

University of Florida
College of Public Health & Health Professions Syllabus
PHC 6018: Environmental Ecology of Human Pathogens (3 credits)
Spring 2023
Delivery Format: Online, Canvas E-learning

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Office hours: Discussion via Canvas/email system

Preferred Course Communications: The “Inbox” in Canvas will be used for all email correspondence.

Prerequisites:
PHC 6313

PURPOSE AND OUTCOME

Course Overview

This course covers major topic areas concerning ecological relationships of environmental pathogens that cause diseases in humans. The course will discuss environmental reservoirs of human pathogens and introduces microbiological techniques necessary to detect and identify the variety of pathogens present in the environment.

Course Description

This course will also examine the more complex ecological relationships of pathogens associated with different environments including water, soil, air, food, and animals, and discuss how physical, chemical and biological components of an environmental niche can change pathogen dynamics in that niche, influencing human health surrounding that environment and beyond. The objective of this course is to complement other subjects in the curriculum such as epidemiology, environmental health, one health, and to provide knowledge for students seeking MS, MPH, and PhD degree. This course is different from other infectious disease courses in that the primary focus is on pathogens in the natural environment and the potential spillover of these pathogens in humans. Therefore, the course materials do not cover in detail the epidemiology of infectious diseases, biological mechanisms of human illness, or broader public health impacts of infectious diseases.

Course Objectives and/or Goals

After completing this course, students should be able to:

1. Distinguish characteristics of bacteria, viruses, and parasites found in the environment
2. Classify the major pathogens present in water, air, soil, and food, and animals.
3. Evaluate pathogen routes of exposure, mechanisms of infection, and health impacts of environmental pathogens
4. Explain the basic microbiological principles of host-pathogen interactions from environmental sources

5. Determine interactions between pathogens and environmental factors driving pathogens' evolution and adaptation
6. Discuss current issues in emerging infectious agents such as drug resistance and relation to climate-change
7. Propose ways to prevent transmission through the study of routes of exposures and critical control points

Relation to Program and Learning Outcomes

Competencies primarily gained in this course

1. Understand the role of environment in human infectious disease
2. Complex and dynamic relationship and interplay among pathogen, environment and human host
3. Identify causative agents of infectious diseases in individuals and the community
4. Evaluate the environmental factors that affect pathogen survival and virulence
5. Interpret the role of the environment on emerging infectious diseases
6. Determine ways to prevent the spread of infectious diseases
7. Communicate effectively with other health professionals in oral and written forms

Instructional Methods

The course will consist of lectures by the instructor combined with occasional guest lectures by invited experts in particular topics. In addition to lectures and online discussion, appropriate film and visual aids may be utilized.

What is expected of you?

You are expected to complete all readings, assignments, and exams. Additionally, you are expected to actively engage in the course throughout the semester. Your participation fosters a rich experience for you and your peers that facilitate overall mastery of the course objectives.

DESCRIPTION OF COURSE CONTENT

This course is taught as a series of modules, each covering one specific aspect of environmental exposure assessment and environmental monitoring. Each module may contain lectures, external links, videos, discussions and required readings as well as assignments. You are responsible for all course content regardless of the format. The topical Outline/Course Schedule below details the dates of content modules and assignments. Debates and Exams are also listed.

Getting Started Online

1. Visit <http://lss.at.ufl.edu> and login to e-Learning in Canvas using your Gatorlink ID and password.
2. Find our course website. It will be listed as PHC 6018: Environmental Ecology of Human Pathogens
3. Complete the "Getting Started" Module under the Modules Tool (left menu). This will prompt you to download and review the syllabus and review the materials on plagiarism.

Course Materials and Technology

Textbook (Required):

Microbiology of Waterborne Disease, 2nd edition (2014), ELSEVIER, ISBN-13: 978-0124158467. Steven L. Percival, Marylynn V. Yates, David W. Williams, Rachel M. Chalmers, and Nicholas F. Gray.

Other course materials will include current literature dealing with waterborne infectious diseases and preventative measures

e-Learning in Canvas site:

There will be an online site for this course in Canvas, the learning management system supported by the University. Log in at <https://lss.at.ufl.edu/> and go to course site for PHC 6018: Environmental Ecology of Human Pathogens

Here, you will find the syllabus, lecture slides, assignments and allow for communication between the students and course instructors where applicable. You will also turn in assignments through this site. Once the course begins, course announcements will often take place through the e-Learning in Canvas site. This includes all emails. This will eliminate any issues with students not getting emails due to connection problems. It will be your responsibility to check the site on a routine basis to keep up with announcements, emails, and course modifications.

