

Division of Biology and Medicine



Brown
BioMed
DIVISION
OF BIOLOGY AND MEDICINE

Brown-Pfizer Master of Arts Program

Master of Arts in Biology

July 30th, 2024

Elizabeth O. Harrington, Ph.D.

*Associate Dean, Office of Graduate Studies
Division of Biology & Medicine*

Master of Arts in Biology

- Established in 1993 via contractual agreement.
- Course offering is a section of an existing Brown University course.



Master of Arts in Biology

Objectives

- Provide graduate instruction within the biological sciences for Pfizer colleagues and contractors who wish to extend their knowledge in discrete areas relating to their employment and/or interests.
- Provide a broad-based and rigorous Master of Arts training in biological sciences.



Master of Arts in Biology

Experiences



Over **200** M.A. in Biology awarded.

Master of Arts in Biology

Experiences

- Many colleagues have remained with Pfizer with advancement within your organization.
- Others have earned additional master's or PhD degrees.



Master of Arts in Biology

Overview

- Open to Pfizer contractors and colleagues.
- Only one prerequisite required:
 - *A Bachelors degree in any field.*
- All courses are virtual.



Master of Arts in Biology

Overview

- Pfizer employees and contractors register as Special Students via a [Registration Form](#);
 - Standard Brown tuition fees apply.
- Students apply to Graduate School for the M.A. program after successful completion of two courses.
- Pfizer reimburses colleagues *only* who pass with grade of a 'B' or better.
- Students must comply with Academic code and Title IX training (on-line)



Master of Arts in Biology

Program Requirements

- 8 graduate courses:
 - 2 of 8 courses in “core” subjects
 - **cell biology,**
 - **biochemistry,**
 - **genetics,**
 - **pharmacology;**
 - 6 of 8 courses with grade of ‘B’ or better.
- Passing final paper or proposal “culminating experience” on topic approved by Assoc Dean, Graduate Studies.



Master of Arts in Biology

Program Requirements: Culminating Experience

- **PURPOSE:** This requirement is designed for the student to demonstrate their ability to integrate the knowledge gained in the prior course work and to apply that to a specific problem in modern biology.



Master of Arts in Biology

Program Requirements: Culminating Experience

Research proposal

Final paper

Research grant to include:

- project summary/abstract,
- specific aims,
- research strategy,
- literature cited

Paper to include:

- introduction,
- discussion,
- conclusion,
- literature cited

Each are to be 10-15 pages, excluding figures, graphs/ charts, and literature cited. Additional details are provided each year regarding font size, margins, etc.



Master of Arts in Biology

Program Requirements: Culminating Experience

- Topics: must be approved by the Associate Dean for Graduate Studies.
- When due: may be undertaken following completion of 7 courses, but completed no later than one semester following completion of the 8th course.



Master of Arts in Biology

Program Requirements

- No course credits towards the degree may be transferred.
- Must be actively employed as a colleague or contractor at Pfizer.
- Pfizer M.A. students may take courses toward the degree on Brown University campus with permission of instructor and Assoc. Dean of Graduate Studies.



Master of Arts in Biology

Program Requirements

- Once accepted by the Graduate School, the students are expected to enroll in courses *continuously each semester*;
 - No classes offered during the summer term.
 - If not, a request for a Leave of Absence (LOA) must be submitted one month prior to the start of the term via the Graduate School to avoid billing.
 - *Only one LOA is permissible during the course of study.*



Master of Arts in Biology

Application Requirements

- Successful completion of two Brown University graduate courses (B or better).
- Undergraduate transcript with date of degree.
- Letter of recommendation from Supervisor at Pfizer.
- 1-2 pg. Colleague Statement
- *No GRE requirement!*



Master of Arts in Biology

Auditing of Classes

- **Auditing** is a student who is registered in a course without earning academic credit upon successful completion under the following conditions:
 - (1) the student must be properly registered for it;
 - (2) the student is entitled to all instruction in the course, including conferences; but will not receive criticism of papers, tests, and examinations.
- Auditing of courses is available only to Pfizer students who have graduated with the Brown/ Pfizer MA degree.



Master of Arts in Biology

Auditing of Classes

- Auditing of courses is limited to a total of 2 courses per Brown/ Pfizer MA graduate.
- To audit a BROWN course, the student must receive permission from the instructor prior to the start of the course.
 - The audited course shall be entered on the permanent record of any student electing this privilege.
 - The status of a course in which a student has registered may not be changed from audit to credit at any time.
- Auditing of a course will be at no cost to the student.



