

THE GEORGE WASHINGTON UNIVERSITY
Environmental and Energy Management Program
EMSE 6225: Air Quality Management
Course Syllabus

Room 205, Tompkins Hall
Course web page: <http://blackboard.gwu.edu>
Instructor web page: <https://eemi.seas.gwu.edu/jonathan-deason>
E&EM web page: <https://eem.seas.gwu.edu/>
E&EM newsletter: <https://eem.seas.gwu.edu/newsletter>
EEMI web page: <https://eemi.seas.gwu.edu/>

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Course Description

Air quality protection, already a major concern throughout most of the world, is expected to increase in importance in the foreseeable future. In the U.S., the milestone Clean Air Act and its amendments have given a strong impetus to this area of environmental management. At the present time, several billions of dollars are being spent each year to protect air quality, and the statutory and regulatory programs of the federal and state governments are reaching into all aspects of our society.

Specific topics studied in the course include the history of air pollution, identification of atmospheric pollutants and their sources, effects of air pollution, emission and ambient air quality sampling and analysis, monitoring and surveillance networks, transport and dispersion of air pollutants, air pollution modeling and climatology, air quality criteria and standards, elements of regulatory control, and engineering control concepts, devices and systems. (Three credit hours, 2.5 hours/session, one lecture session/week, 15 weeks; required course in the Environmental and Energy Management concentration.)

Learning Objectives

At the end of this course, students will have a working knowledge of critical local, regional, continental and global problems associated with air pollution and the historical evolution of such problems. The course also examines the complex regulatory and institutional framework controlling air quality management in the U.S. and explains current air quality management concepts and processes.

Grading

Case studies	10%
Mid-term exam	30%
Course project	25%
Final exam	30%
Class participation	5%

Textbook

Vallero, Daniel, Fundamentals of Air Pollution. New York: Academic Press, Inc., 5th edition, ISBN-13: 978-0124017337 ISBN-10: 0124017339

SCHEDULE AND ASSIGNMENTS

<u>Session</u>	<u>Topics</u>	<u>Assignments</u>
1 Jan 13	<u>Introduction to Air Quality Management.</u> Introductions; Discussion of Course Requirements; History of Air Pollution; Composition of the Atmosphere	Read: Chapter 1 (all), Chapter 3 (all but Section 3.7)
Jan 20	Martin Luther King Day (no classes)	
2 Jan 27	<u>Atmospheric Pollutants and Sources.</u> Natural vs. Anthropogenic Air Pollution; Gaseous and Particulate Pollutants	Read: Section 6.1 (p. 139-175), Chapter 7 (all), Section 24.1 (p. 559-563), Chapter 28 (all) Turn in: Project Proposals
3 Feb 3	<u>Air Pollution Effects I.</u> Overview of Health Effects; Health Effects by Target Organ System; Health Effects by Pollutant	Read: Chapter 9 (all), Chapter 10 (all), Section 11.1 (p. 271-276), Chapter 12 (all), Chapter 13 (all)
4 Feb 10	<u>Air Pollution Effects II.</u> Effects on Vegetation, Animals and Materials; Visibility, Climate, Acid Rain and Other Atmospheric Effects	Read: Chapter 14 (all), Chapter 15 (all)
Feb 17	<u>Presidents' Day</u> (no class)	
5 Feb 24	<u>Air Quality Surveillance I.</u> Ambient Air Quality Assessment; Air Quality Sampling and Analysis	Read: Part 5 (p. 547-558)
6 Mar 2	<u>Air Quality Surveillance II.</u> Emissions Assessment and Air Quality Modeling; Project Progress Report Presentations; Review for Mid-Term Examination	Read: Section 24.2 (p. 563-575), Chapter 25 (all), Sections 26.1-26.8 (p. 627-656), Sections 27.1-27.2 (p. 683-690), Sections 27.4.5-27.4.6 (p. 711-735)
Mar 9	<u>Mid-Term Examination</u>	
Mar 16	<u>Spring Break</u> (no class)	

