

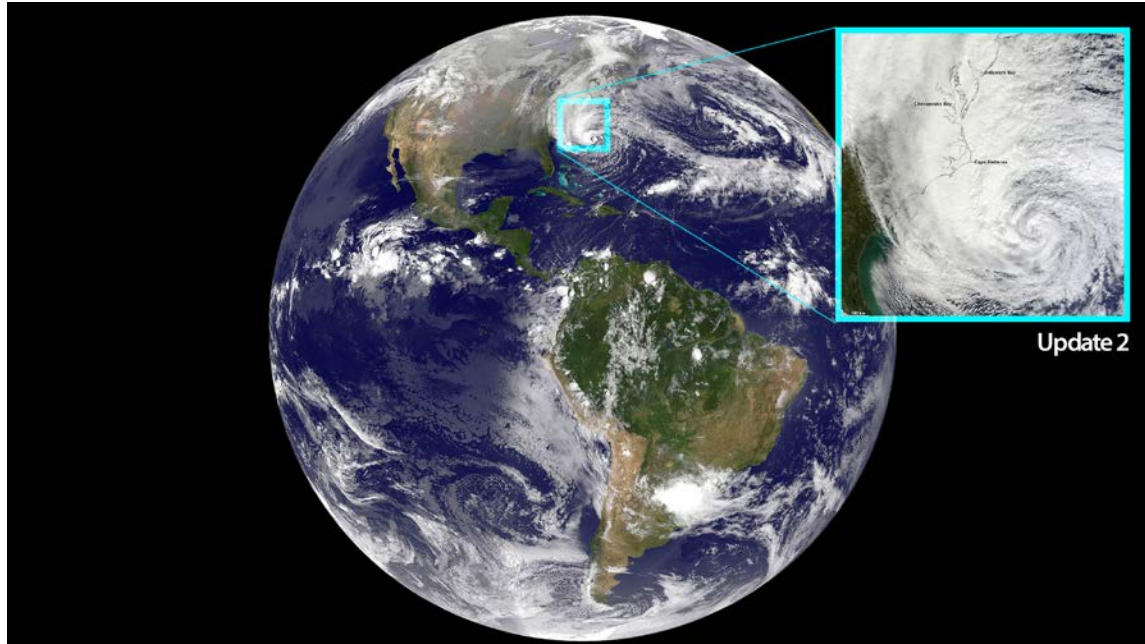
NATURAL SCIENCE I: ENERGY AND THE ENVIRONMENT

MAP-UA 203 010
Fall 2013

Mondays and Wednesdays
2:00 p.m. – 3:15 p.m.
Silver 207

Professor Neville Kallenbach

Dept. of Chemistry
Silver Center, Room 865 Waverly
Phone: 212 - 998 - 8757
E-mail: neville.kallenbach@nyu.edu
Office Hour: Wed. 5:00 p.m.



Hurricane Sandy hitting the east coast in October 2012

1. Course Description

This course aims to provide you with the scientific foundations of important environmental issues and their implications for public policy. The syllabus is divided into sections that explore 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 also includes an investigation of energy from 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 to:

- Acquire or review 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.
- Evaluate new advances in our understanding of environmental science as reported by news media.
- Examine the economic, political, and policy aspects of environmental issues.
- Use evidence and critical thinking to make informed decisions about complex environmental challenges.

3. Teaching Staff

Instructor: Prof. Neville R. Kallenbach Dept. of Chemistry
Silver Center, Room 865 Waverly
Phone: 212 - 998 - 8757
E-mail: neville.kallenbach@nyu.edu
Office Hour: Wed. , 4:00 . – 5:00 p.m. or by appointment

The course is staffed by three graduate student lab instructors. They will be a valuable resource for you during the semester, so take advantage of their expertise.

Laboratory Instructors:

Joseph Katigbak
jk3908@nyu.edu

Laura Poloni
lnp237@nyu.edu

Haotian Wu
hw731@nyu.edu

3. Course Materials

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

Catherine H. Middlecamp et al., *Chemistry in Context: Applying Chemistry to Society*, 7th Edition (Boston: McGraw Hill, 2012)

It is important that you obtain the 7th Edition of the textbook and also have a code to access McGraw-Hill's online learning system called CONNECT.

Trace Jordan and Esther Nemethy, *Laboratory Manual for Energy and Environment* (NYU)

You are also required purchase safety glasses from the NYU bookstore. Many of the laboratory sessions require you to use chemicals that are potentially damaging to your eyes, so **SAFETY GLASSES ARE ABSOLUTELY REQUIRED DURING THESE LABS**. If you do not bring your safety glasses when required, you will not be permitted to perform the lab experiment and will not receive credit for that week's lab. Please ask for "safety glasses" at the bookstore and **not** "safety goggles," which are used for majors-level Chemistry Department courses.

To keep up-to-date with new developments in environmental science and policy, I am also assigning articles as recommended reading. I will provide links to relevant articles and I encourage you to send me any interesting articles that you find yourself.

