Course Number	**ESM 460/560; CE 488/588**
Title	**Air Quality**
Credits	**4**
Prerequisite(s)	**ESM 320 or equivalent**
Days/Time	**MW 9-10:50**
Location	**SRTC B1-82**
Final Exam Day/Time	**3/19 (Comprehensive) Tuesday 0800-0950**

Instructor	**Professor George**
Office	**SRTC 474**
Phone	**725-3861**
E-mail	**georgeL@pdx.edu**
Office Hours	**By appointment**
Mailbox Location	**ESM Office, SRTC 218**

Required Text or Other Materials:

D. Vallero, Fundamentals of Air Pollution, 5th Ed., 2014

Recommended References/Optional Text/Supplemental Readings & Resources:

Supplemental text provided as needed. Newspapers, magazines, and peer-reviewed journal articles.

Catalog Course Description:

This course is an overview of urban air quality issues facing cities in the US and globally. Students will examine the effects of air pollution on public health and the environment, as well as control technologies and regulatory practices used to achieve air quality goals. Course exercises will include a review of air pollution measurement and modeling tools that are used to assess regulatory compliance and to guide policies.

Course Objectives – Students must demonstrate the ability to:

1. Identify important air pollutants, their sources, and their impacts on human health and the environment.
2. Describe the roles of meteorology and chemistry in the formation and dispersion of air pollutants.
3. Explain air pollution measurement and control technologies, and modeling tools.
4. Interpret and utilize online databases of air pollution monitoring information.
5. Summarize how air quality is managed through public policies implemented in the US and globally.

Course Requirements:
Attendance and Participation
Daily/Weekly Exercises and Assignments
Midterm Exam
Research Paper
Research Presentation (graduate students)

Course Grading

Requirement	**Points Assigned (% of Total Grade)**	
	Undergraduate	**Graduate**
In-class exercises/Assignments	100	100
Midterm Exam	100	100
Final Exam (Comprehensive)	150	150
Research Presentation	n/a	100
Total	350	450

Incompletes: A grade of "I" is granted by the instructor *only* with prior approval and consent. Criteria are outlined in the PSU Bulletin. **Program requirements:** {for UG courses} The CEE Department requires that junior and senior engineering courses must be completed with a minimum grade of C-, and a student's cumulative PSU GPA must be 2.33 or higher to graduate from the BSCE and BSENVE programs. Late homework is assessed a point loss of 5%/day.

Grading Scale:

A 94 – 100	B+ 87 – 89	C+ 77 – 79	D+ 67 – 69
A- 90 – 93	B 83 – 86	C 73 – 76	D 63 – 66
	B- 80 – 82	C- 70 – 72	D- 60 – 62

Tentative Course Schedule – Subject to Change!

Week	Date	Topic	Reading Assignment (chapters)
1	1/8	Course Overview/Introduction I	1
	1/10	Air Pollution and Health	7,8,9
2	1/15	NO Class - MLK Holiday	
	1/17	Snow day - no class	
3	1/22	The Atmosphere – Temperature, Light and Pressure	2
	1/24	Air Pollutants I	3,28
4	1/29	Air Pollutants II	
	1/31	Ozone formation	17
5	2/5	Aerosols – deeper dive Impacts Nitrogen Deposition/ Ecosystem – Gorge Case Study	14
	2/7	Measurement Technologies Visibility and Satellite Data	25
6	2/12	**Matt Mavko, Air Sciences:** Air quality projects	
	2/14	**Midterm**	
7	2/19	Air Pollution Modeling	
	2/21	**Brian Snuffer-Zukas** **Maul-Foster Consultant:** Control Technologies	30,31
8	2/26	**Haley Nicholson** (Lewis and Clark Law School): Clean Air Act Regulations **JR Giska (**Oregon DEQ): Cleaner Air Oregon	
	2/28	**Isaac Simpson** (DMG North, Inc.): HVAC systems and Indoor Air Quality	26.10; 28.12
9	3/4	**Neighbors for Clean Air:** EJ and Air Quality	
	3/6	Global Air Quality Issues **Professor Deepti Singh** (Washington State University): Climate Change Impacts	21
10	3/11	Graduate Student Presentations	
	3/13	Film: Taken for a Ride	
Finals Week	**3/19**	**Final Exam 3/19 (Comprehensive_ Tuesday 0800-0950**	

Policies and Expectations

- Cell phones and pagers must be turned off while in class.
- If you are absent, you are responsible for the material covered in your absence. It is up to you to get notes, handouts, and/or assignments, and to make up work that you missed. Please not you will only be able to make up exams with prior approval.
- You are expected to arrive on time and be prepared.
- It is my responsibility to foster a dynamic learning environment where free and open exchange of ideas is encouraged. This cannot occur in a class where cheating is condoned. Any cheating or attempted cheating will result in an automatic grade of zero for that particular assignment, quiz, or exam. Plagiarism tutorial: http://plagiarism.duke.edu
- Please ask questions and use my office hours or contact me to schedule an appointment.