Master of Arts in Biology

Upcoming Courses

- Fall 2024: *Advanced Biochemistry*
 - » **Core course**
- Spring 2025: *Planetary Health: Global Environmental Change and Emerging Infectious Disease*
- Fall 2025: *Molecular Targets of Drug Discovery*
- Spring 2026: *Cell Biology*
 - » **Core course**



BIOL 2270 S02
Advanced Biochemistry

Gerwald Jogl, PhD
Gerwald_Jogl@brown.edu

Course objective:

Review fundamental principles of biochemistry and study how biochemistry shapes current biomedical research.

In each session, we will review core topics in biochemistry and then discuss one or two research publications related to the session topic.

Course Modules:

1. Amino acids, protein structure
2. Enzymes, biocatalysis
3. Carbohydrates and glycolysis
4. Citric acid cycle
5. Oxidative phosphorylation
6. Glycogen, regulation of metabolism
7. Lipids and lipid metabolism
8. Amino acid metabolism
9. Nucleotide metabolism
10. DNA and RNA
11. DNA replication
12. Transcription
13. Translation I: ribosome assembly
14. Translation II: protein synthesis

Article

Accurate structure prediction of biomolecular interactions with AlphaFold 3


<https://doi.org/10.1038/s41586-024-07487-w>

Received: 19 December 2023

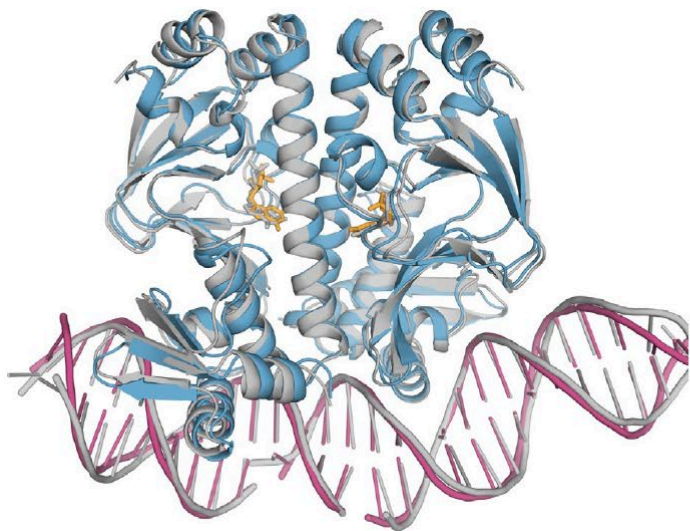
Accepted: 29 April 2024

Published online: 8 May 2024

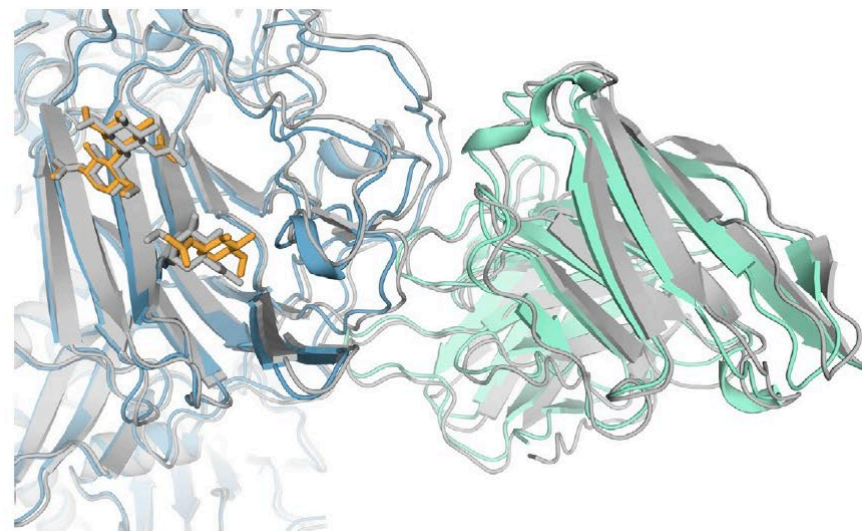
Open access

 Check for updates

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Sequence-based drug design as a concept in computational drug design