8 Mar 23	Air Pollution Meteorology. Microscale and Mesoscale Dispersion; Macroscale Meteorological Considerations; Use of Meteorological Understanding to Improve Air Quality	Read: Chapter 2 (all)
9 Mar 30	<u>Statutory and Regulatory Approaches to Air Quality Management I.</u> Evolution of Federal Air Quality Management Strategies; Generic Air Quality Management Strategies	Read: Section 3.7 (p. 58-74)
10 Apr 6	<u>Statutory and Regulatory Approaches to Air Quality Management II.</u> Current Federal Clean Air Statutory Framework; State and Local Air Quality Organizations and Functions	Read: Section 26.9 (p. 656-670)
11 Apr 13	<u>Engineered Air Quality Control Techniques I.</u> Stationary Source Controls: Plant Operational Changes, Use of Tall Stacks, and Waste Stream Cleanup Technologies	Read: Chapter 30 (all but Section 30.3); Sections 31.1, 31.2 & 31.2.1 (p. 881-890)
12 Apr 20	<u>Engineered Air Quality Control Techniques II.</u> Mobile Source Controls: Combustion Efficiency, Exhaust Gas Recirculation, and Catalytic Reactors. Reformulated Gasoline: The Combustion Process, Explanation of Reformulated Gasoline, Overview of RFG Program, Problems and Future Prospects	Read: Section 31.3 (p. 918-922)
13 Apr 27	<u>Presentations and Review.</u> Project Final Report Presentations; Review for Final Examination	Turn in: Project Final Reports
14 May 4	<u>Final Examination</u>	

Class Logistics

A notification roster will appear on the class web site and will be used to alert each class member if the class is cancelled due to inclement weather or other reasons. If you are uncertain about class cancellation at any time, please call me. If I fail to arrive for the class at the designated starting time and have not notified the class of a late starting time or cancellation, students should wait in the classroom for at least 30 minutes before departing. One member of the class should be selected to notify the EMSE Department of the Instructor's absence by calling the EMSE Department at 202-994-1892 on the next business day.

All students should familiarize themselves with the emergency evacuation routes from our classroom. Pay particular attention to understanding how evacuate if power is out and there is no light. In the event of an emergency evacuation of the class building, students are to assemble at the southeast corner of 21st and G Streets, N.W. (primary location) and not depart until I have accounted for everyone.

GW Campus Advisories and Alerts

Students should check the GW Campus Advisories web site at: <http://www.campusadvisories.gwu.edu/index.cfm> for current information related to campus conditions, closures, safety information and any other information concerning events that may disrupt normal operations. All students, faculty and staff registered in the GW Banner system will receive emergency alerts, notifications and updates sent to their GW email address. If individuals elect to receive these alerts on a mobile device, they may log on to GWeb Information Web Site at <https://banweb.gwu.edu> and update their contact information to include mobile devices.

Academic Integrity

Academic integrity is central to the learning and teaching process. Students are expected to conduct themselves in a manner that will contribute to the maintenance of academic integrity by making all reasonable efforts to prevent the occurrence of academic dishonesty. Academic dishonesty includes, but is not limited to, obtaining or giving aid on an examination, having unauthorized prior knowledge of an examination, doing work for another student, and plagiarism of all types. Ignorance is no excuse.

University Policy on Religious Holidays

In accordance with University Policy, students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. Faculty should extend to these students the courtesy of absence without penalty on For more details and policy accommodations for religious holidays please see: <https://students.gwu.edu/accommodations-religious-holidays> .

Support for Students Outside the Classroom: Disability Support Services (DSS):

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in Rome Hall, Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: <https://disabilitysupport.gwu.edu/> disabilitysupport.gwu.edu/.

Mental Health Services

The University's Mental Health Services offers assistance and referral to address students' personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations, confidential assessments, counseling services (individual and small group), and referrals. Colonial Health Services: 202-994-5300, <https://healthcenter.gwu.edu/mental-health-counselingcenter.gwu.edu/>.