Resources

As a PSU student, you have numerous resources at your disposal. Please take advantage of them while you are here. A small sample is listed below:

- Portland State University Resources
  - A complete list of services at http://my.pdx.edu/students/resources-across-campus
  - Career Center: http://www.pdx.edu/careers
  - Center for Student Health & Counseling: http://www.pdx.edu/shac/
  - The Writing Center: http://www.writingcenter.pdx.edu/
  - Disability Resource Center: http://www.drc.pdx.edu/ is available to help students with academic accommodations. If you are a student who has need for test-taking, note-taking or other assistance, please visit the DRC and notify the instructor at the beginning of the term. They can be found in Smith Union Hall room 116, 1825 SW Broadway, (503)725-4150.
  - Diversity & Multicultural Student Services (DMSS) http://www.pdx.edu/dmss/ Provides structured, academic support service, advising, referrals, and advocacy for first-generation college students, low-income and others facing special challenges. Their offices are located at Smith Center, Room 425
  - The Learning Center's http://www.pdx.edu/tutoring/home mission is to foster the learning process by empowering PSU students to accomplish their academic and personal goals. In addition to helping with current coursework, academic support services can assist in developing effective learning strategies. The Learning Center is located on the second floor of the University Library in the northwest corner, room 245.

Library and Literature Research

It is very tempting to think that all necessary resources or information will be available in full text after typing in a few words at Google.com. This is not the case. You will often need to go to the library, use real library search tools and access real books and articles contained in refereed/archival journals. Be sure to make use of the Vikat library catalog. Go to the PSU library home page at www.lib.pdx.edu/.

Campus Safety

The University considers student safety paramount. The Campus Public Safety Office is open 24 hours a day to assist with personal safety, crime prevention and security escort services. Call 503-725-4407 for more information. For Campus emergencies call 503-725-4404.

Final Notes

- The syllabus is subject to change at the discretion of the instructor as course or other circumstances requires.
- Students with documented disabilities are encouraged to discuss with me arrangements that will enhance their learning in this class.

Ethics and Professionalism

As future professional engineers you should plan to take the FE Exam (see the Oregon State Board of Examiners for Engineering and Land Surveying at www.oregon.gov/osbeels/pages/registration.aspx, and you should be familiar with the ASCE Code of Ethics (http://www.asce.org/Leadership-and-Management/Ethics/Code-of-Ethics/) which includes the following:

Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the engineering profession.

The PSU Student Conduct Code prohibits all forms of academic cheating, fraud, and dishonesty. Further details can be found in the PSU Bulletin or at http://www.pdx.edu/dos/codeofconduct.

Allegations of academic dishonesty may be addressed by the instructor, and/or may be referred to The Office of Dean of Student Life for action. Acts of academic dishonesty may result in a failing grade on the exam or assignment for which the dishonesty occurred, disciplinary probation, suspension or dismissal from the University. The students and the instructor will work together to establish optimal conditions for honorable academic work. Questions about academic honesty may be directed to the Office of The Dean of Student Life (www.pdx.edu/dos/contact).

Course Evaluations

Course evaluations are conducted online. Responses are anonymous. Please provide constructive feedback that is useful to improve the class for future students. Evaluations close before the start of finals week and the Department does not release course evaluation results to faculty until after final grades are entered.

Graduate Student Research Project:

Research projects are to be focused on the study of a current air quality issue for which literature, data or simulation results must also be available. The goal of the project is to conduct an in-depth analysis of an air quality issue which will include discussions of the emission sources, physical processing, health and ecosystem effects, regulations, and politics. The final product of the research will be a presentation with documentation of the research process (pdf of final presentation + annotated bibliography).

Possible Topics for Projects (as they relate to air quality/air pollution):

- Agriculture
- Biogenic emissions
- Biomonitoring
- Climate change impact on an air quality issue (Climate change on any other topic is not acceptable)
- Diesel vs gasoline
- Environmental justice (urban, global)
- Fossil fuel alternatives
- Fracking
- Global pollutant transport
- Indoor pollution
- Industrial abatement technology
- Persistent pollutants

Intermediate products:

Project Abstract - **due Feb 5th:**

- working title of your project
- one paragraph (no more than 200 words) that provides background about why this topic is important and what aspects you will be focusing on
- at least 4 citations of journal articles of primary research plus one other authoritative sources you have reviewed (total of 5 sources)
- data sources

Annotated Bibliography - due **Feb 21st**:

- See: www.library.cornell.edu/olinuris/ref/research/skill28.htm
- At least 10 sources

Summary of Graduate Project Credit (100 points)

- Abstract (15 points)
- Annotated Bibliography (30 points)
- Presentation of Research Project (see rubric below) - 15 minutes + 5 minutes for questions (55 points)

Scoring Rubric for Graduate Student Oral Presentation

Category	Scoring Criteria	Total Points	Score
Organization (15 points)	The type of presentation is appropriate for the topic and audience.	5	
	Information is presented in a logical sequence.	5	
	Presentation appropriately cites requisite number references.	5	
Content (50 points)	Introduction is attention-getting, lays out the problem well, and establishes a framework for the rest of the presentation.	5	
	Technical terms are well-defined in language appropriate for the target audience.	5	
	Presentation contains accurate information.	10	
	Material included is relevant to the overall message/purpose.	10	
	Appropriate amount of material is prepared, and points made reflect well their relative importance. Presenter understands the material presented.	15	
	There is an obvious conclusion summarizing the presentation.	5	
Presentation (35 points)	Speaker maintains good eye contact with the audience and is appropriately animated (e.g., gestures, moving around, etc.).	5	
	Speaker uses a clear, audible voice.	5	
	Delivery is poised, controlled, and smooth.	5	
	Visual aids are well prepared, informative, effective, and not distracting.	5	
	Length of presentation is within the assigned time limits.	5	
	Information was well communicated.	10	
Score	**Total Points**	**100**	