

ENV H 448 A Wi 20: Community Air Pollution

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ENV H 448/548: Community Air Pollution

3 credits, Graded

Meeting Times: Monday, Wednesday and Friday, 10:30-11:20

Location: Health Sciences T-Wing (HST) 473

Instructors:

Elena Austin, ScD

Department of Environmental & Occupational Health Sciences, Box 357234

Office: Health Sciences Building F-225B (1959 NE Pacific St); Phone: 206-221-6301

e-mail: elaustin@uw.edu (<mailto:elaustin@uw.edu>)

Joel Kaufman, MD MPH

Department of Environmental & Occupational Health Sciences, Box 357234

Office: Roosevelt #302 (4225 Roosevelt Way NE); Phone: 206-616-3501

e-mail: joelk@uw.edu (<mailto:joelk@uw.edu>)

Teaching Assistant

Alexandria Vingino

Department of Environmental & Occupational Health Sciences

One Health MPH student

e-mail: avingi@uw.edu (<mailto:avingi@uw.edu>)

Office hours: No scheduled office hours. Students can contact instructor or TA by phone or e-mail, or visit office on an appointment basis.

Prerequisites: Undergraduate student - Environmental Health student, or at least chemistry and introductory biology, or permission of instructor

Graduate student - SPH graduate student, graduate student in related health or science field, or permission of instructor.

Course overview:

This 3-credit course uses a lecture/seminar format, and makes use of local air pollution management resources, to provide a comprehensive overview of community air pollution. Topics covered include: 1) air pollution sources, chemistry and meteorology; 2) effects on human health and the environment; 3) climate change; 4) air quality standards, monitoring and management; 5) air pollution control technology; 6) indoor air; 7) special topics, including wood smoke, environmental justice and alternative fuels.

Instruction is at the level of upper-year undergraduates and graduate students in health-related or related technical fields; there are higher expectations and more requirements of graduate students. While a relatively

comprehensive survey of air pollution topics is provided, there is a clear public health orientation.

Learning objectives: At the end of this course the student should be able to:

1. Classify the various sources of outdoor air pollution and contrast these for the different air pollutants.
2. Describe how meteorology affects air pollution.
3. Describe and critique the types of studies used to learn about the health effects of air pollution.
4. Compare identified health effects of the different air pollutants.
5. Identify the welfare effects of air pollution.
6. Describe methods and technologies for controlling air pollution emissions.
7. Distinguish criteria air pollutants from hazardous air pollutants and compare their respective air quality management approaches.
8. Describe how air quality contributes to environmental justice and social inequality.
9. Outline the components of an air quality management program, including an air pollution monitoring network.
10. Outline the features of National Ambient Air Quality Standards (NAAQS).
11. Identify the pollutants, including greenhouse gases, that affect climate and describe how they contribute to climate change.
12. Describe the major activities of the Puget Sound Clean Air Agency (PSCAA).
13. Describe community-based air monitoring and contrast this approach to regulatory monitoring.
14. Classify the types of indoor air pollution and describe the health effects of each.

Course Requirements and grading policy:

1. Homework

- a. Short, frequent on-line homework assignments (approximately 7) focused on class presentations and readings.
- b. You will have one week to complete each homework assignment. Homework will be submitted and returned online through Canvas. Homework should be submitted in .docx or .pdf format. A late assignment will be docked 10% for each day that it is late up until the homework key is released or the answers are reviewed in class. After that point, late homework will not be accepted. If you have any extenuating circumstances and cannot turn in a homework assignment within that time frame, please contact Dr. Austin to set up an alternate arrangement.

c. Grading:

Undergraduate: 25%

Graduate: 20%

2. Class Participation:

- a. Attend and engage in classroom discussion of assigned topics and readings.
- b. Submit in-class exercises. These are not graded.
- c. Grading:

Undergraduate: 10%

Graduate: 10%

3. Midterm Examination:

a. In-class, open-book, open-notes (no internet) short answer format

b. Grading:

Undergraduate: 30%

Graduate: 20%

4. Final Examination:

a. Exam week, in-class, open-book, open-notes (no internet) short answer and essay format

b. Comprehensive, but focused on material since the mid-term exam

c. Grading:

Undergraduate: 35%

Graduate: 30%

6. Project (for graduate students only.)

a. Small groups (3 – 4 students)

b. Prepare a short report that characterizes the air quality problems in a major US (or Chinese) city, specifically relating to PM_{2.5} and ozone. This should focus on concentrations and their spatial and temporal trends, air pollution sources, risk of noncompliance with air quality standards, and finally a quantitative assessment of the impact of improvements in air quality on indicators of health and monetary costs using BenMAP-CE.

c. Write-up:

i. Length – approximately 25 pages (double-spaced) including figures and tables, excluding references/sources.

d. In-class team presentation of the report to the class – 30 minutes

e. Grading: 20% of graduate student grade

Access and accommodations

If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations, you should contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. Qualifying conditions include but are not limited to mental health, attention-related, learning, vision, hearing, physical or health impacts. DRS offers resources and coordinates

reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor and DRS. It is policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Religious Accommodations Policy

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at [Religious Accommodations Policy](https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/) (<https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/>) Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request](https://registrar.washington.edu/students/religious-accommodations-request/) (<https://registrar.washington.edu/students/religious-accommodations-request/>) form.