Received: 18 July 2022

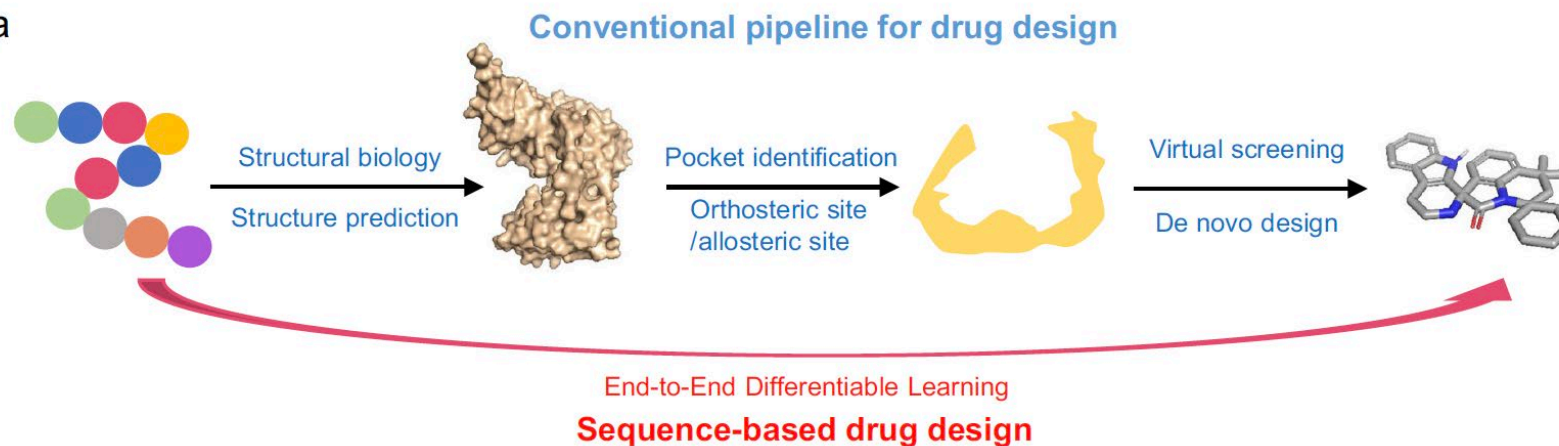
Accepted: 27 June 2023

Published online: 14 July 2023

 Check for updates

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Course Materials

Textbook

Lehninger's Principles of Biochemistry

Eighth Edition 2021

David L. Nelson & Michael M. Cox, MacMillan



One recent research publication for each class:

Science Current Issue First release papers Archive About Submit manuscript

HOME > SCIENCE > VOL. 374, NO. 6575 > AN ORAL SARS-COV-2 M^{PRO} INHIBITOR CLINICAL CANDIDATE FOR THE TREATMENT OF COVID-19

RESEARCH ARTICLE | CORONAVIRUS f tw in wh en

An oral SARS-CoV-2 M^{PRO} inhibitor clinical candidate for the treatment of COVID-19

DAFYDD R. OWEN ^{ID}, CHARLOTTE M. N. ALLERTON ^{ID}, ANNALIESA S. ANDERSON, LISA ASCHENBRENNER, [...], AND YUAO ZHU +38 authors [Authors Info & Affiliations](#)

SCIENCE • 2 Nov 2021 • Vol 374, Issue 6575 • pp. 1586-1593 • DOI: 10.1126/science.abl4784

↓ 183,673 ” 561 🔔 📖 ” 📄



PLANETARY HEALTH

A NEW DISCIPLINE

Traditionally, medical science is based on systems within the human body.
Planetary health broadens health research to include the external systems
that sustain or threaten human health.

BIOL 2455 Planetary Health: Global Environmental Change and Emerging Infectious Disease

*Spring 2025
Online, asynchronous*

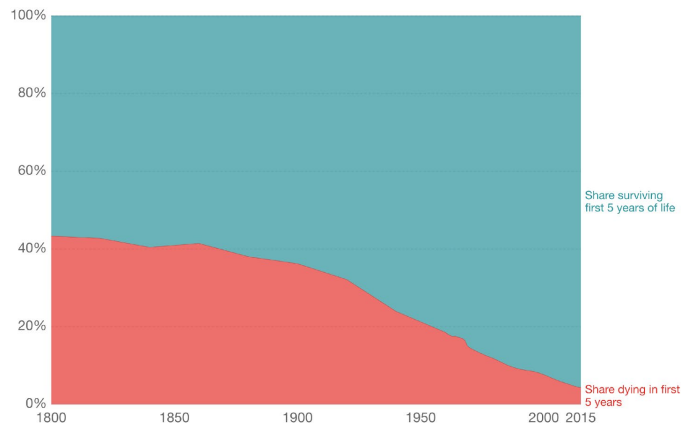
Kate Smith PhD
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Education

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Global child mortality

Share of the world population dying and surviving the first 5 years of life.

