EAS6792/CEE6792 Air Pollution Meteorology

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References: *Air pollution meteorology and dispersion*, by S. Pal Arya, Oxford University Press, 1999.

Atmospheric chemistry and physics, by J. H. Seinfeld and S. N. Pandis, John Wiley & Sons, 1998.

An introduction to boundary layer meteorology, Roland B. Stull, Kluwer Academic Publishers, 1988.

Web: http://apollo.eas.gatech.edu/EAS6792

Class: ES&T L1116, Tues/Thursday 4:30-6:00 pm

Office hours: T/Th 3-4:30 pm

Homework:

	Assignment date	Due date
#1	January 15	January 29
#2	January 29	February 12
#3	February 12	February 26
#4	February 26	March 7
#5	March 12	April 2

Syllabus:

Date	Topics	Chapters (Arya)
	Part I: Air pollution and boundary layer	
Jan 8, 10	Introduction to air pollution	1
Jan 15, 17	Key parameters affecting urban air quality	2
Jan 22, 24	Heat balance, vertical stability and boundary layer characteristics	2, Stull (Chap 1)
Jan 29, 31	Turbulence and its statistics, surface energy budget	4, Stull (Chap 2)
Feb 5, 7	Similarity theory and Monon-Obukov surface layer	4, 8, Stull (Chap 5)
Feb 12, 14	1st order and non-local closures, large-eddy simulation, vertical transport by diffusion	6, 8, Stull (Chap 6)
Feb 19, 21	Turbulent dispersion and Gaussian plumes	9
Feb 26, 28	Plume rise and settling; Deposition	10, 11
Mar 5, 7	Dispersion and air quality modeling (group assignment due)	11
Mar 12, 14	Air quality modeling; Mid-term exam	12
Mar 19, 21	Spring recess	
	Part II: Air pollution and climate change	
Mar 26, 28	Impacts of climate change on air pollution (term paper topics due)	
Apr 2, 4	Impacts of megacities on air pollution	
Apr 9, 11	Climate extreme events and air pollution	
Apr 16, 18	Biomass burning and its impacts	
Jan 8, 10	Term paper presentation	

Grade:

Homework	**25%**
Midterm exam	**20%**
Group project	**15%**
Term paper	**40%**

Term papers:

2009

	Topics
Colin Boswell	Calculation of Background PM 2.5 Values
Kim Brady	Alternative Fuels and Air Pollution
Kate Cerully	The Effect of Aerosols on Precipitation – Suppression or Enhancement
Sunny Choi	Effect of BrO Mixing Height to Ozone Depletion Events
Radihka Dhingra	Wind Speed and Sulfur Dioxide during the 1996 Atlanta Olympics
Ana Garcia	Analysis of meteorological conditions enhancing high particulate matter episodes in Monterrey, Mexico
David Gray	Mechanisms contributing to the Spring ozone maximum in the Northern Hemisphere
Dasa Gu	Vertical distribution of HOx and O_3 in the tropical marine boundary layer during PASE
Ja-Ho Koo	Properties of observed Arctic ozone and bromine compound based on the back trajectory analysis
Zhen Liu	Characteristics of Urban Ozone Formation During CAREBEIJING-2007 Experiment
Sean Ryan	PM2.5 Transport From Wildfires
Wenxian Zhang	Gas and Aerosol Partitioning Over the Equatorial Pacific

2007

	Topics
Sivaihm Balachandra	Impact of air pollution on the South Asian monsoon
Chandra Sherhar	Inferring CALIPSO backscattering data over Antarctica during spring
Xueyuan Deng	Convection over China -- ISCCP DX data analysis results
Bo Yao	Plume rise from free burning fires
Chun Zhao	Does uncertainty of soil NOx emission explain the bias of modeling tropospheric NO_2 columns?

2004

	Topics
Burton Gray	Tracking DMS in Antarctica
Burçak Kaynak	Diurnal vertical concentration profile of CO in an urban environment
Khara Lombardi	A Sensitivity Analysis of Fluxes Between the Atmosphere-Ocean Interface Using the Kantha – Clayson Ocean Model
Dana Lowes	Changes in Concentration of Chemical Species using Back-Trajectory Analysis: Atlanta's Emissions Affecting its surroundings
Grant Michalski	Source Apportionment of PM2.5 With CMB8

2003

	Topics
Mohammad Arhami	Effect of Wind Speed and Direction on Atlanta PM2.5
Paola Augelo	Turbulence, Intermittency and Chaos in High-Resolution Data, Collected At The Amazon Forest
Farhan Auhtar	Ozone trends over the Fourth of July
Jaemeem Baek	The Change of Meteorological Parameters with Land Use in MM5
Rosa Chi	NONROAD Model Sensitivity to Temperature
Chris Henningan	Measurement of inorganic aerosol species – results from DICE
Carlos Hoyos	Air-Sea fluxes over the bay of Bengal during summer 1999
Monique Latalladi	The Vieques Problem
Sangil Lee	Source Apportionment of VOCs in Pensacola, FL 2003
Rick Peltier	PERCH: Implications of A Spatial Assessment of PM Variability
Benton	Convective Roll Effects on Sea

Whilesides	Breeze Fronts
Bo Yan	Calculation of wildfire Plume Rise
Seungju Yoon	A Heavy-Duty Vehicle Visual Classification Scheme: Heavy-Duty Vehicle Reclassification Method for Mobile Source Emissions Inventory Development

Group projects:

2004

- **Reformulated Gasoline in Metro-Atlanta**
- **Pollutants and Their Effect on the Water and Radiation Budgets**

2003

- **Backtrajectory analysis**
- **Urban meteorology**
- **Transportation and air quality: Mobile source emissions regulations**
- **FACIMILE dispersion-chemistry package**
- **CFD street canyon modeling**