Course goals:

The goals of the course are to:

(a) Illustrate how various sub-disciplines in environmental toxicology (i.e., environmental chemistry, oceanography, ecology, conservation biology, epidemiology) are integrated to understand the behavior of pollutants;

(b) Demonstrate how scientific information is applied to inform environmental management decisions and public policy through several case studies; and

(c) Introduce the legislative framework for global pollutants.

(d) Help students think about potential solutions to environmental problems that have direct benefits to public health and the pros/cons of different approaches.

At the end of the course students should be able to:

(1) Identify environmental factors and chemical properties that control the environmental distribution and persistence of contaminants;

(2) Describe chemical attributes and biological processes leading to uptake and accumulation of chemicals;

(3) Conduct a risk assessment for the ecological and human health impacts of contaminant exposures;

(4) Critique legislation and management strategies for environmental contaminants.

Course format:

The format of class includes active discussions, lectures, in-class problems, and exercises. We will also have two movie nights to watch films relevant to the course content. In the first half of the class, a reading discussion, beginning with Rachel Carson's *Silent Spring*, will take place every Tuesday. We will complete exercises in-class to reinforce concepts and discussions in class. For the second half of the class, we will switch from a science focus to policy and regulation. Students will learn the fundamentals of risk assessment and some of the factors that affect public policy decisions.

Typical enrollees:

This course is designed for sophomore to senior undergraduates with an interest in the environment and public health. A basic background in math and chemistry is useful for the course.

When is course typically offered?

This course is being offered in the Spring semester of 2024 in MD119 from 1:30 - 2:45 pm.

What can students expect from you as an instructor?

My teaching stye encourages self-learning and critical thinking through open ended questions and problems. I use a variety of different teaching methods to expose students to the course material. We try to focus on generating constructive ideas about how to solve the problems discussed, rather than simply reviewing challenges. Students will find this course most rewarding if they are genuinely interested in the cross-disciplinary nature of the material and in understanding and addressing underlying drivers of some of greatest modern environmental and public health challenges.

Assignments and grading:

â€¢ Assignments, short exercises & reading questions: 40%,

â€¢ Two mid-terms (15% each = 30%)

â€¢ Final project: 20%

â€¢ Class participation = 10%.

Movie nights (x2): Bonus 1% each.

Collaboration will be permitted on assignments and class projects, but students are

expected to turn in their own and work independently on exams.

Final Project:

This year the final project will be left open ended so students can choose a subject of greatest personal interest within the domain of chemical pollution issues. Students will work in teams of 3-4 on this project. Required components include that students select a site or human and/or ecological population with data on chemical concentrations and conduct a risk assessment using these data by applying concepts learned in the class. If students have a site/question of interest and want to make their own measurements, this may be possible, and they should discuss with the course staff asap. If students are at a loss for ideas on what to do, the course staff will be happy to provide you with many options. Examples from previous years will be posted on the Canvas site.

The final project will be presented as a poster session for the class during reading week. This will provide an opportunity for students to practice their risk communication skills discussed in class. In the past, these projects have been a lot a fun and led to follow up actions in some cases. For example, one year a student group discovered high levels of arsenic in apple juice being served in the MIT cafeteria, prompting a student newspaper article and a recall by the cafeteria. In another year, a group discovered a major PFAS contamination incident on a farm very close to where they grew up in Maine and became personally involved in efforts to collect more data and speak with lawyers involved in the case.

Syllabus:

An example syllabus and schedule.

Absence and late work policies:

Attendance for all classes is mandatory. Permission of the instructor should be obtained for illness or unavoidable conflicts. Late material will be penalized at a rate of 5% per day.

Generative AI policy: Use of ChatCPT and generative AI is permitted in the course but should only be used a starting point for literature/data searches and code generation.

TF office hours:

In addition to Prof. Sunderland's office hours, there are also these options:

- **Jahred** - Thursdays at 10-11am (Geo Museum 418) or schedule on Calendly
- **Bella** - Mondays at 5-6pm (Leverett House, Beren Conference Room)