For technical support related to course materials and links, please contact me and the online course coordinator.

For technical support for this e-Learning in Canvas, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- <https://lss.at.ufl.edu/help.shtml>

Topical Outline and Course Schedule:

Week	Topic	Material Covered	Readings/Comments
Module 1: 1/09/23- 1/13/23	History of pathogens in the environment	-Syllabus, course descriptions and goals and expectation from students -Brief history of Microorganism -Biosphere, ecology, ecosystem, and environment	Recorded and printable lectures only
Module 2: 1/16/23- 1/20/23	Microbiology of environmental pathogens	- Introduction to Microorganisms (viruses, bacteria, protozoa and helminths) -bacterial cells structures and virus life cycles	Part 4: Viruses; page 443-532

		-Water-borne enteric virus with special emphasis on <i>Rotavirus</i> and <i>Norovirus</i>	
Module 3: 1/23/23- 1/27/23	Water- and food-borne bacterial pathogen	- <i>Campylobacteria</i> , <i>Salmonella</i> , and <i>Shigella</i>) - <i>Salmonella</i> and eggs -cholera and <i>Vibrio cholerae</i> - <i>V. cholerae</i> aquatic reservoirs -seasonality of cholera - <i>V. cholerae</i> evolution	Part 2: Bacteriology, page 65-74, and 209-233
Module 4: 1/30/23- 2/3/23	-Soil-borne pathogens -air-borne pathogens	-description of soil and soil-borne pathogens with special emphasis on (- <i>Cryptosporidium spp</i> , <i>Giardia duodenalis</i> , and <i>Toxoplasma gondii</i>) - Air-borne pathogens including, viral, bacterial, and fungal pathogens (e.g., <i>Clostridium</i> , <i>Anthrax</i> , <i>norovirus</i>)	Part 3: Protozoa; page 287-317, 355-369, 375-400 and 417-434
Module 5: 2/6/23- 2/10/23	Host Pathogens interactions	-host factors -pathogen's factors - environmental/ecological factors -ideal disease conditions or asymptomatic carrier stage formation -overall implications to disease fate -cholera and <i>Vibrio cholerae</i>	Recorded and printable lectures only
Module 6: 2/13/23- 2/17/23	Molecular mechanism of pathogens	- <i>Vibrio cholerae</i> , a water-borne pathogen will be discussed as a model pathogen	Recorded and printable lectures only

		-Intracellular pathogens and extracellular pathogens	
Module 7: 2/20/23- 2/24/23	Environmental factors driving pathogen's persistence and evolution	-Physical, chemical, and biological factors influencing pathogens' diversity and distribution in a given time and space in an ecological niche -Climate change and human pathogens	Recorded and printable lectures only Textbook-Part 6: Page 653-663
Module 8: 2/27/23- 3/3/23	<i>Mid-term exam:</i>	<i>Mid-term exam will be given this week</i>	<i>Honorlock proctoring will conduct the exam</i>
Module 9: 3/6/23- 3/10/23	-Water sources and purification of water/wastewater -Emerging microbes and infections	-Sources of water, drinking water purification and wastewater treatment -Eutrophication and water quality (Phosphate and nitrate) -where, why and how pathogens emerge?	Recorded and printable lectures only
Spring break: 3/11/23-3/18/23 (No classes)			
Module 10: 3/20/23- 3/24/23	Phenotypic and genome change for adaptations to changing environments	-Bacterial biofilms and stress adaptations (simple and complex biofilms) -Mutation and evolution of human pathogens -Gene swap methods -mutations and transposable elements	Textbook: Part 1. Page 3-26 & (Recorded and printable lectures only) *<u>Select "topics", one for presentation and another for review paper (need approval from instructor on each "topic").</u> For details on these topics see below on headlines: course requirements/Evaluation/Grading
Module 11: 3/27/23- 3/31/23	Mechanism of Persistence of pathogens in environment	-Bacterial persister phenotype -GASP phenotype -Toxin-antitoxin and persister cell formation	Recorded and printable lectures only

