

Philip Johnson, PhD, MPH, MEd

Course Title: Introduction to Environmental Health (EVST 264)

Course Catalog Description: The course will introduce concepts, principles and tools that guide the intersections of environment and health. It will use an interdisciplinary format drawing from risk analysis, law-policy, social science, environmental science and public health. The course will address numerous topics and case studies including climate change; pollution; emerging technologies; energy systems; chemicals; collapse and catastrophic outcomes; equity, social and environmental justice; and ecosystem/health dynamics. As environmental health scales of impact span from the individual to community, regional and global, the course will cover a broad range of contemporary and future threats.

The course has no prerequisites

Short course description and objectives

The course will connect to core disciplines and analytical approaches that work to understand how physical, chemical and biological agents in air, water, soil, food and other environmental media may adversely affect human health, as well as the interplay and role of social determinants, culture and well-being. Students will learn how experts in epidemiology, sociology, public health, risk analysis, law and community organizing, for example, help to inform our understanding of, and influence outcomes of, environment and health.

The course will explore different dimensions of social activity and behavior that shape how humans interact with the environment. These include the role of the individual; advocacy, activism and resistance; custom and myth; and perception. The course will also explore how equity, disproportionate impact, power and control, voluntary and involuntary exposures and susceptibility play a central role in environment and health outcomes.

As environmental health scales of impact span from the individual to community, regional and global, the course will address a broad range of contemporary and future threats. The course will also discuss and consider the role of communications, data visualization, prosocial endeavor and citizen science in increasing awareness and education of society about the role and importance of environmental health.

Course requirements and the percentage breakdown of graded elements

20% of grade: Participation in class discussion

30% of grade: Six short written exercises applying concepts to case studies (1-2 pages each)

15% of grade: Final paper outline and biography (2-3 pages double-spaced)

35% of grade: Final project paper (10 pages double-spaced)

Attendance policy

Attendance is required in all YSS courses, including on holidays. Absences require prior approval from instructor.

Academic integrity statement

You must document all source material. If you take any text from somebody else, you must make it clear the text is being quoted and where the text comes from. You must also cite any sources from which you obtain numbers, ideas, or other material. Use of ChatGPT or other AI composition software is not permitted. If you have any questions about what does or does not constitute plagiarism, ask! Plagiarism is a serious offense and will not be treated lightly. Fortunately, it is also easy to avoid and if you are the least bit careful about giving credit where credit is due you should not run into any problems.

Provisional five-week syllabus:

Week 1, class 1: Environment and health: past and present

How the “ghost map” helped end a killer disease. S Johnson. TEDSalon (2006)
https://www.ted.com/talks/steven_johnson_how_the_ghost_map_helped_end_a_killer_disease?ubtitle=en [video 10 min.]

Inside the 20-year campaign to rid the world of leaded fuel. United Nations Environment Programme (August 2021) <https://www.unep.org/news-and-stories/story/inside-20-year-campaign-rid-world-leaded-fuel> [5 pp.]

Children and environmental toxins: what everyone needs to know. Landrigan and Landrigan. Oxford University Press (2018) <https://global.oup.com/academic/product/children-and-environmental-toxins-9780190662639?cc=us&lang=en&#> [chapters 1-4, 70 pp.]

Week 1, class 2: Environmental health: evolution of methods and analytical structure

Environmental epidemiology. Volume 2. National Academies Press (US) (1997)
<https://www.ncbi.nlm.nih.gov/books/NBK233638/> [chapters 1-3, 67 pp.]

The exposome concept: a challenge and a potential driver for environmental health research. Siroux et al. *European Respiratory Review* 25 (2016)
<https://pmc.ncbi.nlm.nih.gov/articles/PMC9487242/> [5 pp.]

Integrating multi-omics with environmental data for precision health: a novel analytic framework and case study on prenatal mercury induced childhood fatty liver disease. Goodrich et al. *Environment International* 190 (August 2024)
<https://www.sciencedirect.com/science/article/pii/S0160412024005166?via%3Dihub> [14 pp.]

CDC One Health. About One Health (October 30, 2024) <https://www.cdc.gov/one-health/about/index.html> and One Health Action Stories <https://www.cdc.gov/one-health/php/stories/index.html> [10 pp. plus sampling of action stories]

Week 2, class 1: Risk and environmental health

Risk: a very short introduction. Fischhoff and Kadvany. Oxford University Press (2011) <https://global.oup.com/academic/product/risk-9780199576203?cc=us&lang=en&> [chapters 1-7, 150 pp.]