Our World in Data

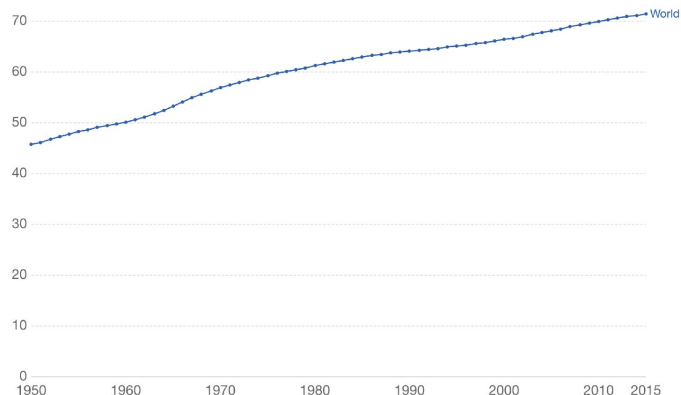


Source: Gapminder and the World Bank OurWorldInData.org/a-history-of-global-living-conditions-in-5-charts/ · CC BY-SA

Life expectancy

Shown is period life expectancy at birth. This corresponds to an estimate of the average number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life

Our World in Data



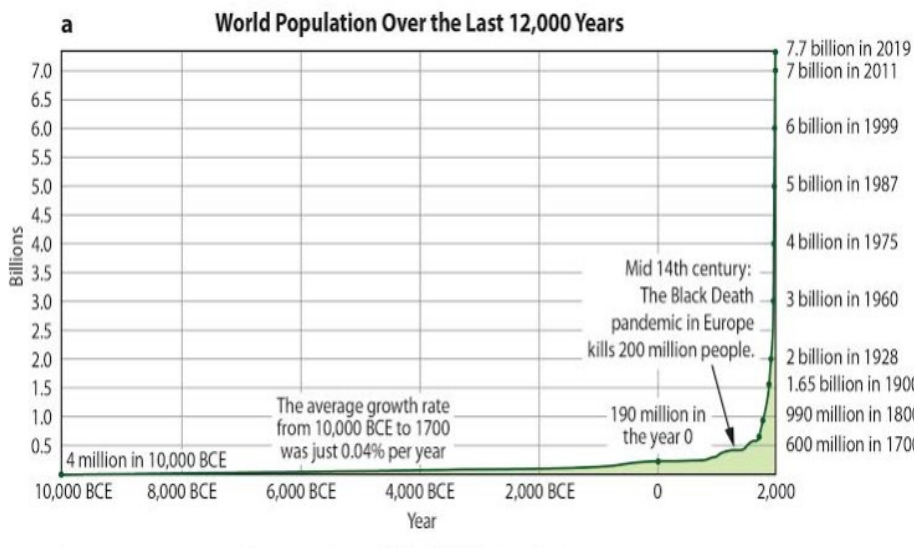
Source: Clio-Infra estimates until 1949; UN Population Division from 1950 to 2015 OurWorldInData.org/life-expectancy-how-is-it-calculated-and-how-should-it-be-interpreted/ · CC BY-SA

Humanity has made tremendous **public health gains** by traditional measures such as global child mortality and life expectancy...



