Piedmont Project XI: January, 2014

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As an instructor in environmental sciences, sustainability was not something new in my course or in my project. However, having had an opportunity to discuss sustainability and other environmental issues with faculty in diverse disciplines through the Piedmont Project XI I came to realize the importance of having more discussion and fieldwork experience in class. It was a great opportunity for me to understand how students in literature, philosophy, and sociology may view sustainability and how I may be able to make the subject matter more accessible to non-science majors. In 2013 I made this course open to all students and in 2014 I decided to have this course strictly for science majors. In 2015, I plan to make this course more approachable to all students that are interested in understanding environmental problems.

Based on the inputs at the Piedmont Project XI, I decided to create a mandatory fieldwork activity in my course (ENVS 385 Air Pollution and Climate Change), where students collect measurements at the site of their own choice. Students will be divided into two groups and each group will take particulate matter concentrations at two sites where they believe would have different concentration levels, after they learn the sources of air pollutant emissions and how they form air pollution. I learned from the Piedmont Project XI that active learning enhances critical thinking and connects materials taught in class to the real world. I hope that students will have a better understanding of the subject matter after they go on a field, collect measurements, analyze the data, and report to the class on their findings. I am hoping that by this exercise students will also learn what may be the effective mitigation policies for reducing air pollution problem.

I would like to thank the organizers and participants of the Piedmont Project XI for making me reconsider how to create an interdisciplinary course as well as how to make the science-intensive course approachable to non-science majors. I am excited to include the fieldwork component in my class, and I look forward to having more discussions with them on science-policy interactions in class.

ENVS 385 Air Pollution and Climate Change

Fall 2014
TTh 11:30am – 12:45pm, Room W307C

Instructor: Prof. Eri Saikawa (eri.saikawa@emory.edu)
Office: Math and Science Center E512, Tel: 404-727-0487
Office Hours: W 1-3pm

The course will cover the science and policy aspects of the three environmental problems: 1) air pollution; 2) stratospheric ozone depletion; and 3) climate change, with a focus on understanding the causes of these issues and the ways it has been handled to solve them. The course will provide basic knowledge in atmospheric chemistry as well as international environmental policy/politics. Students will also learn how to measure particulate matter concentrations in the field and how to interpret the data for policymaking.

Primary Textbook:

Jacob, Daniel (DJ): Introduction to Atmospheric Chemistry, Princeton University Press, 1999. Available online: http://acmg.seas.harvard.edu/people/faculty/djj/book/index.html

Archer, David (DA): Global Warming (2nd ed.), John Wiley & Sons, Inc., 2011.

Supplementary Textbook:

Seinfeld, John H., and Pandis, Spyros N.: Atmospheric Chemistry and Physics – From Air Pollution to Climate Change, John Weiley and Sons, 2006. Available on Knovel: http://www.knovel.com/web/portal/browse/display?_EXT_KNOVEL_DISPLAY_bookid=2126

Wark, Kenneth, Cecil F. Warner, and Wayne T. Davis (KW): Air Pollution: Its Origin and Control, Addison-Wesley, 1997.

Goals:
- Understanding of the science behind three environmental problems.
- Studying the policy/politics associated with solving global environmental issues.
- Integrating science and policy/politics to better manage environment.

Assignments:
Readings; homework assignments; class discussions and presentations; midterm exam and final paper

Course Structure:
Homework is given and is due by the beginning of the class on the date indicated in the syllabus. In-class quizzes are given at the beginning of the class on the date indicated in the syllabus. No late assignments will be accepted without prior approval by the instructor. Homework assignments can be discussed in groups, but MUST be written up independently. Evidence of copying will result in a zero grade for the assignment.
There will be an in-class midterm exam, which is designed to test basic concepts and problem solving ability, and is closed book/notes. There is no final exam. Each student is to prepare and deliver a final presentation on a topic of their choice, related to the material discussed in this course in the last week of class. This project will require independent research and must be written in a form of a literature review or a research paper. Each student is encouraged to develop his/her own project topic idea. Project proposals are due in October and will be reviewed by the instructor to ensure that the project criteria are met.

Grading:
Participation and class discussion – 10%
3 Homework Assignments – 15%
4 in-class Quizzes – 20%
Midterm – 15%
Fieldwork project – 10%
Paper proposal and a class presentation on a research project – 10%
Final paper (8 single-spaced pages, written in format of a scientific paper for publication, due at scheduled exam period) – 20%

Preliminary Class Schedule:

Date			Topic	Reading	Assignment
August	28	Th	Intro/Atmospheric composition		**survey**
September	2	T	Atmospheric Composition	DJ Ch. 1, Ch. 2.1-2.3	
	4	Th	Greenhouse Effect	DA Ch. 2, DJ Ch. 7	
	9	T	Layer Model and the temperature of the atmosphere	DA Ch. 3, 4	**quiz 1**
	11	Th	Greenhouse Effect and Feedbacks	DA Ch. 5, 7	
	16	T	Kyoto Protocol and IPCC	DA Ch. 13	**HW 1 out**
	18	Th	Air pollution sources		
	23	T	Aerosols	DJ Ch. 8	**HW 1 due**

	25	Th	Chemical kinetics and Stratospheric chemistry I	DJ Ch. 9,10	**quiz 2**
	29	T	Stratospheric chemistry II	DJ Ch. 10	
October	2	Th	Models	DJ Ch. 3	
	7	T	Review		
	9	Th	Midterm		
	14		Fall break		
	16	Th	Air pollution I	DJ Ch. 11	**proposal due**
	21	T	Air pollution II	DJ Ch. 11	
	23	Th	Biogeochemical cycles	DJ Ch. 6	
	28	T	Group project I		**quiz 3**
	30	Th	Group project II		
November	4	T	Ozone diplomacy		**HW 2 out**
	6	Th	Ozone air pollution	DJ Ch. 12	
	11	T	Acid Rain Science	DJ Ch. 13	**HW 2 due**
	13	Th	Potential climate impacts	DA Ch. 12	
	18	T	**quiz 4**		
	20	Th	Mitigation strategies and action plans		
	25	T	Acid Rain Policy		**HW 3 out**
	27	Th	Thanksgiving		
December	2	T	Fossil fuels and energy	DA Ch. 9	**HW 3 due**
	4	Th	Student Presentations		
	9	T	Student Presentations		