Module 12: 4/3/23-4/7/23	Bacterial social life through communications	-Quorum sensing and signaling molecules -Outer membrane vesicles (OMVs) -Two component regulatory systems in bacteria	Recorded and printable lectures only
Module 13: 4/10/23-4/14/23	Emerging and reemerging pathogens	-emerging and reemerging pathogens -antibiotic resistance and the environment	Recorded and printable lectures only
Module 14: 4/17/23-4/21/23			
<p>Student presentation: Present your topic (slide presentation) for maximum 15 min with 10 slides. Also, submit your presentation in Canvas between 4/17/2023 and 4/21/2023 so your classmates can critique your presentation <u>that is required</u></p> <p>Submit written paper on preselected topic: (Submit your paper between 4/17/2023 and 4/26/2023)</p> <p>Write a review paper on a topic consistent with the course. Total 7 pages (lines should be double spaced), including: a title page (1-page), an abstract (1-page), introduction (2-pages), discussion (2- pages) and literature citations with 10-12 references (1-page). <i>Submit your written report [paper] (last due date of paper submission is 4/26/22)</i></p>			
Module 15: 4/27/23-4/28/23	No classes: Reading days for final exams		
Module 16: 4/29/23-5/5/23	Final Exam (cumulative)	Final exam will be given this week. Honorlock Proctoring will conduct the exam	There will be 40 questions to be answered by 1 hour and 30 min time. Question types include multiple choice, true/false, matching and select the best answer among many given options

ACADEMIC REQUIREMENTS AND GRADING

General information

Assignments are to be turned in as a Word document or PowerPoint file as directed, unless otherwise indicated. They will be returned to you with comments. If you have unexpected issues with Canvas, you may email the assignment to the instructor directly. Assignments are individual projects and shared work may be treated as a form of plagiarism. Assignments may be required to be submitted via Turnitin in this course (this will be done automatically in the Canvas Assignment). This tool will pick up any passages in students' work that come from another source. Be sure to adequately cite your sources/references for these assignments to avoid plagiarism (see format below). Also please confirm that your work is not overtly plagiarized, the Turnitin system will

give you a report. Some similarity is expected and unavoidable, however if large portions are copied from other sources, this will be as considered plagiarism.

The Canvas assignment tool will notify you confirming the submission of your assignment. PLEASE check your UFL email at <http://webmail.ufl.edu> on a regular basis for these and other email notices from the course site. If you do not receive an email confirmation within 2 hours of submission, please return to the site and resubmit your assignment. It is a student's responsibility to verify that they turn in assignments on time and that they turn in the CORRECT assignment attachment. Please take a few moments to open your submitted attachment and verify that you have submitted to correct file.

Students will be graded in the course through assigned work including written assignments, presentations, online discussions, and examinations (see below for details).

Course Requirements/Evaluation/Grading

Mid-term and Final Exams (250 points each; 500 points total; see Course Schedule for due date): The format for both exams will be **CLOSED BOOK**. The midterm exam will test your knowledge of the first series of lectures leading up to the mid-term, including material covered in lectures and assigned readings. The final exam will be comprehensive focusing both materials covered in lectures prior to mid-term and after the mid-term exam. Both exams will be comprised of multiple choice, matching, true/false, and short answer questions, where you will be expected to interpret the material that is presented in the course and apply it to the scenarios or situations that the exam questions present. You will have 90 minutes to complete each exam. Exams will be administered through the Canvas Online Learning System (Honorlock Proctoring). We will utilize an online proctoring service for all exams. More information on how to take exams will be provided on the course site. Issues arising over make-up tests will be dealt with on a case-by-case basis.