Multi-cultural Inclusion Commitment from Environmental Health

The UW School of Public Health seeks to ensure all students are fully included in each course. We strive to create an environment that reflects community and mutual caring. We encourage students with concerns about classroom climate to talk to your instructor, your advisor, a member of the departmental or SPH Diversity Committee and/or the program director. [Victoria Gardner \(mailto:vg@uw.edu\)](mailto:vg@uw.edu), Assistant Dean for Equity, Diversity & Inclusion can provide resources for students with classroom climate concerns.

We have the privilege of learning together and we have a responsibility to engage in dialogue in a way that supports learning for all of us. Here are some practices we as learning community members can strive to use in our learning process:

- My own viewpoint is important—share it. It will enrich others.
- My students' and colleagues' viewpoints are important—listen to them. Do not judge them.
- Extend the same listening respect to others I would wish them to extend to me. We all have room to grow to become better listeners in non-judgmental ways.
- Recognize that I might miss things others see and see things others might miss.
- Raise my views in such a way that I encourage others to raise theirs.
- Inquire into others' views while inviting them to inquire into mine.
- Ask questions when I don't understand something.
- Surface my feelings in such a way that we make it easier for others to surface theirs.
- Test my assumptions about how and why people say or do things.
- Challenge what was said or done, rather than make assumptions about the individual.
- Beware of either-or thinking.
- Be willing to take risks in moving outside my comfort zones.
- Affirm others.

Academic integrity

Students at the University of Washington are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity. The UW School of Public Health (SPH) is committed to

upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and the SPH Academic Integrity Policy. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington Community Standards and Student Conduct website.

Readings:

- Required text:
 - Vallero, Daniel A. Fundamentals of Air Pollution. Fifth edition / Daniel A. Vallero. ed., Academic Press, 2014.
 - E-book version (UW Libraries): Go to <http://app.knovel.com/hotlink/toc/id:kpFAPE0011/fundamentals-of-air>
(<http://app.knovel.com/hotlink/toc/id:kpFAPE0011/fundamentals-of-air>)
- Supplements (both required and elective): as announced.

SCHEDULE (Subject to minor changes)

Jan 6	Course introduction		Austin
Jan 8	Sources, components and chemistry (I)		Austin
Jan 10	Sources, components and chemistry (II)	Homework 1 assigned In-class exercise 1	Austin
Week 2			
Jan 13	Sources, components and chemistry (III)		Austin
Jan 15	Dynamics, meteorology, dispersion	in-class exercise 2	Austin
Jan 17	Air pollution modeling and prediction	Homework 1 due Homework 2 assigned	Austin
Week 3			
Jan 20	MLK Day – no class		

Jan 22	Criteria pollutant health effects (I)		Austin
Jan 24	Criteria pollutant health effects (II)	Homework 2 due Homework 3 assigned	Kaufman
Week 4			
Jan 27	Environmental justice		Bechle
Jan 29	Hazardous air pollutants (I)		Austin
Jan 31	Hazardous air pollutants (II)	in-class exercise 3 Homework 3 due Homework 4 assigned	Austin
Feb 3	Mid-term review		Austin
Feb 5	Welfare effects: visibility and ozone depletion	Homework 4 due	Kaufman
Feb 7	Mid-term exam	Mid-term	Mid-term
Week 6			
Feb 10	Air pollution epidemiology (I)		Kaufman
Feb 12	Air pollution epidemiology (II)	in-class exercise 4	Kaufman
Feb 14	Air pollution epidemiology (III)	Homework 5 assigned	Kaufman
Feb 17	Presidents Day – no class		
Feb 19	Welfare effects: acid deposition and		Austin

vegetation effects

Feb 21	Monetary costs of air pollution	Homework 5 due Homework 6 assigned	Austin
Feb24	Greenhouse gases I (climate change)	in-class exercise 5	Kaufman
Feb 26	Greenhouse gases II (climate change)		Kaufman
Feb 28	Air quality monitoring & Control methodology & technology	Homework 6 due Homework 7 assigned	Austin
Mar 2	Indoor air quality & health effects		Kaufman
Mar 4	Air quality management (I)		Kaufman/ Saganić
Mar 6	Air quality management (II)	Homework 7 due in-class exercise 6	Austin
Mar 9	Community Air Monitoring		Austin
Mar 11	Graduate student presentations		Austin
Mar 13	Final review & course evaluation		Austin

FINAL EXAM Monday, March 16th

Downloadable syllabus: [Syllabus](#)

Course Summary:

Date	Details	
Fri Jan 10, 2020	 In-class exercise 1 (https://canvas.uw.edu/calendar?event_id=1325102&include_contexts=course_1354843)	10:30am to 11:20am
Fri Jan 17, 2020	 Homework 1 (https://canvas.uw.edu/courses/1354843/assignments/5171330)	due by 10:30am
Fri Jan 24, 2020	 Homework 2 (https://canvas.uw.edu/courses/1354843/assignments/5182321)	due by 10:30am
Wed Feb 5, 2020	 Homework 3 (https://canvas.uw.edu/courses/1354843/assignments/5232240)	due by 10:30am
	 Homework 4 (https://canvas.uw.edu/courses/1354843/assignments/5241209)	due by 10:30am
	 How often do you check the current or projected ambient air pollution levels? (https://canvas.uw.edu/courses/1354843/assignments/5209464)	
	 In-Class Exercise 1 (https://canvas.uw.edu/courses/1354843/assignments/5215976)	
	 In-Class exercise 2 - Ozone Formation (https://canvas.uw.edu/courses/1354843/assignments/5223157)	