Finally, you will be provided with additional videos, and websites throughout the semester that further explore the environmental topics in the course syllabus.

4. Lecture and Laboratory Schedule (Labs are in blue):

The readings listed in this schedule are based on *Chemistry in Context*, 7th Edition. Additional readings will be posted on the course site and announced in class.

ENERGY AND ENVIRONMENT – FALL 2013

	<i>Date</i>	<i>Lecture Topic</i>	<i>Reading</i>	<i>Laboratory Project</i>
1	W Sept 4 <i>Sept. 3 & 4</i>	Course Introduction		<i>No Lab</i>
		THE AIR WE BREATHE		
2	M Sept 9 <i>Sept 10 & 11</i>	The Air We Breathe	Chapter 1	<i>Math Review</i>
3	W Sept 11	Chemical Principles	Chapter 1	
4	M Sept 16 <i>Sept 17 - 18</i>	Air Pollution – Science and Policy	Chapter 1	<i>Lab 1: Properties of Air</i>
		THE OZONE LAYER		
5	W Sept 18	Atomic Structure	Chapter 2	
6	M Sept 23 <i>Sept 24 & 25</i>	Molecules and Light	Chapter 2	<i>Lab 2: Properties of Light</i>
7	W Sept 25	The Ozone Layer	Chapter 2	
8	M Sept.30 <i>Oct 1 & 2</i>	Ozone Depletion – Science and Policy	Chapter 2	<i>Review for Midterm 1</i>
		CLIMATE CHANGE		
9	W Oct 2 M Oct 7 <i>Oct 8 & 9</i>	Earth's Climate Midterm 1 (Chapters 1 & 2)	Chapter 3	<i>Lab 3: Sunscreens</i>

10	W Oct 9	Greenhouse Gases	Chapter 3	
	<i>M Oct 14</i>	<i>No class – fall break</i>		
	<i>Oct 15 & 16</i>			<i>No labs – fall break</i>
11	W Oct 16	Carbon Cycle / Ocean Acidification	Chapter 3	
12	M Oct 21	Global Warming – Science and Policy	Chapter 3	
	<i>Oct 22 & 23</i>			<i>Lab 4: Molecular Structure</i>
		ENERGY FROM COMBUSTION		
13	W Oct 23	What is Energy?	Chapter 4	
14	M Oct 28	Energy from Combustion	Chapter 4	
	<i>Oct 29 & 30</i>			<i>Lab 5: Energy from Fuels</i>
15	W Oct 30	Fossil Fuels and Biofuels – Science and Policy	Chapter 4	
		WATER FOR LIFE		
16	M Nov 4	Water and Ions	Chapter 5	
	<i>Nov 5 & 6</i>			<i>Lab 6: Aqueous ions</i>
17	W Nov 6	Measuring Concentration	Chapter 5	
18	M Nov 11	Water Quality – Science and Policy	Chapter 5	
	<i>Nov 12 & 13</i>			<i>Review for Midterm 2</i>
19	W Nov 13	Water Resources	Chapter 5	
	M Nov 18	Midterm Exam 2 (Chapters 3 – 5)		
	<i>Nov 19 & 20</i>			<i>Lab 7: Hard Water</i>
	<i>W Nov 20</i>	<i>No class – Thanksgiving</i>		
		ENERGY FROM ELECTRON TRANSFER		
20	M Nov 25	Electron Transfer Reactions	Chapter 8	
	<i>Nov 26 & 27</i>			<i>Lab 8: Building Batteries</i>
21	W Nov 27	Fuel Cells	Chapter 8	
22	M Dec 2	Solar Cells	Chapter 8	
	<i>Dec 3 & 4</i>			<i>Lab 9: Solar Cells & Fuel Cells</i>
23	W Dec 4	Adjustment lecture		
		SELECTED TOPIC		
24	M Dec 9	Sustainability	TBA	
25	W Dec 11	Course review		
	M, Dec. 16	Final Exam, 2:00-3:50		

5. Grade Allocation

Midterm Exam 1	15 %
Midterm Exam 2	15 %
Final Exam	20%
Laboratory	20 %
Homework	20 %
In-Class Work	10 %

6. Exams

The course has a midterm exam and a final exam on the dates given below:

Midterm Exam 1	Monday, October 7	3:00 p.m. – 4:15 p.m.	Silver 207
Midterm Exam 2	Monday, November 18	3:00 p.m. – 4:15 p.m.	Silver 207
Final Exam	Monday, December 16	2:00 p.m. – 3:50 p.m.	Silver 207

The **Midterm Exam** will contain questions on material from Chapters 1, 2 & 3. The **Final Exam** will contain questions on material from Chapters 4, 5, 6 & 8 plus the special topic. Each exam will also contain one or two questions based on the **laboratory projects**.

If you will miss a midterm exam because of illness, you must contact Professor Kallenbach by e-mail **before the start of the exam** and provide a doctor's note explaining your absence. **No make-up exam** will be given for midterms. Instead, the final exam will count as 35% of your course total. This option is **not advisable** unless extreme circumstances prevail.

