

GGS-319/CLIM-319 Air Pollution (Syllabus)

Fall, 2015

Associate Prof. Zafer Boybeyi



Instructor and Contact information



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Office Hours

Associate Prof. Zafer Boybeyi

Office Hours:

Tuesday: 1:30pm – 2:30pm

Thursday: 1:30pm – 2:30pm

Additional hours by appointment

Tentative Travel:

N/A

Course Website

`camp.cos.gmu.edu/CLIM-319.html`

Username: `gmuconference`

Password: `camp405`

Air Pollution

- ✓ This course focuses on air pollution meteorology problem covering the air pollution fundamentals, regulations, calculation of concentrations of pollution under various atmospheric conditions, pollution and meteorological interactions, risk assessment, emergency response systems, impact on climate and environment.
- ✓ This course would be useful for any student wanting a one-semester overview of the fundamentals of air pollution



Air Pollution

Goals:

To provide students:

- ✓ an overview of the physical, chemical and dynamical processes which control the state and evolution of air pollutants
- ✓ an understanding of the key scientific discoveries and remaining unanswered questions in air pollution and their impact on weather, climate and environment
- ✓ an overview of the primary scientific principles and analytical tools used in air pollution studies, including numerical model predictions

Air Pollution

Required Text Book:

Introduction to Atmospheric Chemistry

Daniel J. Jacob

Princeton University Press

ISBN-13: 978-0-691-00185-2

More Advanced Suggested Readings

- ❖ IPCC – Intergovernmental Panel on Climate Change Reports, available publicly!

More Advanced Suggested Readings

- ❖ **Introduction to Air Pollution Science, A public Health Perspective**, Robert F. Phalen
- ❖ **Air Pollution: Its origin and control**, Kenneth Wark et al., Wesley Publishing Company
- ❖ **Introduction to Micrometeorology**, S. Pal Arya, Academic Press, 2001
- ❖ **Physics and Chemistry of the Solar System**, 2nd Edition, J.S. Lewis, Academic Press, 2004.
- ❖ **Photochemistry of Planetary Atmospheres**, Y.L. Yung, W.B. Demore, Oxford, 1998.
- ❖ **Earth: Evolution of a Habitable World**, J. I. Lunine, Cambridge, 1998.

Course Outline

Class format will consist of:

- ✓ Lectures covering material (chapters) in the suggested text book and power point presentations
- ✓ Homework assignments
- ✓ Class discussion
- ✓ Midterm exam
- ✓ Final exam

Air Pollution

Format:

- ✓ There will be approximately two lecture topics covered per week. These lectures will include class discussion of topical issues.
- ✓ Chapters from the required textbook will provide the basic framework of the course and most of the qualitative discussions.
- ✓ While supplemental quantitative material will be provided to you via class notes (i.e., power point presentation).

Air Pollution

Tentative Grading Policy:

- ✓ Homework: 15%
 - ✓ Every passing day from due date, 10% off
- ✓ Two in-semester exams: 40%
- ✓ Final Exam (Comprehensive): 35%
- ✓ Participation: 10%

You are responsible for all material from the text, and any additional assigned readings.

Air Pollution

Tentative Exam Dates:

Exam #1 – Thursday, October 1

Exam #2 – Tuesday, November 24

Final Exam: Comprehensive

Thursday, Dec 17: 1:30–4:15pm

Tentative Schedule: (August 31, 2015 – Dec 21, 2015)

- Sep 1 – 3
- Sept 8 – 10
- Sept 15 – 17
- Sept 22 – 24
- Sept 29
- Oct 1 (Exam #1)
- Oct 6 – 8
- Oct 13 (Columbus Day recess, no class)
- Oct 15
- Oct 20 – 22
- Oct 27 – 29
- Nov 3 – 5
- Nov 10 – 12
- Nov 17 – 19
- Nov 24 (Exam #2)
- Nov 26 (Thanksgiving recess, no class)
- Dec 1 – 3
- Dec 8 – 10 (Dec 12 – last day of classes)
- Dec 17 (Final Exam, 1:30 pm – 4:15 pm)