PLANETARY
HEALTH
ALLIANCE

The Great Acceleration: Exponential growth in population and world GDP



Yet at the same time,
we've disrupted Earth's natural systems

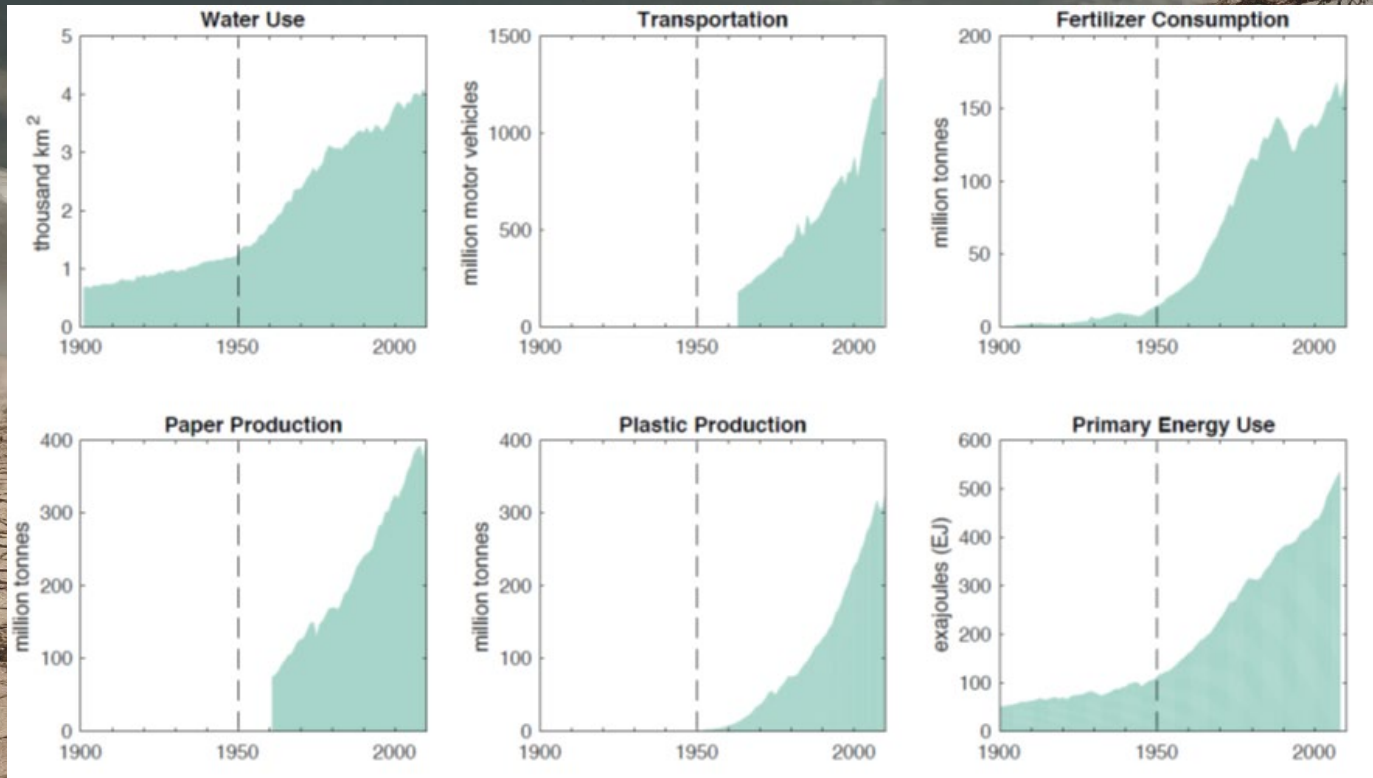
Anthropogenic environmental changes include:

- Biodiversity shifts
- Changing biogeochemical flows
- Changing land use and land cover
- Global pollution
- Climate change
- Depletion of natural resources

