

Course Title: Ecology and Human Health (IB 361)

Instructor: Dr. Brian Allan (ballan@illinois.edu)

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Class Times: Tues/Thurs 12:30 – 1:50 PM

Location: Roger Adams Lab 116

Office Hours: Online via course website and by appointment

Website: <https://learn.illinois.edu/>

Grading:

Exam 1	25%
Exam 2	25%
Team Project	25%
Online Quizzes	15%
In-class Exercises	10%

Course Description: Welcome to Ecology and Human Health! This course will cover a wide range of topics related to how the environment affects human health. While we will focus on the ecology of infectious diseases, including what are the organisms that cause infectious diseases in humans, what factors contribute to their emergence, and the complexity of ecological processes that can influence infectious disease exposure, we will also touch on a variety of related topics. These include the impacts of global change, including climate change, on human well-being, the impacts of infectious disease on human history, and the ecological, political and social ramifications of pandemics, to name a few. Whether you are interested primarily in anthropology, ecology, epidemiology, or human medicine, we think this course will cover topics that will interest you and help you develop your worldview. Beyond the course material, your instructors place an emphasis on helping you develop skills that will be useful to you in whatever career you choose to pursue. In that vein, desired student learning outcomes include: using critical thinking skills and quantitative reasoning to solve problems, reading and evaluating primary scientific literature, working collaboratively, and critically evaluating science-related news and information. A variety of in-class exercises will be utilized to help you develop these skills and enhance learning.

Prerequisites: None.

Readings and Discussions: There is no textbook available, so readings will be assigned from either the science news or primary scientific literature. Assigned readings should be read in their entirety, including the more challenging research articles. Students are responsible for learning all material presented in lecture and discussion, and discussion time will be used to clarify and highlight the most important aspects of the assigned readings (i.e., what are the major “take home” points).

Online Quizzes: To prepare for discussions, students should complete an online quiz on the assigned reading via the course website prior to class. The online quiz will be available until 30 minutes before the start of class. Students will only be able to make one attempt to answer the questions.

In-class Exercises: During lecture students will be presented with a variety of “in-class exercises”, the goal of which will be to augment student learning and participation, particularly at higher levels of cognitive reasoning (e.g., synthesizing ideas across scientific disciplines, critical evaluation of data, etc.). These exercises will be graded based upon completion of the activities and a qualitative evaluation of the effort.

Team Project: The last ~2 weeks of the course will be devoted to team projects. For their project, teams will complete a series of assignments using the course website and prepare a final report. The results of the team projects will be presented in the last class on May 5. The class times on 4/21, 4/23, 4/28, and 4/30 should be reserved for working on these team projects.

Class Website: A simple class website has been built using the Moodle course management system. All important materials associated with the class can be found on this website, including an up-to-date syllabus and pdfs of all assigned readings. There is also an online discussion forum, where students can post questions related to class materials or events and expect a quick response from the instructor, TA, or fellow students. Grades and class announcements will also be posted/accessible via the course website.

Missed Exams and Discussions: Students with a legitimate excuse for missing an exam will be offered an opportunity to take a make-up exam at a time convenient for the instructors of the class. Make-up exams pose a considerable inconvenience to your instructors, so please make every reasonable effort not to miss a scheduled exam time. Students with a legitimate excuse for missing a class can recover the missed points by turning in a short (~1 page) critique of the assigned reading that offers a substantial evaluation of the topic or research results presented in that reading. Students should obtain instructor permission to make up the points and turn in the critique within one week of the missed class.

Re-grades: Students who wish to dispute an exam grade may submit their exam for a re-grade. However, the entire exam will be re-graded, with the potential outcome that the grade may go up, down, or stay the same. Re-grades must be submitted in class within one week of the return of the exam, and include both the original, unmodified exam and a concise, typed letter explaining the reason for the re-grade request.

Learning Philosophy: While many college-level courses in the sciences focus on rote memorization and multiple choice-style exams, educational studies show this results in a low level of comprehension and retention of the material. In this class, we will utilize a variety of techniques to encourage development of higher-order cognitive skills and understanding (e.g., the ability to look at a graph and understand what was the scientific hypothesis being tested). As such, exams will be designed to evaluate both comprehension of the material *and* higher-level reasoning skills. In-class exercises will be used to help students develop these skills and prepare for this style of examination.

Academic Integrity: It is the expectation of the course instructors that students will conduct themselves with the utmost integrity and honesty and adhere to the guidelines of the UIUC Student Code. Students determined to be cheating on an exam will receive a grade of “0” for the exam and will receive a formal disciplinary letter. Completing in-class exercises or online quizzes for other students is also considered cheating (by both parties) and will be penalized similarly.

