

University of Florida
College of Public Health & Health Professions Syllabus
Course Number: PHC 7307
Quantitative Assessment of Environmental Health Impacts (3 credit hours)
Spring Semester, 2023
Delivery Format: On-Campus
E-Learning Website (<https://ufl.instructure.com/courses/xxxx>)

Instructor Name: Song Liang, PhD
Times: Thursday, 10:40 am – 1:40 pm
Room Number: HPNP G105
Phone Number: 352-273-9203
Email Address: songliang@ufl.edu
Office Hours: 10 am – 11 am, Friday (meeting via zoom) or email to set up an appointment
Preferred Course Communications (e.g. email, office phone): email

Prerequisites

PHC6313 (Environmental Health Concepts), PHC 6001 (Principles of Epidemiology in Public Health), and PHC 6050 (Statistical Methods for Health Sciences Research), or consent of the instructor

PURPOSE AND OUTCOME**Course Rationale and Overview**

This course complements existing environmental health and method courses, aiming to broaden and strengthen skillsets available to students through applied training to bridge the theory-application gaps. The course introduces major environmental hazards, concepts, theories, and applied quantitative tools on environmental health impact assessment for graduate students (environmental health sciences, epidemiology, medical geography, and biology majors) and health professionals by focusing on environmental burden of diseases, risk assessment, transmission and control of water- and vector-borne diseases, health effects of environment/climate change. The course combines lectures, computer-based exercises, discussions, and a class project.

Relation to Program Outcomes

This course provides primary gains or reinforcement of the following competencies:

1. Describe to specific communities or general populations the direct and indirect human and ecological effects of major environmental agents
2. Describe genetic, physiological, and psychosocial factors that affect susceptibility to adverse health outcomes following environmental exposure(s)
3. Specify approaches for assessing, preventing, and controlling environmental hazards that pose risks to human health and the environment
4. Develop testable hypotheses and models to evaluate biological and chemical environmental exposures

Course Objectives and/or Goals

Upon successful completion of the course, students should be able to:

1. Understand basic concepts and theories of burden of diseases, environmental determinants of infectious pathogen dynamics;
2. Apply epidemiological and statistical tools to quantify environmental burden of diseases;
3. Identify and develop models of environmental diseases with different transmission/exposure pathways, parameterize the models using data from field/lab and/or literature, and assess the model validity;
4. Apply the models to assess health impacts associated with environmental changes in the context of infectious diseases;
5. Evaluate control, prevention, and surveillance of environmental diseases through the use of applied models;
6. Critique modeling papers on environmental health impacts

DESCRIPTION OF COURSE CONTENT

Topical Outline/Course Schedule

Week	Date(s)	Topic(s)	Readings	Exercise/Case study paper	Due
1	1/12	Course introduction Statistical & mathematical modeling in environmental health (EH)	1, 2, 3		
2	1/19	Introduction to quantification of disease burden	4	Ex 1	
3	1/26	Environmental burden of disease	5,6	Ex 2, CSP 1	Ex 1
4	2/2	Exposure assessment	7	Ex3-1	Ex 2
5	2/9	Dose-response & risk characterization	7	Ex 3-2	CSP 1
6	2/16	Special topics: Simulation & data fitting; variability & uncertainty in EH	8,9	Ex 4-1, CSP 2	Ex 3
7	2/23	Environmental heterogeneity & transmission of environmental diseases	10	Ex 4-2	
8	3/2	Waterborne diseases & control – I, empirical approaches	11,12	Ex 5-1	Ex 4-1 & Ex 4-2, CSP 2
10	3/9	Waterborne diseases & control – II, mechanistic approaches	13	Ex 5-2, CSP 3	
11	3/16	<i>Spring Break</i>			
12	3/23	Climate & forecast of vector-borne diseases – I, empirical approaches	14	Ex 6-1	Ex 5
13	3/30	Work on class project			
14	4/6	Climate & forecast of vector-borne diseases – II, mechanistic approaches	15	Ex 6-2	CSP 3
15	4/13	One health and complex systems thinking & approaches in EH	16		Ex 6
16	4/20	Work on class project			
17	4/27	Class project presentation			

Course Materials and Technology

Textbook

There is no required textbook for this course. Specific readings for each lecture are required (see reading list below)

Required software

R, a language and environment for statistical computing and dynamic modeling, will be used throughout the class. R is freely available and can be downloaded from <https://www.r-project.org/>

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://elearning.ufl.edu/> and go to course site for PHC 7307.

