

# **NATURAL SCIENCE I: ENERGY AND THE ENVIRONMENT**

**V55.0203.001  
Fall 2008**

**Mondays and Wednesdays  
3:30 p.m. – 4:45 p.m.  
Silver 207**

**Professor Trace Jordan**

Morse Academic Plan  
Silver Center, Room 903  
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**Office Hour: Thursday, 9:30 a.m. – 11:00 a.m.**



## **1. Course Description**

This course explores the scientific foundations of current environmental issues and their implications for public policy. The syllabus is divided into sections that each examines a current environmental theme in depth. The first sections investigate the composition of the atmosphere and the chemical processes that cause air pollution, ozone depletion, and global warming. Moving to the study of water, the course explores the properties of this unique solvent, the effect of various aqueous pollutants, and the origin of acid rain. The course concludes with a discussion of the energetics of chemical reactions, our continuing reliance on fossil fuels, and the potential of alternative energy sources. The laboratory experiments are closely integrated with the lecture topics and provide hands-on explorations of central course themes. Throughout the course we also examine how scientific studies of the environment are intimately connected with political, economic and policy concerns.

## **2. Course Objectives**

Your learning objectives for the course are:

- Acquire knowledge of foundational concepts, processes, and terminology in chemistry.
- Develop skills in problem solving and use of quantitative reasoning.
- Understand the methods of scientific investigation, including the roles of experiments and computer simulations.
- Critically evaluate new advances in our understanding of environmental science as reported by news media.
- Address the complex economic, political, and policy aspects of environmental issues.

## **3. Course Materials**

There are two required texts for the course that are available in the NYU Bookstore:

Lucy Pryde Eubanks et al., *Chemistry in Context: Applying Chemistry to Society*, 6<sup>th</sup> Edition (Boston: McGraw Hill, 2009)

T. Jordan, Esther K. Nemethy, and Susan L. Price, *Laboratory Manual for Energy and the Environment*.

We will also read up-to-date articles on **current environmental topics** from the popular media (e.g., *New York Times*) and scientific literature (e.g., *Science*, *Nature*).

You will also need to purchase **safety glasses** from the NYU bookstore. Many of the laboratory sessions will require you to use chemicals that are potentially damaging to your eyes, so **SAFETY GLASSES ARE ABSOLUTELY REQUIRED DURING THESE LABS.**

<b>REMEMBER TO BRING YOUR SAFETY GLASSES TO THE LAB SESSIONS!</b>
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#### 4. Lecture and Laboratory Schedule

