

**ENV H 448 / 548 Syllabus, Winter 2017**  
**Community Air Pollution**  
Monday, Wednesday and Friday, 10:30-11:20  
Health Sciences Building, Room RR-134

**Instructor:**

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**Teaching Assistant**

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**Course web site:** <https://canvas.uw.edu/courses/1099251>

**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 organic 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. Outline the components of an air pollution monitoring network.
9. Outline the features of National Ambient Air Quality Standards (NAAQS).
10. Summarize the components of an air quality management program.
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 8) focused on class presentations and readings.
- b. Grading:
  - Undergraduate: 25%
  - Graduate: 20%

**2. Class participation.**

- a. Attend and engage in classroom discussion of assigned topics and readings.
- 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<sub>2.5</sub> 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

**Accommodation:** To request academic accommodations due to a disability, please contact Disabled Student Services, 448 Schmitz (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating that you have a disability that requires academic accommodations, please present the letter to the instructor in order to discuss the accommodations you might need in this class.

**Academic Integrity:** Students at the University of Washington (UW) 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.

**SCHEDULE** (Subject to minor changes)

<b>Date</b>	<b>Topic(s)</b>	<b>Reading(s) ** Sternberg</b>	<b>Assignments/ Exams</b>
<b>Week 1</b>			
<b>Jan 4</b>	Course introduction		
<b>Jan 6</b>	Sources, components and chemistry (I)	1-13; 195-9; 225-33	homework 1
<b>Week 2</b>			
<b>Jan 9</b>	Sources, components and chemistry (II)	339-49; 356-9; 391-3; 399-406; 412-7	
<b>Jan 11</b>	Sources, components and chemistry (III)	463-71; 483-4; 285-9; 307-11	homework 2
<b>Jan 13</b>	Criteria pollutant health effects (I)	233-6; [5]	
<b>Week 3</b>			
<b>Jan 16 MLK day</b>			
<b>Jan 18</b>	Dynamics, meteorology, dispersion	127-52	homework 3
<b>Jan 20</b>	Modeling & Criteria pollutant health effects (II)	159-60; 182-3; 189- 90; 471-2; [5]	in-class exercise
<b>Week 4</b>			
<b>Jan 23</b>	Criteria pollutant health effects (III)	349-51; [5]	
<b>Jan 25</b>	Criteria pollutant health effects (IV)	291-2; 406	homework 4
<b>Jan 27</b>	Hazardous air pollutants & health effects (I)	509-25	

<b>Week 5</b>			
<b>Jan 30</b>	Hazardous air pollutants (II)	509-25	in-class exercise
<b>Feb 1</b>	Welfare effects: visibility Mid-term review	Jacobson 7.1-2, 7.3.1-2	
<b>Feb 3</b>	Mid-term exam		Mid-term
<b>Week 6</b>			
<b>Feb 6</b>	Welfare effects: ozone depletion, acid deposition	488-91	
<b>Feb 8</b>	Welfare effects: vegetation effects	472-3	homework 5
<b>Feb 10</b>	Air pollution and environmental justice (Julian Marshall)		
<b>Week 7</b>			
<b>Feb 13</b>	Greenhouse gases (climate change)		
<b>Feb 15</b>	Greenhouse gases (climate change)		homework 6
<b>Feb 17</b>	PSCAA (Phil Swartzendruber) & Air quality monitoring (Matt Harper)		
<b>Week 8</b>			
<b>Feb 20 Presidents Day</b>			
<b>Feb 22</b>	Air quality monitoring & Control methodology & technology		homework 7
<b>Feb 24</b>	Air quality management (I1): standards/guidelines		
<b>Week9</b>			

<b>Feb 27</b>	Monetary costs of air pollution		homework 8
<b>Mar 1</b>	Air quality management (III): compliance		
<b>Mar 3</b>	Open		
<b>Week 10</b>			
<b>Mar 6</b>	Open		
<b>Mar 8</b>	Graduate student presentations		
<b>Mar 10</b>	Indoor air quality & health effects; Course review & evaluation		
<b>FINAL EXAM day March date time</b>			

### Readings

**Primary text:** see Schedule for assigned readings

Steven Sternberg. Air Pollution: Science, Engineering and Policy, College Publishing, 2015.

### Supplemental readings:

Jacobson MZ. Air Pollution and Global Warming, 2<sup>nd</sup> ed. Cambridge University Press, New York, 2012.