D. (2020). The population genetics of pathogenic escherichia coli. *Nature Reviews Microbiology, 19(1),* 37–54.

Thanner, S., Drissner, D., & Walsh, F. (2016). Antimicrobial resistance in agriculture. *MBio, 7(2)*, e02227-15.

Marongiu, L., Burkard, M., Lauer, U. M., Hoelzle, L. E., & Venturelli, S. (2022). Reassessment of historical clinical trials supports the effectiveness of phage therapy. *Clinical Microbiology Reviews, 35(4),* e0006222.

Lanrewaju, A. A., Enitan-Folami, A. M., Sabiu, S., Edokpayi, J. N., & Swalaha, F. M. (2022). Global Public Health Implications of human exposure to viral contaminated water. *Frontiers in Microbiology, 13,* 981896.

Prince-Guerra, J. L., Nace, M. E., Lyles, R. H., Fabiszewski de Aceituno, A. M., Bartz, F. E., Arbogast, J. W., Gentry-Shields, J., Jaykus, L.-A., Heredia, N., García, S., & Leon, J. S. (2020). Both handwashing and an alcohol-based hand sanitizer intervention reduce soil and microbial contamination on farmworker hands during harvest, but produce type matters. *Applied and Environmental Microbiology, 86(18)*, e00780-20.

Brumfield, K. D., Usmani, M., Santiago, S., Singh, K., Gangwar, M., Hasan, N.A., Netherland, M., Deliz, K., Angelini, C., Beatty, N.L., Hug, A., Antapreet, S.J., & Colwell, R.R. (2023). Genomic diversity of *Vibrio* Spp. and metagenomic analysis of pathogens in Florida Gulf Coastal waters following Hurricane Ian. mBio 0 (0): e01476–23.

Yeo, S., Becker, A., Cacciatore, M., Anderson, A., Patel, K. (2022). Humor can increase perceived communicator effectiveness regardless of race, gender, and expertise - If you are funny enough. *Science Communication, 44 (5),* 531-664.