Here, I will post the syllabus, lecture presentations, exercise instructions and assignments, and allow for discussions/chats amongst the students. You will also turn in assignments through this site. Once the course begins, all communication will take place through the e-Learning in Canvas site. This includes all emails and discussions as 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.

Reading list

1. Corvalán C, Hales S, McMichael AJ, Millennium Ecosystem Assessment (Program), World Health Organization. Ecosystems and human well-being: health synthesis. Geneva, Switzerland: World Health Organization; 2005. (read page 11-26)
2. Eisenberg JN, Desai MA, Levy K, Bates SJ, Liang S, Naumoff K, et al. Environmental determinants of infectious disease: a framework for tracking causal links and guiding public health research. *Environ Health Perspect.* 2007;115(8):1216-23. doi: 10.1289/ehp.9806. PubMed PMID: 17687450; PubMed Central PMCID: PMC1940110.
3. Spear R. Mathematical modeling in environmental health. *Environ Health Perspect.* 2002;110(7):A382. PubMed PMID: 12117653; PubMed Central PMCID: PMC1240922.
4. Prüss-Üstün A, Corvalán C, World Health Organization. Preventing disease through healthy environments : towards an estimate of the environmental burden of disease. Geneva, Switzerland: World Health Organization; 2006. (Chapter 4: Methods) (http://www.who.int/quantifying_ehimpacts/publications/preventingdisease.pdf)
5. Carlton EJ, Liang S, McDowell JZ, Li HZ, Luo W, Remais JV. Regional disparities in the burden of disease attributable to unsafe water and poor sanitation in China. *B World Health Organ.* 2012; **90**(8): 578-87.
6. Smith KR, Corvalan CF, Kjellstrom T. How much global ill health is attributable to environmental factors? *Epidemiology.* 1999; **10**(5): 573-84.
7. Blumenthal UJ., Fleisher JM, Esrey SA, Peasey A. Epidemiology: a tool for the assessment of risk. In *Water Quality: Guidelines, Standards and Health: Assessment of Risk and Risk Management for Water-Related Infectious Disease.* World Health Organization.2001, IWA Publishing. (http://whqlibdoc.who.int/publications/2001/924154533X_chap7.pdf)
8. Oreskes, N. Evaluation (not validation) of quantitative models. *Environmental Health Perspectives,* 1998, **106**, 1453-1460.
9. Nauta, M. J. Separation of uncertainty and variability in quantitative microbial risk assessment models. *International Journal of Food Microbiology,* 2000, **57**(1-2), 9-18. doi: Doi 10.1016/S0168-1605(00)00225-7

10. Haas C, Eisenberg JNS. Risk Assessment. In *Water Quality: Guidelines, Standards and Health: Assessment of Risk and Risk Management for Water-Related Infectious Disease*. World Health Organization. 2001, IWA Publishing. (http://whqlibdoc.who.int/publications/2001/924154533X_chap8.pdf)
11. Altizer S, Dobson A, Hosseini P, Hudson P, Pascual M, Rohani P. Seasonality and the dynamics of infectious diseases. *Ecol Lett*. 2006;9(4):467-84. doi: 10.1111/j.1461-0248.2005.00879.x. PubMed PMID: WOS:000236384100011.
12. Ngwa MC, Liang S, Kracalik IT, Morris L, Blackburn JK, Mbam LM, et al. Cholera in Cameroon, 2000-2012: Spatial and Temporal Analysis at the Operational (Health District) and Sub Climate Levels. *PLoS Negl Trop Dis*. 2016;10(11):e0005105. doi: 10.1371/journal.pntd.0005105. PubMed PMID: 27855171; PubMed Central PMCID: PMC5113893.
13. Liang S, Seto EYW, Remais JV, Zhong B, Yang CH, Hubbard A, et al. Environmental effects on parasitic disease transmission exemplified by schistosomiasis in western China. *Proc Natl Acad Sci USA*. 2007; **104**(17): 7110-5.
14. Gao, H. W., Wang, L. P., Liang, S., Liu, Y. X., Tong, S. L., Wang, J. J., . Cao, W. C. (2012). Change in Rainfall Drives Malaria Re-Emergence in Anhui Province, China. *Plos One*, 7(8). doi: ARTN e43686 10.1371/journal.pone.0043686
15. Parham, P. E., & Michael, E. Modeling the Effects of Weather and Climate Change on Malaria Transmission. *Environmental Health Perspectives*, 2001, 118(5), 620-626. doi: 10.1289/ehp.0901256
16. Zinsstag, J., Schelling, E., Waltner-Toews, D., & Tanner, M. From "one medicine" to "one health" and systemic approaches to health and well-being. *Preventive Veterinary Medicine*, 101(3-4), 2011,148-156. doi: 10.1016/j.prevetmed.2010.07.003

