



EMORY

ROLLINS  
SCHOOL OF  
PUBLIC  
HEALTH

**DEPARTMENT:** Environmental Health

**COURSE NUMBER:** EH 515      **SECTION NUMBER:** 1

**CREDIT HOURS:** 2      **SEMESTER:** S2019

**COURSE TITLE:** Air Quality in the Urban Environment: A Survey of Research Methods and Recent Findings

**CLASS HOURS AND LOCATION:** TU 10:00AM - 11:50AM

**INSTRUCTOR NAME:** Donghai Liang  
Jeremy A. Sarnat

**INSTRUCTOR CONTACT INFORMATION**

**EMAIL:** donghai.liang@emory.edu

**PHONE:** 404-712-9583

**SCHOOL ADDRESS OR MAILBOX LOCATION:** CNR 2032

**OFFICE HOURS:** By appointment

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**SCHOOL ADDRESS OR MAILBOX LOCATION:** CNR 2029

**OFFICE HOURS:** By appointment

**Teaching Assistant(s):**

N/A

**COURSE DESCRIPTION**

The link between the air we breathe and human health affects millions globally, placing urban air quality as a leading contributor to the global burden of disease. This course examines ways to characterize urban air pollution as well as its public health implications based on recent clinical, epidemiological and toxicological research. The course will be highly interactive and will provide instruction on conducting basic, applied air quality research in academic, governmental and community-based settings.

Course: Air Quality in the Urban Environment: A Survey of Research Methods and Recent Findings

## MPH/MSPH FOUNDATIONAL COMPETENCIES:

- Demonstrate knowledge of general environmental science principles, and apply them to human health
- Identify and understand appropriate approaches for quantifying environmental exposures and their impacts on human health such as the use of environmental sampling, biomarkers and risk assessment techniques
- Understand and use key environmental health tools including quantitative data analysis, geographical information systems and multi-media models

## COURSE LEARNING OBJECTIVES:

After completing this course, students should be able to:

- Identify the key urban air pollutants based on their physical and chemical properties and their impact on human health and the environment.
- Identify the major sources of urban air pollution, their trends, fate and transport in the atmosphere.
- Perform basic air pollution calculations to estimate ambient concentrations of pollutants.
- Interpret and utilize online databases of air pollution monitoring information.
- Understand the role of meteorological factors and photochemistry in the formation and dispersion of urban air pollution.
- Display familiarity with methods for measuring urban air pollution including direct sampling and modeling techniques.
- Demonstrate knowledge of the role of air pollution exposure assessment in promoting environmental health

## EVALUATION

Students' grades in this class will be based upon:

- Field Data Analysis (30%). Students will work on a field-based air pollution dataset and conduct a detailed data analysis according to the guidelines provided by the instructors. The aim of this analysis is to better understand air pollution data by conducting statistical analyses to resolve trends spatial and temporal trends.
- Exceptional Events Analysis (50%). Students will select an historical event or natural occurrence for a given location and prepare a detailed analysis examining the effect of this event/occurrence on urban pollutant concentrations (e.g., the Atlanta Olympics on traffic-related pollutant levels). Each student will give a brief oral presentation on their exceptional events analysis in the final week. The aim of this exercise is to familiarize students with accessing existing air quality databases and applying concepts covered in the course with actual air quality data.
- Class participation, in-class and homework assignments (20%)

<b>Final Grade</b>		≥ 95 points	A
Field Data Analysis	30 points	85 – 94 points	A-
Exceptional Event Analysis	50 points	78 – 84 points	B+
Assignments and Participation	20 points	75 – 77 points	B
		70 – 74 points	B-
		50 – 69 points	C
		< 50 points	F

## **COURSE STRUCTURE**

EH 515 is a survey course designed to introduce and examine ways to interpret and characterize urban air pollution, as well as understand its public health implications based on recent clinical, epidemiological and toxicological research. The course will be highly interactive and will provide instruction on conducting basic, applied air quality research in academic, governmental and community-based settings.