Public health research and surveillance priorities from the East Palestine train derailment: proceedings of a workshop – in brief. National Academies (2024) <https://nap.nationalacademies.org/catalog/27441/public-health-research-and-surveillance-priorities-from-the-east-palestine-train-derailment> [13 pp.]

Management of indoor air and airborne pathogens. Proceedings of a workshop series – in brief. National Academies (2023) <https://www.nationalacademies.org/our-work/indoor-air-management-of-airborne-pathogens-a-virtual-workshop-series> [11 pp.]

Week 2, class 2: Disproportionate impact

CBS News interview with Dr. Mona Hanna-Attisha. Pediatrician on lessons from Flint water crisis: Flint has opened our eyes (2024) <https://www.youtube.com/watch?v=IPbwUs2jq4> [video 10 min.]

Looking around the corner: (re)imagining power for a healthy and just California. USC Equity Research Institute (ERI). Ito et al. (January 2023) <https://dornsife.usc.edu/eri/publications/looking-around-the-corner/> [66 pp.]

Strategic planning to advance environmental justice. White House Council on Environmental Quality (October 2023) https://www.whitehouse.gov/wp-content/uploads/2023/11/Strategic-Planning-to-Advance-Environmental-Justice_final-Oct.-2023.pdf [20 pp.]

Climate and environmental justice programs stalled. *Inside Climate News* (February 16, 2025) <https://insideclimatenews.org/news/16022025/climate-environmental-justice-programs-trump-freeze/> [5 pp.]

Week 3, class 1: Science of air, water and soil

The Lancet Commission on pollution and health. *The Lancet Commissions* 391:10119 (February 3, 2018) [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(17\)32345-0.pdf](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)32345-0.pdf) [50 pp.]

Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: results from GEOS-Chem. Vohra et al. *Environmental Research* 195 (February 9, 2021)

<https://www.semanticscholar.org/paper/Global-mortality-from-outdoor-fine-particle-by-fuel-Vohra-Vodanos/76e4eef3ba920eed533c943452cc6681a9a82bba> [23 pp.]

Plume Pittsburgh site introduction. CREATE Lab, Carnegie Mellon University (2024)
<https://plumepgh.org/about.html> [video 2 min.]

Temperature inversion impacts and ACHD's Mon Valley Pollution Episode Rule – an explainer. J Graham (2024) <https://breatheproject.org/temperature-inversion-impacts-and-achds-mon-valley-pollution-episode-rule-an-explainer/> [2 pp.]

Pittsburgh's three rivers and their tributaries. Current and historical influences on water quality. E Sargent (2023) <https://storymaps.arcgis.com/stories/0fbfba3b67af40dc8a01e0a95cc08a06> [10 pp.]

Urban soils in a historically industrial city: patterns of trace metals in Pittsburgh, Pennsylvania. Maxim et al. *Environmental Research Communications* 4:7 (2022)
<https://www.pitt.edu/pittwire/features-articles/metal-pollutants-soil-study> [2 pp.]
<https://iopscience.iop.org/article/10.1088/2515-7620/ac7cc2/meta> [10 pp.]

Week 3, class 2: Chemicals in the environment

European Environment Agency. Chemicals and health (2023)
<https://www.eea.europa.eu/publications/zero-pollution/health/chemicals> [10 pp.]

Project TENDR Briefing Paper: protecting the developing brains of children from plastics and toxic chemicals in plastics. M Swanson (April 2024) <https://projecttendr.thearc.org/project-tendr-briefing-paper-protecting-the-developing-brains-of-children-from-plastics-and-toxic-chemicals-in-plastics/> [10 pp.]

PFAS in the textile and leather industries. Minnesota Pollution Control Agency (May 2023)
<https://www.pca.state.mn.us/sites/default/files/gp3-06.pdf> [19 pp.]

Why Europe may ban the most popular weed killer in the world. E Stokstad. *Science* (June 17, 2016) <http://www.sciencemag.org/news/2016/06/why-europe-may-ban-most-popular-weed-killer-world> [2 pp.]

The herbicide glyphosate gets 10 more years in the EU. B Erickson. *Chemical & Engineering News* (November 17, 2023) <https://cen.acs.org/environment/pesticides/herbicide-glyphosate-10-years-EU/101/web/2023/11> [1 p.]

