



BIOL 2455

Planetary Health Global Environmental Change and Emerging Infectious Disease

Spring 2025

Course Description and Structure

Description

Will a warmer world be a sicker world? What is it about the New England landscape that supports the proliferation of Lyme Disease? How are local wildlife trade and global species invasions contributors to emerging diseases like the 2003 outbreak of monkeypox virus in the USA? We will explore these and related questions in *Planetary Health: global environmental change and emerging infectious disease*. Planetary health is a timely new field focused on understanding the human health implications of human-caused disruptions to Earth's natural systems. The facet of 'health' that we focus on in this course is infectious disease. Students will learn how, when, where and why infectious diseases emerge in association with anthropogenic environmental impacts, specifically climate change, land-use change, and increased human interaction with animals.

Modality, Dates & Pace

BIOL2455 *Planetary Health* is a fully online asynchronous course that runs during Brown's Spring semester 2025 and which is exclusive for students in the Brown-Pfizer MS program. The course officially begins on January 22, 2025. The class does not observe the University Reading Period, nor does it have a final exam, and so the last day will be April 28, 2025. The course will not have any work due on weekends, the long weekend (Feb 15-18), or during spring recess (Mar 22-30). The course is designed so students can generally work at their own pace. There are 5 modules, each lasting ~11 academic/business days. Each module has virtual discussions for students to interact with one another on content. There will be an optional zoom meeting at the start of each module to set the stage for the material. Regular zoom drop ins will also be

available to answer questions and talk about material. The optional zoom meeting schedule is below.

Learning Outcomes

Students who successfully complete this course will be able to:

- Define Planetary Health, provide examples of the kinds of topics the field focuses on, and explain its importance.
- Describe a list of patient-planetary health co-benefits.
- Define emerging infectious disease and describe the global increase and geographic distribution of emerging infectious diseases in the human population over the last century.
- Draw on evidence-based examples to describe how climate change, land-use change, and species invasion/animal trade can lead to the emergence of infectious disease in humans and wildlife.
- Explain, using examples, how and why the environmental and emerging disease impacts of our changing planet are not distributed evenly across populations and geographies.
- Assemble and critique a list of actions that can help to prevent infectious disease emergence resulting from environmental change.
- Research and develop an evidence-based opinion article on a Planetary Health topic of choice.
- Draw on peer-reviewed evidence and investigative works to construct and defend an argument in support of covid-19's origin being nature or the lab setting.

Instructor, Contact Information & Student Hours

Instructor: Kate Smith PhD

Hello and welcome to Planetary Health! I am Kate Smith, Senior Associate Dean of Biology Education and Associate Professor of Medical Science. You can learn more about me on Researchers@Brown. Before and after the course starts you are welcome to email me directly at katherine_smith@brown.edu. Once the course starts, you may also contact me directly through the Canvas email platform.

Course Requirements

Required Reading materials

- One book: *Spillover: Animal Infections and the Next Human Pandemic* by David Quammen. The cost of this book online ranges from \$2.00 used to \$15.00 new on Amazon (not including shipping). Brown bookstore will also carry the book for students.
- Other literature will be assigned in each module and made available directly through Canvas. Readings draw on a range of sources from peer-reviewed, to op-ed, to online evidence-based sources from experts in the field.

Student Accessibility Services

Brown University is committed to full inclusion of all students. Students who, by nature of a documented disability, require academic accommodations should contact the instructor directly. Students may also speak with Student Accessibility Services to discuss the process for requesting accommodations.

Practice Academic Integrity

Ensure you are aware of Brown's [Code of Student Conduct](#).

Time Commitment

Successful completion of Planetary Health will require students to engage with the course most days between January 22 and April 28. What follows is a general breakdown of my estimate for how much time students will spend on the major components of the course. These estimates are based on previous similar offerings of Planetary Health. Because the course is fully online and asynchronous it behooves every student to be disciplined about creating a schedule and initiating work early.

- (90 hrs.) Modules 1-5 lessons and assessments: Modules 1-5 will each include brief online lectures, assigned readings, case studies, quizzes, reflections, and virtual discussions with peers.
- (90 hrs.) Projects: There are two major projects in the course: one related to the book *Spillover* and an op-ed on a topic of choice within the field.

Primary Course Activities

There are five modules in the course, each covering a portion of the course learning objectives. Each module assesses learning through notes-based quizzes, reflections, and virtual discussions with peers.

1. Module 1 introduces students to the field of Planetary Health and rise of emerging infectious diseases.

2. Modules 2, 3 and 4 dive deeply into the connection between a specific environmental change (invasive species, land-use change, and climate change) and disease emergence.
3. Module 5 focuses on pandemics - offering the opportunity to consider the origins of covid-19 and showcases solutions for future pandemic preparedness.

There are two primary projects: 1) reading and an assignment based on *Spillover: Animal Infections and the Next Human Pandemic* by David Quammen, and 2) a Planetary Health op-ed on any topic of your choosing for an audience of your choosing.

