ENV H 448 / 548 Syllabus, Spring 2015
Community Air Pollution
Tuesday and Thursday, 9:00-10:20
Health Sciences Building, Room T-359

Instructor:
Sverre Vedal, MD MSc
Department of Environmental & Occupational Health Sciences, Box 357234
Office: Roosevelt 303; Phone: 206-616-8285
e-mail: svedal@uw.edu

Course web site: https://canvas.uw.edu/courses/965168

Office hours: No scheduled office hours. Students can contact instructor by phone or e-mail, or visit his 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 and student oral discussions, 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 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. Classify the types of indoor air pollution and describe the health effects of each.

Course requirements and grading policy:

1. Take-home Quizzes / Homework
a. Short, frequent on-line quizzes and homework assignments (approximately 6) focused on class presentations and readings.

b. Grading:
   
   Undergraduate: 25%
   Graduate: 15%

2. Class participation.
   
   a. Attend and engage in classroom discussion of assigned topics and readings.
   
   b. Grading:
      
      Undergraduate: 15%
      Graduate: 15%

3. Mid-term examination
   
   a. In-class, open-book, open-notes (no internet) short answer format
   
   b. Grading:
      
      Undergraduate: 25%
      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 mini-state implementation plan (SIP) in response to WA State nonattainment of federal air pollution standards for a specific criteria pollutant
   
   c. Write-up:
i. Length – approximately 25 pages (double-spaced) including figures and tables, excluding references/sources.

ii. Contents (suggested): Executive summary, Introduction, Non-attainment regions, Air quality data and sources, Clean Air Act requirements, Attainment strategy, Predicted future air quality

d. In-class team presentation of the report to the class – 20 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.

**SCHEDULE** (Subject to change)  

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic(s)</th>
<th>Reading(s) **</th>
<th>Assignments/ Exams</th>
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<tbody>
<tr>
<td></td>
<td><strong>required</strong></td>
<td><strong>elective</strong></td>
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<td><strong># in [#] see Readings below</strong></td>
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<tr>
<td><strong>Week 1</strong></td>
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<tr>
<td>Mar 31</td>
<td>Course introduction</td>
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<td>Apr 2</td>
<td>Sources, components and chemistry (I)</td>
<td>Godish 2.1, 2.2, 2.4; Jacobson 5.1-5.5 (skim 5.3); [1]</td>
<td>[2]</td>
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<td><strong>Week 2</strong></td>
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<tr>
<td>Apr 7</td>
<td>Sources, components and chemistry (II)</td>
<td>Godish 2.3</td>
<td>Jacobson 4.2-4.4; [3, 4]</td>
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<td>Apr 9</td>
<td>Criteria pollutant health effects (I)</td>
<td>[5]</td>
<td>Godish 5.1-5.4</td>
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<td>Date</td>
<td>Topic</td>
<td>Godish</td>
<td>Jacobson</td>
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<tr>
<td>Apr 14</td>
<td>Dynamics, meteorology, dispersion &amp; modeling</td>
<td>Godish 1.1, 1.2, 3.1, 3.3; Jacobson 6.5-6.8</td>
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<tr>
<td>Apr 16</td>
<td>Criteria pollutant health effects (II)</td>
<td>[5]</td>
<td>Godish 5.1-5.4</td>
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<td><strong>Week 4</strong></td>
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<td>Apr 21</td>
<td>Criteria pollutant health effects (III)</td>
<td>[5]</td>
<td>Godish 5.1-5.4</td>
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<td>Apr 23</td>
<td>Hazardous air pollutants &amp; health effects</td>
<td>Godish 8.4.8; [6,7,8,9,10,11]</td>
<td>Jacobson 3.6.10, 8.1.6 (p. 180), 8.1.10; [12,13]</td>
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<td><strong>Week 5</strong></td>
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<td>Apr 30</td>
<td>Mid-term exam</td>
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<td><strong>Week 6</strong></td>
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<td>May 5</td>
<td>Welfare effects: ozone depletion, acid deposition, vegetation effects</td>
<td>Jacobson 11 &amp; 10; Godish 6 (esp. 6.1 &amp; 6.3.2.1)</td>
<td>Godish 4.6 &amp; 6.3.3; 4.3-5</td>
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<td>May 7</td>
<td>Greenhouse gases (climate change)</td>
<td>Jacobson 12.2, 12.3.1, 12.4, 12.5.6-7, 12.6; [14,15]</td>
<td>Godish 4.7; Jacobson 12.3.2, 12.5; [16]</td>
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<td><strong>Week 7</strong></td>
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<td>May 12</td>
<td>Air quality monitoring</td>
<td>Phalen Ch.4</td>
<td>Godish 7.1-2 [19,20]</td>
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<td>May 14</td>
<td>Air quality monitoring by the PSCAA (Matt Harper)</td>
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## Week 8

