

ENV H 448 / 548 Syllabus, Winter 2019
Community Air Pollution
Monday, Wednesday and Friday, 10:30-11:20
Health Sciences Building, Room T-625

Instructors:

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Course web site: <https://canvas.uw.edu/courses/1128527>

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 is an environmental justice issue.
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. 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. Vedal 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.
- b. Grading:

Undergraduate:	10%
Graduate:	10%

3. Mid-term 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%

5. 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.

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.

Classroom Climate: The student experience in this class is important to us as your instructors. The UW School of Public Health seeks to ensure that 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, or a member of the departmental (DEOHS) or SPH Diversity Committee and/or the program director.

Readings:

- Required text:
 - Sternberg, Air pollution: engineering, science and policy, 1st ed., 2015; ISBN-10: 1932780076; ISBN-13: 978-1932780079
 - E-book version: Go to <https://www.vitalsource.com> and search for this ISBN: 978-1-932780-08-6
- Elective texts (excerpts provided by instructor):
 - Jacobson, Air Pollution and Global Warming, 2nd ed., 2012; ISBN-10: 110769115X; ISBN-13: 978-1107691155
 - Godish, Air Quality, 5th ed., 2015; ISBN-10: 1466584440; ISBN-13: 978-1466584440
- Supplements (both required and elective): as announced.

SCHEDULE (Subject to minor changes)
Updated 2/4/2019

** # in [#] see Readings

Date	Topic(s)	Reading(s) in Sternberg	Assignments/ Exams
Week 1			
Jan 7	Course introduction		
Jan 9	Sources, components and chemistry (I)	1-13; 195-9; 225-33	homework 1 assigned
Jan 11	Sources, components and chemistry (II)	339-49; 356-9; 391-3; 399-406; 412-7	in-class exercise 1
Week 2			
Jan 14	Sources, components and chemistry (III)	463-71; 483-4; 285-9; 307-11	homework 2 assigned
Jan 16	Criteria pollutant health effects (I)	233-6; Brook suppl	in-class exercise 2
Jan 18	Dynamics, meteorology, dispersion	127-52; suppl: Godish & Jacobson	homework 3 assigned
Week 3			
Jan 21	MLK Day - no class		
Jan 23	Modeling & Criteria pollutant health effects (II)	159-60; 182-3; 189-90; 471-2; Brook	in-class exercise 3
Jan 25	Criteria pollutant health effects (III)	349-51; Brook	
Week 4			
Jan 28	Criteria pollutant health effects (IV)	291-2; 406; Brook	homework 4 assigned

Jan 30	Criteria pollutant health effects (V)		
Feb 1	Hazardous air pollutants & health effects (I)	509-25 & suppl readings	
Week 5			
Feb 4	Snow Day – no class		
Feb 6	Hazardous air pollutants (II) Mid-term review	509-25 & suppl readings	
Feb 8	Welfare effects: visibility	236-7 Jacobson read section 7.2; Skim 7.1, 7.3.1 and 7.3.2	
Week 6			
Feb 11	Mid-term exam		Mid-term
Feb 13	Welfare effects: ozone depletion, acid deposition	485-91; 292-300	in-class exercise 4 homework 5 assigned
Feb 15	Air pollution and environmental justice (Julian Marshall)	Marshall paper	
Week 7			
Feb 18	Presidents Day – no class		
Feb 20	Welfare effects: vegetation effects	351; 472-3	
Feb 22	Greenhouse gases I (climate change)	Jacobson 263-74; 567-76; 578-9; 581; 586-92; [Resource: IPCC 2018]	

Week 8			
Feb25	Greenhouse gases II (climate change)	598-600; 602-6 [skim: 606-23]; Mazzi	in-class exercise 5 homework 6 assigned
Feb 27	Monetary costs of air pollution		
Mar 1	Air quality monitoring & Control methodology & technology	Skim readings: 241-72; 316-32; 362-83; 399; 408; 419-55; 481; 523; 599; 708-716	homework 7 assigned
Week 9			
Mar 4	Air quality management (I): standards/guidelines	69-81	
Mar 6	PSCAA (Erik Saganic)		
Mar 8	Air quality management (II): compliance	81-95	in-class exercise 6
Week 10			
Mar11	Indoor air quality & health effects	631-5 Dales et al.	
Mar 13	Graduate student presentations		
Mar15	Final review & course evaluation		
FINAL EXAM Monday, March 18th, 8:30 – 10:20 AM			