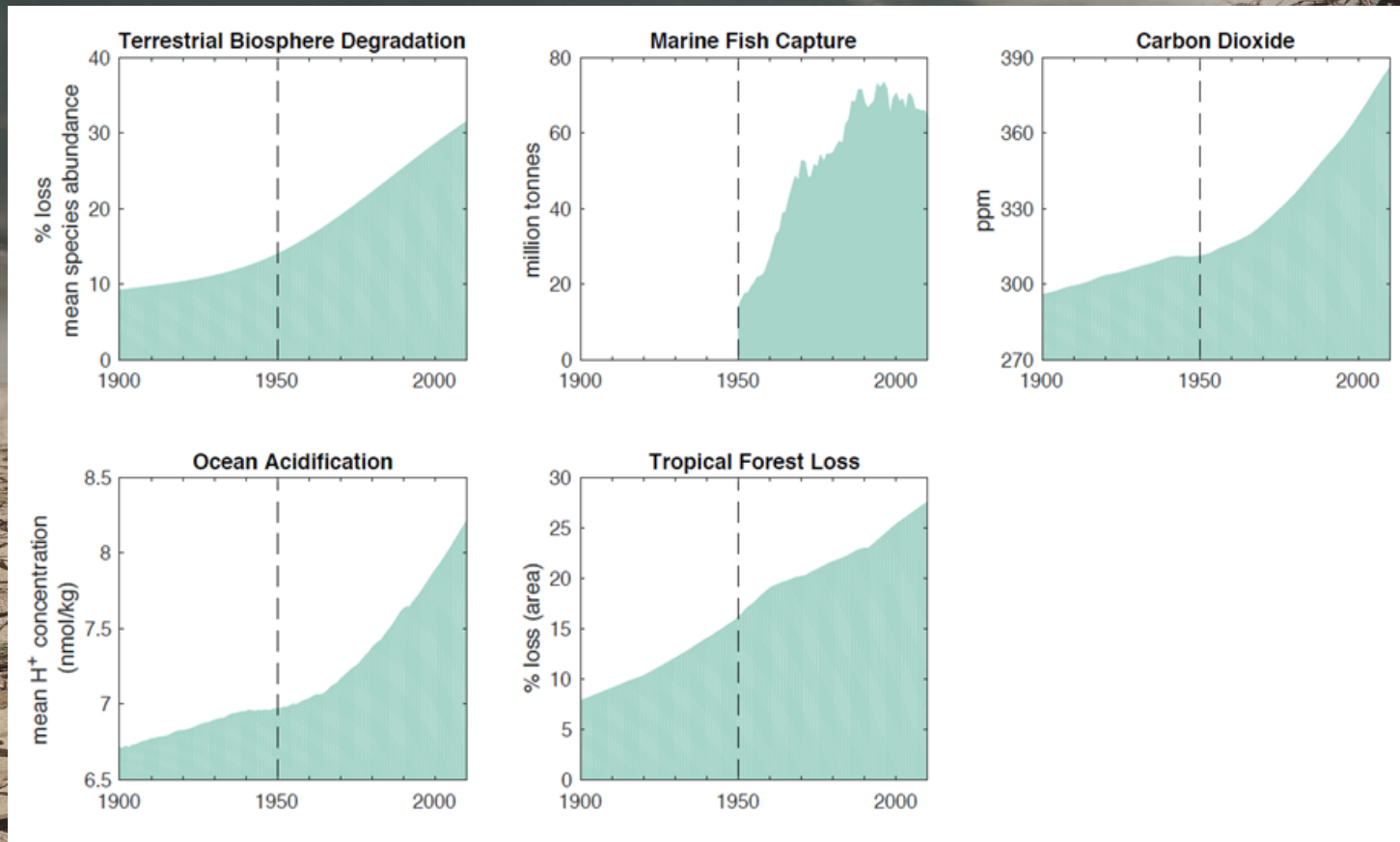


PLANETARY
HEALTH
ALLIANCE

The Great Acceleration: Consumption patterns skyrocket after 1950



The Great Acceleration: Accelerated human impacts on natural systems



Our environment is changing — and it's not just our climate.

- We've cleared nearly half of temperate & tropical forests
- Biodiversity is rapidly disappearing: ~150 species lost daily
- Our oceans have become 30% more acidic since the Industrial Revolution
- Land is desertifying: we use over two-thirds of the world's ice free surface for ag
- Soil, air, and water ecosystems are being polluted
- Biogeochemical cycles are being altered: CO2 levels increased 25% since the 1950s and we've exceeded the planetary boundaries for nitrogen and phosphorus
- We've dammed over 60% of our rivers
- Extreme weather events wreak havoc on communities
- Temperatures are increasing
- Sea levels are rising




These changes in our environment severely **affect our health** and jeopardize decades of public health gains:

Human health impacts include, but aren't limited to:

- Cardiovascular diseases
- Respiratory diseases, like asthma
- Infectious zoonotic and diarrheal diseases
- Antimicrobial resistance
- Toxic exposures
- Heat strokes
- Mental health effects
- Malnutrition
- Forced displacement and migration
- Civil strife and trauma





“We have mortgaged the health of future generations to realize economic and development gains in the present.”

The *Rockefeller Foundation–Lancet Commission* on planetary health (2015)

Planetary health is a scientific field and global movement focused on understanding and quantifying the growing human health impacts of anthropogenic global environmental change, and developing solutions that will allow humanity and the natural systems we depend on to thrive now and in the future.



MAKE THE CONNECTION

Planetary health challenges current barriers between disciplines and explores the connections between them.

Which mineral deficiency in humans is related to CO₂ emissions?



Read a study in *The Lancet Global Health* on how atmospheric CO₂ **reduces zinc** in plants and the humans who eat them.¹

How might urban planning affect rates of dementia?



Research in *The Lancet* links **dementia** risk to living near major roads.²

Which weather conditions are linked to increases in cardiac admissions?