Optional Zoom Meeting Schedule (Tentative as of July 2024)

Optional module launch meetings and drop in hours for general questions

Zoom link for all meetings: <https://brown.zoom.us/my/katherinefsmith>

Orientation launch: Jan 22 3-3:30 EST

Module 1 launch: Jan 29 3-3:30 EST

Drop in: Feb 5 3-3:30 EST

Module 2 launch: Feb 13 3-3:30 EST

Drop in: Feb 19 3-3:30 EST

Module 3 launch: Mar 4 1:30-2 EST

Drop in: Mar 12 3-3:30 EST

Module 4 launch: Mar 19 3-3:30 EST

Drop in: Apr 2 3-3:30 EST

Module 5 launch: Mar 10 3:30-4 EST

Drop in: Mar 16-3:30 EST

Canvas Announcements

We will use Canvas Announcements for general course announcements and reminders.

Grading and Evaluation Criteria

The course may be taken for a grade or S/NC. Final grades are based on the total possible points earned through the course assignments. The point distribution for final grades is: 90-

100% of total pts=A; 80-90%=B; 70-80%=C; >70%=S; <70%=NC. It is important to note that assignment deadlines in Canvas are for Eastern Standard Time. Late assignments are generally not accepted though I will work with you if an extenuating circumstance arises that prevents you from submitting work on time. In these cases it is important to email me right away so I can assist (if helpful), and so we can work together most effectively.

Weekly Quizzes, Reflections & Discussions (15 points each)

There will be several low stakes Canvas based assignments per module, each worth 15 points: quizzes, discussions and reflections. These will be an opportunity to showcase your learning in various ways and engage with peers and the instructor virtually. On time, thoughtful, complete, constructive and detailed contributions to module assessments will garner full points towards the final grade.

Projects (100 points each)

There are two primary projects each worth 100 points.

Project 1. Reading and an assignment based on *Spillover: Animal Infections and the Next Human Pandemic* by David Quammen.

- **Glossary** (10 pts) - As you read *Spillover* you will notice that the author is writing for a general audience and works hard to define scientific concepts and terms. Many of the concepts presented may be new to you, for example a 'reservoir host' or 'R0'. As you read *Spillover*, create a running glossary of no less than 15 concepts/terms you encounter, which are new, and (most importantly) interesting to you. You should use the definition in the book as a start, but also research the term/concept using external sources to present a definition in your own words. You are encouraged to use a combination of formal informational websites (like CDC, WHO), education resources (i.e. textbooks), and the primary literature in your search for a thoughtful definition. Include at least 1 reference for each term. Cite these additional references briefly using any format that works for you (just be consistent). The aim is to define a minimum of 10 terms/concepts in whatever amount of space you need (no word limit) in your own words. Again, the point of this is for you to learn more about topics that interest you.
- **Personal interest** (30 pts) - What was the most interesting thing you learned reading *Spillover*? Perhaps it was a new concept or a chapter on a specific disease case study. In your own words, summarize the part of the book that was most interesting to you and reflect on why you think it captured your attention. What additional research did you do to learn more about the topic, if any. If not, what questions do you still have? Did this particular interest, or the book in general, change anything for you personally in terms of your interests in the health of people and the planet? Please elaborate. This reflection should be ~300 words.

- **Putting covid-19 in context and looking forward** (30 pts) - How did *Spillover* help you to better appreciate and/or understand the covid-19 pandemic, put it in perspective, and think about its origins? This response should be ~300 words.
- **Book review** (30 pts) - Provide a formal review of the book for a general audience of your choosing. You should offer formal detailed critique of the content and writing style by pointing to specific examples from the book. You can write your review for the audience of your choosing: local library newsletter, book club blog, the NYTimes, amazon.com, etc. It is easy to be critical but a good book review includes some positives and some negatives. Think about your audience and name it at the start of your review. Your review should be ~500 words.

Project 2. A Planetary Health op-ed on any topic of your choosing for an audience of your choosing.

- Students will develop an op-ed on a Planetary Health topic of personal interest that is tailored for a specified audience of they're choosing. The op-ed can focus on any topic addressed in the course, or one related more broadly to Planetary Health but not addressed in the course, for example why Planetary Health should be part of every health care worker's training. For inspiration you might spend time on the Planetary Health Alliance website reviewing the breadth of topics covered by experts and budding experts in the field. The point of this assignment is to offer you the opportunity to learn more about something of personal interest in the field and to share your opinion on it. A specific venue and accompanying target audience should be identified for the op-ed. Options are endless and include widely read news outlets (e.g. *The NY Times*, *The Hindu*), local news outlets (e.g. *The Times-Picayune* | *The New Orleans Advocate*), peer-reviewed journal publications (e.g. *Lancet* editorial or correspondence), organizational outlets (e.g. op-ed for the Planetary Health Alliance blog), and more. The goal is to think about the audience you are writing for and tailor the language and content to them. Resources for op-ed writing and a rubric will be provided