	<i>Date</i>	<i>Lecture Topic</i>	<i>Reading</i>	<i>Laboratory Project</i>
	<i>Sept 2 &amp; 3</i>			<i>No labs</i>
1	W Sept 3	Course Introduction		
		<b>THE AIR WE BREATHE</b>		
2	M Sept 8	The Air We Breathe	Ch 1, pp. 8 - 21	
	<i>Sept 9 &amp; 10</i>			<i>Math Review</i>
3	W Sept 10	Chemical Reactions in the Atmosphere	Ch. 1, pp. 21 - 34	
4	M Sept 15	Sources of Air Pollution	Ch 1., pp. 32 - 49	
	<i>Sept 16 &amp; 17</i>			<i>Lab 1: Properties of Air</i>
		<b>THE OZONE LAYER</b>		
5	W Sept 17	Atoms and Molecules	Ch 2, pp. 56 - 64	
6	M Sept 22	Molecules (contd.) / Properties of Light	Ch 2, pp. 64 - 72	
	<i>Sept 23 &amp; 24</i>			<i>Lab 2: Properties of Light</i>
7	W Sept 24	The Ozone Layer	Ch 2, pp. 72 - 79	
8	M Sept 29	CFCs and Ozone Depletion	Ch 2, pp. 79 - 94	
	<i>Sept 30 / Oct 1</i>			<i>Lab 3: Sunscreens</i>
		<b>GLOBAL WARMING</b>		
9	W Oct 1	Earth's Climate	Ch. 3, pp. 100 - 110	
10	M Oct 6	Greenhouse Gases	Ch. 3, pp. 110 - 118	
	<i>Oct 7 &amp; 8</i>			<i>Lab 4: Molecular Structure</i>
11	W Oct 8	Carbon Emissions	Ch. 3, pp. 118 - 126	
	<i>M Oct 13</i>	<i>No Class – Columbus Day</i>		
	<i>Oct 14 &amp; 15</i>			<i>No labs</i>
12	W Oct 15	Global Warming – Science	Ch. 3, pp. 126 - 134	
13	M Oct 20	Global Warming – Policy	Ch. 3, pp. 134 - 143	
	<i>Oct 21 &amp; 22</i>			<i>Review for Midterm Exam</i> <i>Biofuel notes due</i>
	<b>W Oct 22</b>	<b>Midterm Exam</b>		
		<b>ENERGY AND SOCIETY</b>		
14	M Oct 27	What is Energy?	Ch. 4, pp. 150 - 160	
	<i>Oct 28 &amp; 29</i>			<i>Lab 5: Biofuels</i>
15	W Oct 29	Fossil Fuels & Biofuels	Ch. 4, pp. 164 - 183	
		<b>THE WATER WE DRINK</b>		
16	M Nov 3	Water as a Solvent	Ch. 5, pp. 194 - 201 & 203 - 216	
	<i>Nov 4 &amp; 5</i>			<i>Lab 6: Ions in Solution</i>
17	W Nov 5	Measuring Concentration	Ch. 5, pp. 201 - 203	
18	M Nov 10	Water Quality – Science & Policy	Ch. 5, pp. 216 - 232	
	<i>Nov 11 &amp; 12</i>			<i>Lab 7: Water Hardness</i>
		<b>ACID RAIN</b>		
19	W Nov 12	Acids and Bases	Ch. 6, pp. 238 - 246	
20	M Nov 17	Origins of Acid Rain	Ch. 6, pp. 250 - 257	
	<i>Nov 18 &amp; 19</i>			<i>Lab 8: Acid Rain</i>
21	W Nov 19	Acid Rain – Science & Policy	Ch. 6, pp. 258 - 276	
		<b>ELECTRON TRANSFER</b>		
22	M Nov 24	Electron Transfer Reactions	Ch. 8, pp. 330 - 340	
	<i>Nov 25 &amp; 26</i>			<i>Lab 9: Building Batteries</i>
	<i>W Nov 26</i>	<i>No Class - Thanksgiving</i>		
23	M Dec 1	Fuel Cells	Ch. 8, pp. 340 - 353	
	<i>Dec 2 &amp; 3</i>			<i>Lab 10: Fuel Cells</i>
24	W Dec 3	Solar Energy	Ch. 8, pp. 353 - 362	
25	M Dec 8	Solar Energy DVD		
	<i>Dec 9 &amp; 10</i>			<i>Review for Final Exam</i>
26	W Dec 10	Course Review		

**NOTE:** Wednesday, November 26, is a legislative day and classes run on a Monday schedule. We will run the Wednesday lab sections on the usual schedule, but we will attempt to find spaces in the Tuesday lab sections for students who have a class conflict.

## **5. Grade Allocation**

Midterm Exam	20 %
Final Exam	30 %
Laboratory	20 %
Homework	20 %
In-Class Assignments	10 %

**NOTE:** Additional assistance for this class is available to you free of charge at the College Learning Center (CLC). The CLC provides tutoring at Weinstein Residence Hall and at 3<sup>rd</sup> Avenue North Residence Hall. For information on one-on-one and group peer tutoring, please visit the CLC or go to their website: [www.nyu.edu/cas/clc](http://www.nyu.edu/cas/clc)

## **6. Exam Format and Policies**

All exams will be held in Silver 207 and the schedule is listed below:

<b>Midterm Exam</b>	<b>Wednesday, October 22</b>	<b>3:30 p.m. – 4:45 p.m.</b>
<b>Final Exam</b>	<b>Monday, December 15</b>	<b>4:00 p.m. – 5:50 p.m.</b>

The exams will contain questions covering the **lectures, readings, and laboratory projects**. Study questions for the lecture topics will be distributed regularly during the semester. The final exam will be **cumulative** and will cover topics from throughout the course. Homework assignments provide practice with some types of questions that will appear on the exams.