### **In-class and Homework Assignments (20% of final grade)**

You will work on a series of in-class and homework assignment to familiarize yourself with the concepts and knowledge covered in the lectures. You are encouraged to work on these assignments with your classmates, but the final submission of the assignments shall be your own work.

### **Field Data Analysis (30% of final grade)**

You will be given a field-based measurement dataset to conduct a detailed air pollution data analysis according to the guidelines provided by the instructors. The aim of this analysis will be to get hands on experience in dealing with air pollution data and exposure assessment by conducting statistical analyses. Through this practice, you will understand and use key environmental health tools including quantitative and qualitative data analysis. The field data analysis will be distributed on February 5<sup>th</sup> and will be due in class on March 5<sup>th</sup>. The field data analysis is an individual assignment and shall be your own work.

### **Exceptional Event Analysis (50% of final grade)**

You will select an historical event or natural occurrence for a given location and prepare a detailed analysis examining the effect of this event/occurrence on urban pollutant concentrations (e.g., the Atlanta Olympics on traffic-related pollutant levels). Each student will give a brief oral presentation (5 min) on their exceptional events analysis in the final week (April 23<sup>rd</sup>). The aim of this exercise is to familiarize students with accessing existing air quality databases and applying concepts covered in the course with actual air quality data. The exceptional event analysis will be distributed on February 19<sup>th</sup> and will be due on April 30<sup>th</sup>. The exceptional event analysis is an individual assignment and shall be your own work.

MPH/MSPH Foundational Competency assessed	Representative Assignment
Select quantitative and qualitative data collection methods appropriate for a given public health context.	<ol style="list-style-type: none"> <li>1. In-class and homework assignments</li> <li>2. Field Data Analysis</li> <li>3. Exceptional Event Analysis</li> </ol>
EH Concentration Competencies assessed	Representative Assignment
Demonstrate knowledge of general environmental science principles and apply them to human health.	<ol style="list-style-type: none"> <li>1. In-class and homework assignments</li> <li>2. Exceptional Event Analysis</li> </ol>
Identify and understand appropriate approaches for quantifying environmental exposures and their impacts on human health such as the use of environmental sampling, biomarkers and risk assessment techniques.	<ol style="list-style-type: none"> <li>1. Field Data Analysis</li> <li>2. Exceptional Event Analysis</li> </ol>
Understand and use key environmental health tools including quantitative data analysis, geographical information systems and multi-media models.	<ol style="list-style-type: none"> <li>1. In-class and homework assignments</li> <li>2. Field Data Analysis</li> <li>3. Exceptional Event Analysis</li> </ol>

## COURSE POLICIES

As the instructors of this course, we endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Equity and Inclusion, 404-727-9877.

**ATTENDANCE.** EH 515 is a highly interactive course and class attendance and participation are very important. When teaching graduate students, though, we are uncomfortable with making attendance mandatory or taking weekly roll. That said, we promise you at least two things regarding attendance and EH 515. First, this is a course that you get out what you put in - you will enjoy and benefit much more from EH 515 if you come to class. Second, you will find that the field data analysis and exceptional event analysis will be much easier to prepare for and successfully complete if you attend class.

**COURSE CANVAS SITE:** <https://canvas.emory.edu/courses/54166>; course title is EH-515-1: Air Quality in the Urban Env. - Spring 2019

**TEXT (Optional):** This course has no formal text. The primary reference sources for this course is provided in the reading list in the syllabus, and will be uploaded on canvas before each class. You are expected to read these materials to familiarize yourself with the concepts and knowledge covered in each lecture.

Course: Air Quality in the Urban Environment: A Survey of Research Methods and Recent Findings

## RSPH POLICIES

### **Accessibility and Accommodations**

Accessibility Services works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, you must contact the Office of Accessibility Services (OAS). It is the responsibility of the student to register with OAS. Please note that accommodations are not retroactive and that disability accommodations are not provided until an accommodation letter has been processed.