For technical support for this class, please contact the UF Help Desk at:

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

ACADEMIC REQUIREMENTS AND GRADING

Exercise reports: 30% of grade
 Case study papers: 6% of grade
 Class project
 a. Presentation: 12% of grade
 b. Written report: 48% of grade
 Participation: 4 % of grade

Grades will include four components – exercise reports, case study paper, a class project, and participation.

Exercise Reports There are 6 reports based on computer-based exercises. Each exercise report will be assigned at the beginning of the class and due by the following class. Specific modeling exercises will be assigned together with computer-based exercise tutorial materials and the student is expected to follow the tutorial and finish up the exercises and a report emphasizing the application of the concepts learned in class. For exercise report assignment and due date, see *Class Outline of Topics & Schedule*.

Case Study Papers There are three case study papers. Each case study paper will be assigned to the class to provide an application of the lecture and lab topics. Each student is required to write a brief critique paper (1-page limit, double-spaced) that will summarize the *methods* used by the researchers and an assessment of how well the quantitative techniques are performed and applied to the topic of investigation. The paper will be discussed in class following the submission. For the case study assignment and due date, see *Class Outline of Topics & Schedule*.

Participation The participation is graded based on the activities that students engage in during discussion session of case study papers. Students who actively participate in all discussion sessions receive full points.

Class Project Each student is required to undertake an individual class project relevant to modeling environmental health impacts and/or disease transmission and control. Projects may involve original research (e.g. a study involving data collection and analysis; *check with the instructor if a research project is envisioned that will involve human subjects*), analysis of secondary (including published) data, or transmission model-based studies. The project should define a clear research question and study design. Each student will need to present his/her class project. The presentation should be prepared in Power Point format and limited to 20 minutes (15 minutes for the presentation and 5 minutes for questions and answers). The final report should be doubled-spaced and within a 20-page limit, and follow a standard journal manuscript format (e.g. Introduction, Materials and Methods, Results, Discussion and/or Conclusions, References). The final written report is due on the presentation date.

To encourage steady progress in the class project throughout the semester, the final project will include the following due dates for ungraded assignments:

- Week 7 – Choice, background, and objective of the proposed study
- Week 8 – Proposed methodologies

Point System Used

%	93% to 100%	90% to 92%	87% to 89%	83% to 86%	80% to 82%	77% to 79%	73% to 76%	70% to 72%	67% to 69%	63% to 66%	60% to 62%	Below 60%
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E

Please be aware that a C- is not an acceptable grade for graduate students.

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	W F	I	N G	S- U
Grade Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0	0.0	0.0	0.0	0.0

For greater detail on the meaning of letter grades and university policies related to them, see the Registrar's Grade Policy regulations at:

<http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Exam Policy

N/A

Policy Related to Make up Exams or Other Work

All assignments are expected to turn in according to the syllabus schedule. Late assignments will receive zero points unless justified personal issues. Personal issues with respect to class participation or fulfillment of course assignments will be handled on an individual basis.

Policy Related to Required Class Attendance

Student classroom/lab attendance is required and absence needs pre-approval by the instructor.

Please note all faculty are bound by the UF policy for excused absences. For information regarding the UF Attendance Policy see the Registrar website for additional details:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT

Communication Guidelines

Please use the Inbox tool in canvas for all communication.

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.

Online Faculty Course Evaluation Process

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times

when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

SUPPORT SERVICES

Accommodations for Students with Disabilities

If you require classroom accommodation because of a disability, you must register with the Dean of Students Office <http://www.dso.ufl.edu> within the first week of class. 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 make sure you provide this letter to me by the end of the second week of the course. 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>. On line 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