Student Oral Presentation with Discussion [150 points] (15% of total grade [1000] points; see Course Schedule for due date): Each student is required to present orally on a selected topic (*prior permission [at least two weeks before presentation] required for the topic to be presented*) that is relevant to the course material. This assignment is worth 150 points (15% of total grade [1000] points). ***Presentations are expected to have a duration of maximum 15 minutes with accompanying slides (maximum 10 slides are allowed)***. Students shall record their presentations for posting in Canvas. In addition to presentations, each student must peer-review others' posting in the canvas. Specifically, each student will post a video discussion post on at least two other students' presentations. In addition, each student is required to post a video response in reply to each student's post made on their own presentation (dialogue about these topics is important) as well as a reply to a question posed by the course instructor. *Finally, the instructor will critically review and provide feedback to each students' presentation to enhance your ability to critically think and improve your ability to present and answer queries raised by audience members potentially from a much larger conference/meetings that you may encounter during your career.*

Student Written Report [150 points] (15% of total grade [1000] points; see Course Schedule for due date): Each student is required to submit a written report on a topic that is sufficiently distinct from their presentation topic. The topic must be approved by the instructor at least two

weeks prior to submission (although it is recommended that topics be cleared with the instructor at least a month in advance). ***The total report shall not exceed 7 pages (lines on each page must be double spaced), including a title page (1-page), an abstract (1-page), introduction (2 pages), discussion (2-pages) and literature citations (1- page with up to 10-12 references included).*** Assignments must be turned in as a Word document in the Canvas Assignment tool, unless otherwise indicated. *The goal of the written report is to familiarize you on how to critically think, summarize, and compose a formal scientific paper by assembling vast research information published in prior years by other scientists on your topic area.* They will be returned to you with comments. If you have unexpected issues with Canvas, you may email the assignment to the course TA and professor directly. Assignments are normally intended as individual projects unless otherwise directed. Resubmissions after the due date may be subject to a late submission penalty. Written assignments will be due at 11:59 PM on the due date.

Discussions [200 points] (20% of total grade [1000] points; weekly): All students will participate in discussions throughout the semesters [200 points] (20% of total grade [1000] points). The instructor will ask thought-provoking question(s) weekly based on that week's course comprehension and relevance to real life scenarios. All students will be expected to participate in these discussions. Each student must make discussion posts on these queries/questions. In addition, each of student is required to comment on their peers' discussion posts. Students will receive credit for these discussions by actively contributing to the discussions. In order to receive perfect credit, each student is expected to make at least one discussion comment post pertinent to discussion question to be posted during each discussion session. The student whose original post is being discussed is expected to actively participate and facilitate these discussions. *The goal(s) of the weekly discussion is to facilitate brainstorming and critical thinking on out-of-the box and provocative questions posted by the instructor prior to students' posting. The instructor will provide feedback to student's answers with grades for each week.*

Grading

Requirement for Graduate Students	Total Points (%)	Due date
Discussion	200 (20%)	Weekly
Midterm Exam	250 (25%)	Week 8
Presentation	150 (15%)	Week 15

Written Report	150 (15%)	Week 15-16
Final Exam	250 (25%)	Exam Week (Week 17)
Total	1000 (100%)	

Point system used (i.e., how do course points translate into letter grades).

Percentage of Points Earned	93-100%	90-92.99%	87-89.99%	83-86.99%	80-82.99%	77-79.99%	73-76.99%	70-72.99%	67-69.99%	63-66.99%
Points Earned	1000-930	929-900	899-870	869-830	829-800	799-770	769-730	729-700	699-670	669-630
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D

Please be aware that a C- is not an acceptable grade for graduate students. The GPA for graduate students must be 3.0. based on 5000 level courses and above to graduate. A grade of C counts toward a graduate degree only if a sufficient number of credits in courses numbered 5000 or higher have been earned with a B+ or higher

Passing grades and Grade Points: Credit Earned

Passing Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0

More information on UF grading policy may be found at:
<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

Policy Related to Make up Exams or Other Work

Assignments turned in up to 24 hours late (from 11:59PM of the day the assignment was due) will be discounted **10%** of the grade that they would otherwise receive. Assignments turned in more than 24 hours late will **not** be graded and will contribute zero points toward your final grade unless arrangements have been made in advance with the instructor. Missed assignments will contribute zero points toward your final grade.

Special Circumstances. In the event of exceptional situations that may interfere with your ability to perform an assignment or meet a deadline, contact the instructor as soon in advance of the deadline as possible. Such special cases will be dealt on an individual basis, provided that you have sufficient documentation.

Please note: Please note: Any requests for make-ups due to technical issues MUST be accompanied by the UF Computing help desk (<http://helpdesk.ufl.edu/>) correspondence. You MUST e-mail me within 24 hours of the technical difficulty if you wish to request a make-up.