A study in *The Lancet Planetary Health* shows that, while drought is associated with reduced respiratory hospital admissions in a US population, **cardiac admissions are increased in periods of worsening drought.**³

How does our daily commute affect our health?



Research in *The Lancet Public Health* shows that even though cyclists and pedestrians are more at risk of inhaling pollutants, the positive effects of **active commuting** outweigh the negative.⁴

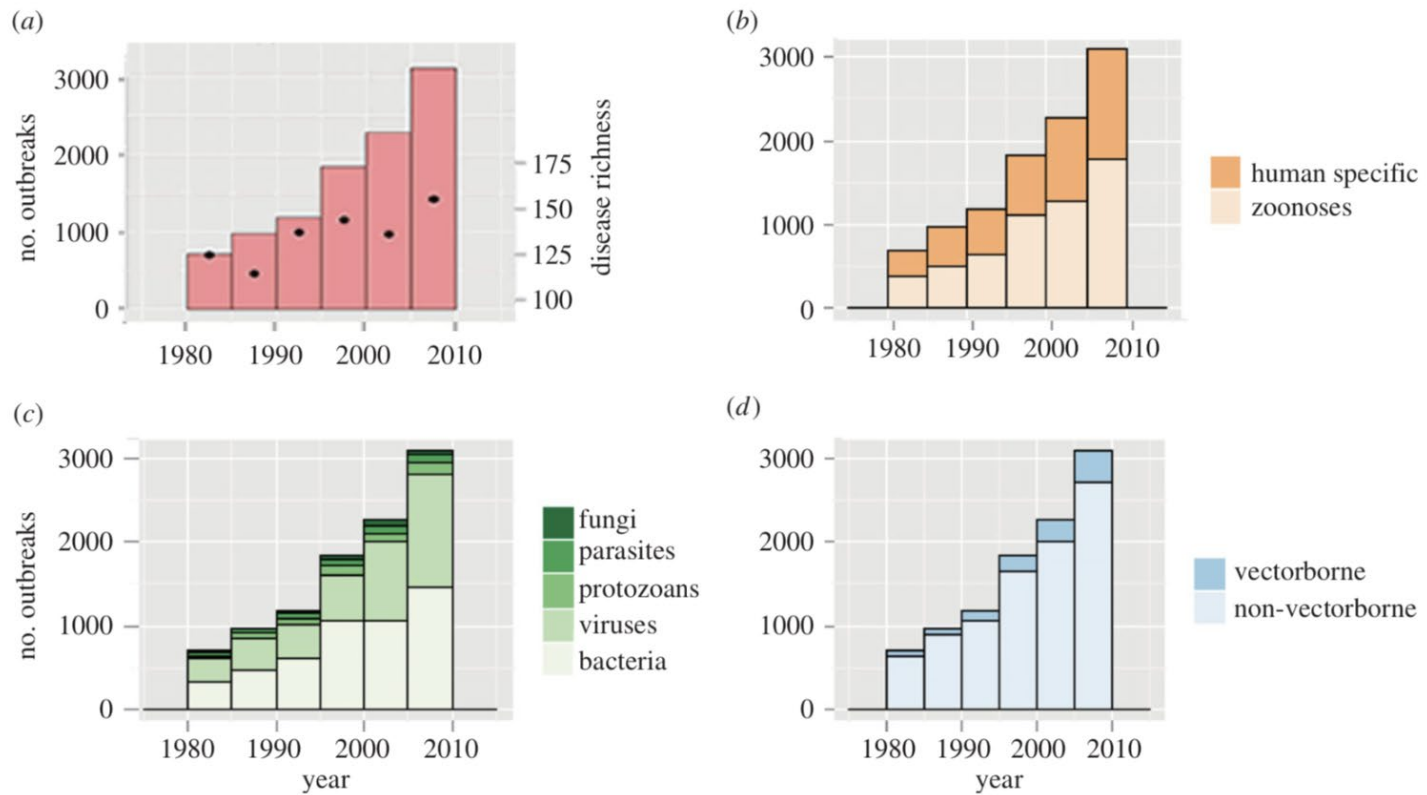
A decline in which animal population is linked to vitamin A deficiencies in humans?



Decline in **bee populations** could significantly increase deficiencies in vitamin A and folate. Research in *The Lancet* highlights the importance of protecting pollinators to protect human nutrition.⁵

Global rise in human infectious disease outbreaks

Katherine F. Smith^{1,†}, Michael Goldberg¹, Samantha Rosenthal²,
Lynn Carlson³, Jane Chen¹, Cici Chen^{4,†} and Sohini Ramachandran^{1,5,†}





PLANETARY HEALTH

**BIOL 2455 Planetary Health: Global Environmental Change and
Emerging Infectious Disease**
Spring 2025

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?