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<tr>
<th>May 19</th>
<th>Air quality management (I): PSCAA and woodburning (Erik Saganic)</th>
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<tr>
<td>May 21</td>
<td>Air quality management (I1): standards/guidelines</td>
<td>Jacobson 8.1, 8.2.1, 8.2.10, 8.2.12; Phalen Ch.6 (sections I-V)</td>
<td>Godish 8.3-4; Jacobson 8.3-4; [21]</td>
<td>Quiz/homework 6</td>
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## Week 9

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<tr>
<th>May 26</th>
<th>Control methodology &amp; technology</th>
<th>Phalen Ch.6 (sections VI – VIII)</th>
<th>Godish 7.1–2</th>
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<tr>
<td>May 28</td>
<td>Air quality management (III): compliance</td>
<td>Godish 8.1-8.2,8.5-8.6; [17]</td>
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## Week 10

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<tr>
<th>Jun 2</th>
<th>SIP report graduate student presentations</th>
<th>[24]</th>
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<tr>
<td>Jun 4</td>
<td>Indoor air quality &amp; health effects; Course review;</td>
<td>Godish 11; Jacobson 9</td>
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<td>Instructor research &amp; policy experience</td>
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## Final

### Readings

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

**Supplemental readings:** the numbers in brackets [#] correspond to the numbers in the “readings hard copies” link under Readings on the course website and are identified below.

**March 31** Introduction.
No readings

**April 2 and 7** Air pollution components/sources

**Required:**
http://www.epa.gov/oar/airtrends/aqtrends.html#comparison

**Elective:**
[2] Detailed Puget Sound air pollution concentrations and trends:

**April 9, 16 and 23.** Criteria pollutant health effects (I and II)

**Required:**

**April 14.** Air pollution dynamics/meteorology/chemistry/transport (I and II)

No supplemental readings.

**April 21.** Special topic 1: PSCAA monitoring

**Required:** Phalen Ch. 4

**April 28** Hazardous air pollutants

**Required:**
[8] EHP benzene (pdf)
[9] PSCAA regs (pdf)
[10] HAPS discussion questions (pdf)

Elective: [12] [13]

**April 30** Welfare effects: visibility
No supplemental readings.

**May 7** Welfare effects: ozone depletion, acid precipitation, vegetation

**May 12** Greenhouse gases (climate change)
Required:


**May 14** Air pollution control methodology/technology
Phalen Ch. 6 (sections VI-VIII)

**May 19** Air quality management (I): Special topic 2: PSCAA & wood burning
Required:
[17] PSCAA strategic plan (pdf)
[18] websites for strategic plan information (pdf)

Elective:
[19] PSCAA PM background (pdf)
May 21 Air quality management (II) standards/guidelines
   Required: Phalen Ch.6 (sections I-V)
   Elective: [20]

May 26 Air quality monitoring
   Required:
   Phalen Ch. 4
   [21] Monitoring discussion questions (pdf)

       Elective:
       [22] AQI from PSCAA (pdf)
       [23] PSCAA monitoring network (pdf)

May 28 Air quality management (III): compliance
   Required: [17]

June 4 Indoor air quality/health effects; Review & Faculty research-policy experience
   Required: [24]

Course resource materials
   (available on the course website)