If you will miss the midterm exam because of illness, you must contact Professor Jordan by e-mail **before the start of the exam** and provide a doctor's note explaining your absence. **No make-up exams** will be given for the course. Instead, the final exam will count as 50% of your course total. Since the final is cumulative and the most difficult exam of the course, this option is not advisable unless extreme circumstances prevail.

The final exam is scheduled for **Monday December 15, from 4:00 – 5:50 p.m.** This date is set by the NYU Registrar's Office and no alternative date will be provided. **Do not make plans to leave NYU before the final exam.** A make-up will be given for the final exam only under exceptional circumstances that must be discussed with Professor Jordan prior to the exam. In the rare cases where approval is granted, a grade of incomplete will be given for the course and the make-up will be scheduled for the Spring 2009 semester.

## **7. Homework Format and Policies**

The homework assignments will contain questions that review the course material and/or are based on supplementary readings. Certain questions on the homework assignments may require you to access information on relevant web sites. Each assignment is worth **10 points** – two questions will be graded (4 points each) and 2 points will be given for completing all the questions. **The clarity of presentation, explanation of your answers, and the use of correct units will be considered as part of the homework score.**

**Homework assignments must be submitted on time for full credit.** If you miss a lecture or laboratory session due to a documented absence you are still required to complete the homework assignment. Contact your laboratory instructor to arrange a suitable deadline for submitting the work.

## **8. Laboratory Sessions**

The laboratory sessions will be held in **Silver 202** and will begin on **September 9 & 10**. There are no laboratory sessions during the first week of class. The laboratory instructors for each section are listed below.

**Xinshuai Zhao**  
xz315@nyu.edu

**Bishwajit Paul**  
bp675@nyu.edu

**Anuttara Udomprasert**  
au300@nyu.edu

<b>Lab Section</b>	<b>Day and Time</b>	<b>Instructor</b>
Section 002	Tuesday, 11:00 a.m. – 12:40 p.m.	Xinshuai Zhao
Section 003	Tuesday, 1:00 p.m. – 2:40 p.m.	Xinshuai Zhao
Section 004	Tuesday, 3:00 p.m. – 4:40 p.m.	Bishwajit Paul
Section 005	Tuesday, 5:00 p.m. – 6:40 p.m.	Bishwajit Paul
Section 006	Wednesday, 9:00 a.m. – 10:40 a.m.	Anuttara Udomprasert
Section 007	Wednesday, 11:00 a.m. – 12:40 p.m.	Anuttara Udomprasert

Each weekly lab project is worth 50 points:

<b>Attendance</b>	<b>10 points</b>
<b>Quiz</b>	<b>10 points</b>
<b>Lab Assignment</b>	<b>30 points</b>

**You must be registered in a laboratory section in order to receive credit for the course.** The sections have a capacity of 20 students, which is determined by safety issues and availability of laboratory equipment. The section enrollment will not be increased. If you are not appropriately registered for a laboratory section by project #2 you will be required to drop the course.

### ***Attendance Credit:***

You are expected to arrive punctually for the beginning of the lab session and arriving more than **10 minutes late** will result in a loss of attendance credit for the session.

### ***Laboratory Quiz:***

Questions will be based on the introduction to the experiment in the laboratory manual. Arriving more than 10 minutes late for the lab will exclude you from taking the quiz.

### ***Laboratory Assignment:***

This assignment should be completed and submitted during the laboratory period by working collaboratively with your laboratory partners. Some laboratories may have a take-home component in addition to the in-lab exercises.

You will be at a disadvantage in the course if you miss any of the lab sessions. If you cannot attend a lab session because of illness, notify your lab instructor **before the start of the lab**. Because of the logistics of using the laboratory room, it is not possible to attend another laboratory section other than your own or to perform make-up experiments. If you will miss a lab session due to special circumstances, including observation of a religious holiday, please notify your lab instructor in advance. **Excessive absences may result in failing the laboratory component of the course.**

## **9. In-Class Assignments**

In-class assignments will be given regularly throughout the semester. Some of these assignments will provide practice with important course topics, while others will ask for your written perspectives on an environmental policy issue. For some assignments you will work individually and for other assignments you will work in a group.

These in-class assignments can be completed **only during the class in which they are given** – there are **no make-ups for any reason**. Full credit is given for your best effort at answering the questions.