Policy Related to Required Class Attendance

Please note all faculty are bound by the UF policy for excused absences. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT

Expectations Regarding Course Behavior

You are expected to maintain a civil tone and respect the opinions of other persons. While commenting on others' posts is encouraged, aggressive or patronizing tone and language are unacceptable and may result in the loss of your posting and discussion privileges.

Communication Guidelines

You are required to contact the professor by email using the "Inbox" in Canvas for clarification and assistance with the course material and the assignments, and for special issues that may arise. Weekday daytime (US Eastern Time) emails have the best chances of being answered quickly. Please only use the Canvas "Inbox" to communicate with the course instructor and/or TA. While the instructors and TAs will check their UFL email regularly, they will not be held responsible for email sent directly to their UFL addresses.

Academic Integrity

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For additional information regarding Academic

Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>
<http://gradschool.ufl.edu/students/introduction.html>

Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior. Plagiarism is especially damaging in an online learning environment and will be dealt with in an official way, according to University of Florida regulations. Incidents will be reported directly to the Office of Student Judicial Affairs and a formal procedure will be started in each and every case. There will be no informal incident resolution between student and instructor. Should you have any doubts on whether something constitutes plagiarism, please consult the many available resources on the topic, e.g., starting with <http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.html>, or contact the instructor in advance. There is also a reference posted in the course site, in the Course Help link. As you submit assignments, you will have the opportunity to check it for unintentional plagiarism using Turnitin®, the same software that instructors will use to check your work. You are encouraged to take advantage of this option. If you turn in assignments that are plagiarized, you will receive zero points for that assignment.

You are expected to turn in original work in this course. This means that when answering assignment questions, writing papers, posting discussions, etc. you will be expected to write your responses in your own words. You **MAY NOT** copy answers word for word from any course materials or outside sources. On occasion it may be useful to provide a quote from course materials or outside sources in which case you must properly cite the source and place the quote in quotation marks. That being said we urge you to avoid excessive quotation as it does little to demonstrate your understanding of course material.

Online Faculty Course Evaluation Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online 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/>.

Policy Related to Guests Attending Class

Only registered students are permitted to attend class. However, we recognize that students who are caretakers may face occasional unexpected challenges creating attendance barriers. Therefore, by exception, a department chair or his or her designee (e.g., instructors) may grant a student permission to bring a guest(s) for a total of two class sessions per semester. This is two sessions total across all courses. No further extensions will be granted. Please note that guests are **not** permitted to attend either cadaver or wet labs. Students are responsible for course material regardless of attendance. For additional information, please

review the Classroom Guests of Students policy in its entirety. Link to full policy:
<http://facstaff.php.ufl.edu/services/resourceguide/getstarted.htm>

SUPPORT SERVICES

Accommodations for Students with Disabilities

If you require classroom accommodation because of a disability, it is strongly recommended you register with the Dean of Students Office <http://www.dso.ufl.edu> within the first week of class or as soon as you believe you might be eligible for accommodations. The Dean of Students Office will provide documentation of accommodations to you, which you must then give to me as the instructor of the course to receive accommodations. Please do this as soon as possible after you receive the letter. Students with disabilities should follow this procedure as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

Counseling and Student Health

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: <http://www.counseling.ufl.edu>. Online and in person assistance is available.

You Matter We Care website: <http://www.umatter.ufl.edu/>. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care website, which is staffed by Dean of Students and Counseling Center personnel.

The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: <https://shcc.ufl.edu/>

Crisis intervention is always available 24/7 from:

Alachua County Crisis Center:

(352) 264-6789

<http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx>

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

Inclusive Learning Environment

Public health and health professions are based on the belief in human dignity and on respect for the individual. As we share our personal beliefs inside or outside of the classroom, it is always with the understanding that we value and respect diversity of background, experience, and opinion, where every individual feels valued. We believe in, and promote, openness and tolerance of differences in ethnicity and culture, and we respect differing personal, spiritual, religious, and political values. We further believe that celebrating such diversity enriches the quality of the educational experiences we provide our students and enhances our own personal and professional relationships. We embrace The University of Florida's Non-Discrimination Policy, which reads, "The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act." If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see your instructor or refer to the Office of Multicultural & Diversity Affairs website: www.multicultural.ufl.edu.