Air Pollution

Learning Outcomes

- ✓ By the end of the semester this course student will have developed a basic understanding of the following:
 - ✓ Characterization of air pollution problem
 - ✓ Dynamics & physics of air pollution events
 - ✓ Long term evaluation
 - ✓ Atmospheric motions & stability
 - ✓ Atmospheric moisture and the role of water in air pollution considerations
 - ✓ Air pollutants & global warming
 - ✓ Emergency response systems
 - ✓ Risk assessments
 - ✓ Air pollution prediction
 - ✓ Major air pollution problems

Air Pollution

Content

- ✓ Air Pollution Fundamentals
 - ✓ Measuring of composition
 - ✓ Atmospheric Pressure
 - ✓ Simple Models
 - ✓ Atmospheric Transport
 - ✓ Governing Equations
 - ✓ Geochemical Cycles
 - ✓ The Greenhouse Effect
 - ✓ Aerosols
 - ✓ Chemical Kinetics
 - ✓ Stratospheric Ozone
 - ✓ Oxidizing Power of the Troposphere
 - ✓ Ozone Air Pollution
 - ✓ Acid Rain

Air Pollution

Content

- ✓ Concentration Calculation & Distribution
 - ✓ Stability, turbulence and diffusion
 - ✓ Gaussian plume dispersion model
 - ✓ Lagrangian plume dispersion model
 - ✓ Plume rise
 - ✓ Special applications (inversions, topography, fumigation, etc.)
 - ✓ Pollution scale considerations
 - ✓ Pollution sources
 - ✓ Pollution time trends

Air Pollution

Content

- ✓ Air Pollution Applications
 - ✓ Emergency response systems
 - ✓ Examples of real world applications

`camp.cos.gmu.edu/conference.html`

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Use of Personal Technology in the Classroom

- ✓ LAPTOPS are permitted in class for taking notes.
- ✓ But **PLEASE don't** use laptops during class time for other activities such as web surfing and email.
- ✓ Cellphones must be turned off or on vibrate. Please do not take calls or text in the lectures.

GMU Honor Code

- ✓ GMU is an Honor Code university; The principle of academic integrity is taken very seriously and violations are treated gravely.

Honor Code: *To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this*
Honor Code

Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

<http://catalog.gmu.edu/content.php?catoid=5&navoid=410#Honor>

Academic Integrity

- ✓ What does academic integrity mean in this class?
 - ✓ Essentially when you are responsible for a task, you will perform that task.
 - ✓ When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form.
 - ✓ Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions.
 - ✓ When in doubt (of any kind) please ask for guidance and clarification.

Students with Disabilities

- ✓ If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Resources at 703/993-2474.
- ✓ All academic accommodations must be arranged through that office.

Important Dates

- ✓ September 8 – Enrollment Deadline: This is the last day to add into a course. Students may not register into any section after this date. No exceptions. This is also the last day to drop a course without losing tuition money.
- ✓ September 15 – Drop Deadline: This is the last day a student may drop a course. Students will receive a 67% tuition refund. After this date, students may withdraw from a course, but only according to strict guidelines.
- ✓ October 2 – Drop Deadline: This is the last day a student may drop a course. Students will receive a 33% tuition refund. After this date, students may withdraw from a course, but only according to strict guidelines.

Other Useful Campus Resources

WRITING CENTER: A114 Robinson Hall; (703) 993-1200;

<http://writingcenter.gmu.edu>

UNIVERSITY LIBRARIES "Ask a Librarian"

<http://library.gmu.edu/mudge/IM/IMRef.html>

COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS):

(703) 993-2380;

<http://caps.gmu.edu>

The University Catalog,

<http://catalog.gmu.edu>

is the central resource for university policies affecting student, faculty, and staff conduct in university affairs.

Additional Useful Campus Resources

[English Language Institute](#)

Holds workshops for students whose first language is not English.

Learning Services provides a variety of experience based learning opportunities through which students explore a wide range of academic concerns, including those listed below. Presentations on a variety of academic skill topics are available to the university community. The programs are open to all George Mason University students free of charge. Services are confidential and use of these services does not become part of the student's academic record.