Cancer in Iowa: what role does agriculture play in Iowa's high cancer rates? *Investigate Midwest*. E. Jordan (April 2, 2024) <https://investigatamidwest.org/2024/04/02/cancer-in-iowa-what-role-does-agriculture-play-in-iowas-high-cancer-rates/> [5 pp.]

Week 4, class 1: Climate Change

The impacts of climate change on human health in the United States: a scientific assessment. Crimmins et al. U.S. Global Change Research Program, Washington, DC (2016) <https://health2016.globalchange.gov/> [chapters 1-5, 155 pp.]

Estimated effects of projected climate change on the basic reproductive number of the Lyme Disease vector *Ixodes scapularis*. Ogden et al. *Environmental Health Perspectives* 122:6 (March 14, 2014) <https://ehp.niehs.nih.gov/doi/10.1289/ehp.1307799> [7 pp.]

Paris when it sizzles: the City of Light aims to get smart on heat. J Goodell. *Yale Environment* 360 (July 18, 2023) <https://e360.yale.edu/features/paris-heat-waves-climate-change> [4 pp.]

Week 4, class 2: Climate Change

The impacts of climate change on human health in the United States: a scientific assessment. Crimmins et al. U.S. Global Change Research Program, Washington, DC (2016) <https://health2016.globalchange.gov/> [chapters 6-9, 120 pp.]

Climate change's hidden mental toll on children. B Ikiz. *Think Global Health* (December 12, 2023) <https://www.thinkglobalhealth.org/article/climate-changes-hidden-mental-toll-children> [3 pp.]

Communities, climate change, and health equity – state-level implementation proceedings of a workshop – in brief. National Academies. Johnson and Reich, Rapporteurs (2022) <https://nap.nationalacademies.org/catalog/26693/communities-climate-change-and-health-equity-state-level-implementation-proceedings> [12 pp.]

Week 5, class 1: Moving from science to policy

Children's exposure to diesel exhaust on school buses. Environment & Human Health, Inc. 2002 <http://www.ehhi.org/reports/diesel/> [chapters 1-4, 6; 30 pp.]

The rush to drill for natural gas: a public health cautionary tale. Finkel and Law. *American Journal of Public Health* 101:5 (May 2011) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3076392/> [10 pp.]

New York State Department of Health completes review of high-volume hydraulic fracturing. Acting DOH Commissioner Zucker recommends activity should not move forward in New York State (December 17, 2014) https://www.health.ny.gov/press/releases/2014/2014-12-17_fracking_report.htm [1 p.]

A public health review of high-volume hydraulic fracturing for shale gas development. New York State Department of Public Health (December 2014) https://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf [Executive Summary, 12 pp.]

43rd Statewide Grand Jury finds Pennsylvania failed to protect citizens during fracking boom (2020) <https://www.attorneygeneral.gov/taking-action/43rd-statewide-grand-jury-finds-pennsylvania-failed-to-protect-citizens-during-fracking-boom/> [2 pp.]

Report 1 of the Forty-Third Statewide Investigating Grand Jury. Office of the Attorney General. Commonwealth of Pennsylvania (2020) <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w.responses-with-page-number-V2.pdf> [pp. 1-102]

Week 5, class 2: Citizen science, community participation and data visualization

Using low-cost technology to democratize data and protect public health: case studies in Pittsburgh. P Johnson. *Candid Learning for Funders* (April 18, 2017) <http://www.grantcraft.org/blog/using-low-cost-technology-to-democratize-data-and-protect-public-health-cas> [2 pp.]

What it was like “living downwind” of Shenango Coke Works. A Waltz. *Next Pittsburgh* (April 20, 2017) <https://nextpittsburgh.com/environment/what-it-was-like-living-downwind-of-shenango-coke-works/> [2 pp.]

Living downwind, Allegheny County Clean Air Now (2017) <http://www.accan.org/media/Living-Downwind.pdf> [50 pp.]

Here’s what happened to asthma, COPD admissions after a big polluter shut down. J Gever. *MedPage Today* (May 18, 2022) <https://www.medpagetoday.com/meetingcoverage/ats/98781> [1 p.]

An interrupted time series analysis of the cardiovascular health benefits of a coal coking operation closure. Yu and Thurston. *Environmental Research Health* 1:4 (2023) <https://iopscience.iop.org/article/10.1088/2752-5309/ace4ea> [10 pp.]