Students who registered with OAS and have a letter outlining their academic accommodations are strongly encouraged to coordinate a meeting time with me to discuss a protocol to implement the accommodations as needed throughout the semester. This meeting should occur as early in the semester as possible.

Contact Accessibility Services for more information at (404) 727-9877 or [accessibility@emory.edu](mailto:accessibility@emory.edu). Additional information is available at the OAS website at <http://equityandinclusion.emory.edu/access/students/index.html>

### **Honor Code**

**You are bound by Emory University's Student Honor and Conduct Code.** RSPH requires that all material submitted by a student fulfilling his or her academic course of study must be the original work of the student. Violations of academic honor include any action by a student indicating dishonesty or a lack of integrity in academic ethics. *Academic dishonesty refers to cheating, plagiarizing, assisting other students without authorization, lying, tampering, or stealing in performing any academic work, and will not be tolerated under any circumstances.*

The RSPH Honor Code states: "Plagiarism is the act of presenting as one's own work the expression, words, or ideas of another person whether published or unpublished (including the work of another student). A writer's work should be regarded as his/her own property."

([http://www.sph.emory.edu/cms/current\\_students/enrollment\\_services/honor\\_code.html](http://www.sph.emory.edu/cms/current_students/enrollment_services/honor_code.html))

## COURSE CALENDAR AND OUTLINE

Week	Date	Instructor	Topic(s)	Reading	Assignment
1	1/15	Donghai Liang, PhD Jeremy A. Sarnat, ScD	Course Overview Introduction to Air Pollution	Davis, "When Smoke Ran Like Water", Chapter 1.	
2	1/22	Jeremy A. Sarnat, ScD	The atmospheric system	Godish, Chapter 1	Analyzing pollutant data- due in class January 29th
3	1/29	Jeremy A. Sarnat, ScD	Introduction to atmospheric chemistry: gases	Godish, Chapter 2.3 & 2.4	
4	2/5	Jeremy A. Sarnat, ScD	Introduction to atmospheric chemistry: particulate matter	Godish, Chapter 2.3 & 2.4	Field data analysis distributed- due in class on March 5th
5	2/12	Donghai Liang, PhD	Meteorology and air quality	Godish, Chapters 3.1 & 3.3	
6	2/19	Donghai Liang, PhD	Air pollution modeling	Godish, Chapter 7.3	Exceptional Events analysis distributed- due on April 30th
7	2/26	Donghai Liang, PhD	Constructing a Gaussian Plume Model	Godish, Chapter 7.3	In-class exercise on building and using a Gaussian Plume model
8	3/5	Donghai Liang, PhD	Characterizing exposure to air pollution	Godish, Chapters 7.1 & 7.2	In-class exercise: Designing an air pollution epidemiologic study
Spring Break- No Class- March 12, 2019					
9	3/19	Donghai Liang, PhD	Quantifying air pollution health effects	Godish, Chapters 5.1 & 5.2; 5.4 & 5.5	

<b>Week</b>	<b>Date</b>	<b>Instructor</b>	<b>Topic(s)</b>	<b>Reading</b>	<b>Assignment</b>
10	3/26	Donghai Liang, PhD	Pathways and mechanism of air pollution insult	Brook et al. 2010 "Particulate Matter Air Pollution and Cardiovascular Disease: An Update to the Scientific Statement from the American Heart Association."	
11	4/2	Donghai Liang, PhD	Air pollution control	Godish, Chapter 8.2.1 – 8.4.8, 9 & 10	
12	4/9	Donghai Liang, PhD	Indoor air quality	Godish, Chapter 11	
13	4/16	Donghai Liang, PhD	Air quality in crisis: a closer look at China	'Under the Dome' viewing	
14	4/23	Donghai Liang, PhD Jeremy A. Sarnat, ScD	Exceptional Event Analyses Oral Presentation		
Exam Week—No Class- April 30, 2019					Exceptional Events written analysis due