PLANETARY HEALTH

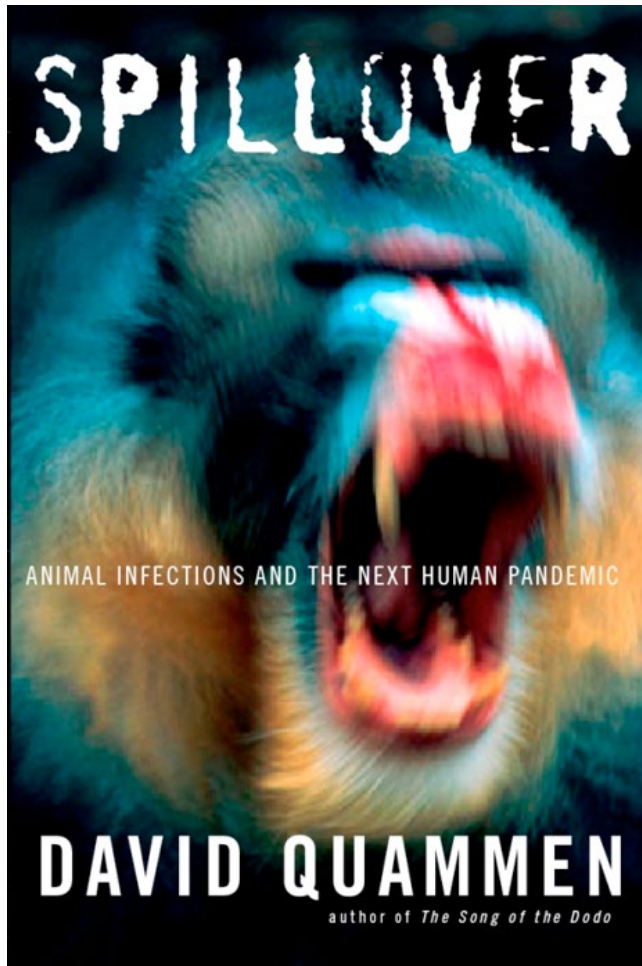
BIOL 2455 Planetary Health: Global Environmental Change and Emerging Infectious Disease
Spring 2025

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?

Aim: 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 & Pace:

- Fully online asynchronous course in Canvas. Designed so students can generally work at their own pace.
- 5 modules, each lasting ~11 academic/business days:
 - Module 1 introduces students to the field of Planetary Health and rise of emerging infectious diseases. Modules 2-4 dive deeply into the connection between a specific environmental change (invasive species, land-use change, and climate change) and disease emergence. Module 5 focuses on pandemics - considering the origins of covid-19 and the future of pandemic preparedness.
- 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.



Assessments:

Each module: quizzes, reflections, contribution to virtual discussions

Two larger projects:

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

Project 2. Op-ed on any topic of your choosing for an audience of your choosing. *Does not need to be focused on infectious disease.*

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.



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A NEW DISCIPLINE

Traditionally, medical science is based on systems within the human body. Planetary health broadens health research to include the external systems that sustain or threaten human health.

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*Spring 2025
Online, asynchronous*

Kate Smith PhD
Associate Professor of Medical Science
Senior Associate Dean of Biology
Education

katherine_smith@brown.edu

Masters of Arts in Biology

How to get started????

1. Register for course offering via the Brown website:
<http://www.brown.edu/pfizer>
2. Educational Assistance:
 - Colleagues: Apply for via HR source. Following the successful completion of the course ('B' or better), you will be reimbursed by Pfizer to pay off your loan.
 - Contractors: None available, but Ledge Light credit union has individual educational loan options.



Masters of Arts in Biology

Tuition Payment Information

- **Electronic ACH Payment** - Students and their Authorized Users can access the E-Bill & Payment system at <http://payment.brown.edu> to make online ACH payments via a U.S. personal checking or savings account. Electronic ACH payments will post to the student's account immediately and may take up to 48 business hours to post against the payer's bank account.
- **Mail** - Payment by check, money order or certified check must be made payable to Brown University and sent to Brown University Cashier's Office at:
 - Brown University Cashier's Office
Campus Box 1911
69 Brown Street, 2nd Floor
Providence, RI 02912



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- **Good luck!!**