Disability Accommodations: Students with disabilities who require assistance to participate in this class are asked to discuss any requested accommodations with the course instructor as soon as possible.

Grade Range:

A+ = 99.5-100, A = 93.5-99.4, A- = 89.5-93.4

B+ = 86.5-89.4, B = 83.5-86.4, B- = 79.5-83.4

C+ = 76.5-79.4, C = 73.5-76.4, C- = 69.5-73.4

D+ = 66.5-69.4, D = 63.5-66.4, D- = 59.5-63.4

F = 59.4 or below.

Week	Date	Unit	Topic	Assigned Reading
1	1/21	Introduction and Epidemiology of Infectious Diseases	Lecture 1. Introduction to ecology and human health Discussion 1. The current ebola outbreak	
	1/23		Lecture 2. The Past: Diseases that changed the world Discussion 2. The Plague of Thebes	Kousoulis et al. 2012, EID
2	1/28	Epidemiology of Infectious Diseases	Lecture 3. The Present: Emerging and reemerging diseases Discussion 3. Resurrection of the 1918 influenza	Kaiser 2005, Science
	1/30		Lecture 4. The Future: Disease dynamics in an altered world Discussion 4. Globalization of infectious diseases	Smith et al. 2007, Ecology
3	2/4	Population Ecology	Lecture 5. Population ecology of infectious diseases Discussion 5. Vaccine hesitancy	Hotez 2020, NYTimes
	2/6		Lecture 6. Modeling infectious disease transmission Discussion 6. Ecological theory to enhance disease control	Smith et al. 2005, Frontiers
4	2/11	Community Ecology	Lecture 7. Extending community ecology to pathogens Discussion 7. The ecology of disease	Robins 2012, NYTimes
	2/13		Lecture 8. Disease and keystone species Discussion 8. A world without parasites	Wood & Johnson 2015, Frontiers
5	2/18	Biodiversity, Predators, & the Dilution Effect	Lecture 9. Effects of biodiversity on disease dynamics Discussion 9. Sacred cows and sympatric squirrels	Dobson et al. 2006, PLoS Medicine
	2/20		Lecture 10. Are predators good for your health? Discussion 10. Evaluating top-down regulation of reservoirs	Ostfeld & Holt 2005, Frontiers
6	2/25	Aquatic Ecosystems	Lecture 11. Ecology of water-borne diseases Discussion 11. Cholera outbreak, Haiti	Piarroux et al. 2011, EID
	2/27	Exam 1	Lecture and Discussions 1-11	
7	3/3	Global Change and Diseases	Lecture 12. Climate change and infectious diseases Discussion 12. The baffling nexus of climate change and health	Walsh 2012, NYTimes
	3/5		Lecture 13. Landscape structure, disturbance, and disease dynamics Discussion 13. Emergence of Hendra virus from flying foxes	Plowright et al. 2011, Proc. B
8	3/10	Conservation Medicine	Lecture 14. Extending invasion biology to infectious diseases Discussion 14. A mosquito-borne virus sweeps the Caribbean	Robles 2014, NYTimes
	3/12		Lecture 15. Infectious agents crossing the species barrier Discussion 15. Origins of major human infectious diseases	Wolfe et al. 2007, Nature
9	3/24	Ecological-Epidemiology	Lecture 16. Food-borne illnesses: An emerging threat Discussion 16. When food kills	Harris 2012, NYTimes
	3/26		Lecture 17. The economics of human health Discussion 17. Leishmaniasis and poverty	Alvar et al. 2006, Trends Parasitology

10	3/31	Climate Change	Lecture 18. Climate change impacts on water, fire and drought Discussion 18. Climate change as a factor in mass migration	Chan 2015, NYTimes
	4/2		Lecture 19. Climate change and the world food supply Discussion 19. A good life within our planet's limits?	O'Neill 2018, The Conversation
11	4/7	Microbial Ecology and the Human Microbiome	Lecture 20. Microbiomes of the human body 1 Discussion 20. Tending the body's microbial garden	Zimmer 2012, NYTimes
	4/9		Lecture 21. Microbiomes of the human body 2 Discussion 21. To survive surgery, take probiotics	Kinross et al. 2012, JPEN
12	4/14	Pandemics	Lecture 22. How to prepare for the zombie apocalypse Discussion 22. How the response to Zika failed millions	McNeil Jr. 2017, NYTimes
	4/16	Exam 2	Lecture and Discussions 12-22	
13	4/21	Team Projects	Team Project Work Time	
	4/23		Team Project Work Time	
14	4/28	Team Projects	Team Project Work Time	
	4/30		Team Project Work Time	
15	5/5	Project Reports Due	Presentation of Team Projects	