The final exam is scheduled by the NYU registrar's Office as specified. A make-up will be given for the final exam **only under exceptional circumstances** that must be discussed with Professor Kallenbach prior to the exam. In the rare cases where approval is granted, a grade of **incomplete** will be given for the course and a make-up might be scheduled for the Spring 2011 semester or when the final is scheduled when the course is taught next.

7. Homeworks

These assignments will be scheduled in CONNECT.

8. In-Class Assignments

In-class assignments will be given regularly throughout the semester. For some assignments you will work **individually** and for other assignments you will work in a **group**. Full credit is given for your best effort at answering the questions.

These in-class assignments are designed to be completed **during the class in which they are given**. A maximum of **two make-ups** will be allowed for in-class assignments. Make-ups must be completed within **two weeks** of the original date for the in-class assignment.

9. Laboratory Sessions

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 September 21/22, you will be required to **drop the course**.

The laboratory sessions will be held in **Silver 202** and will begin on **September 14 & 15**. There are **no laboratory sessions during the first week of class**. The laboratory instructors for the course are listed below, along with their contact information.

Joseph Katigbak
jk3908@nyu.edu

Laura Poloni
lnp237@nyu.edu

Haotian Wu
hw731@nyu.edu

<i>Lab Section</i>	<i>Day and Time</i>
Section 002	Tuesday, 11:00 a.m. -12:40 p.m.
Section 003	Tuesday, 1:00 p.m. – 2:40 p.m.
Section 004	Tuesday, 3:00 p.m. – 4:40 p.m.
Section 005	Wednesday, 9:00 a.m. – 10:40 a.m.
Section 006	Wednesday, 11:00 a.m. – 12:40 p.m.

Each weekly lab project is worth 50 points that will be added and scaled to make up 20% of your final grade:

Attendance	10 points
Quiz	10 points
Lab Assignment	30 points

Attendance Credit: You are expected to arrive punctually for the beginning of the lab session. 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 partner. 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 serious illness or because you are observing a religious holiday, **you must notify your lab instructor before the start of the lab.** Unexcused lab absences will result in loss of credit for the lab session.

Because of the logistics of using the laboratory room, **no make-up labs are possible.** Permission to attend another lab section to complete a lab project will only be given under special circumstances that must be discussed with Professor Jordan and your lab instructor in advance.

5. Grade Components

Midterm Exam	15 %
Midterm Exam	15 %
Final Exam	20 %
Laboratory	20 %
Homework	10 %
Learn Smart	10 %
In-class Exercises	10%

6. Exams

The course has two midterm exams and a final exam on the dates given below:

Midterm Exam 1	Monday, October 8	3:0 p.m. – 4:15 p.m.	Silver 207
Midterm Exam 2	Monday, November 19	3:00 p.m. – 4:15 p.m.	Silver 207
Final Exam	Wednesday, December 19	4:00 p.m. – 5:50 p.m.	Silver 207

Midterm Exam 1 will contain questions on material from Chapters 1 and 2. **Midterm Exam 2**

will contain questions from Chapters 3, 4 and 5. The final Exam will be cumulative, with an extra focus on Chapter 8. Each exam will also contain one or two questions based on the **laboratory projects**.

If you miss a midterm exam because of illness, you must contact Professor Kallenbach by e-mail **before the start of the exam** and **provide a doctor's note explaining your absence**. **No make-up exam** will be given for the midterms. Instead, the final exam will count as 35% of your course total. Since the final exam will be cumulative, this option is not advisable unless extreme circumstances prevail.

The final exam is scheduled by the NYU registrar's Office and **no alternative exam date will be provided**. 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 2013 semester.

7. Homeworks

The course includes two different homework assignments:

- Online homework assignments using the CONNECT system.
- **Learn Smart** self-assessment modules for each chapter.

Homeworks must be submitted on time for full credit and late homeworks will be penalized.

If you suffer from an illness during the course, or miss class for any excused reason, you are still required to complete all the homework assignments. Contact Professor Kallenbach to arrange a date for submitting the work.

8. Reviews

It is important to regularly monitor your own understanding of the course material throughout the semester. To that end, the course will use the **LearnSmart** feature in CONNECT to provide you with a **review** of how well you have understood the content of each chapter. Note that a chapter of the text covers several lectures.

Each module provides you with short answer questions that are based on concepts and skills presented in the textbook readings and lectures for that week. For each question, you are first asked to rate your **confidence** in your answer and then you will be given feedback on whether your answer is correct. At the end of the module, you will be provided with a summary score of how well you know these topics. These questions are designed to help you identify topics that you may find unclear or confusing. When you do, please be sure you reread that section of the chapter or consult the professor or your lab instructor.

The **weekly review assignment** must be submitted by **11:59 p.m.** on **Sunday night of each week** (unless an exception is announced). Each review should take approximately **30 minutes** to complete. You will receive **full credit for completing the review**, regardless of how many questions you answer correctly. The goal of the review is to provide you with a **self-assessment** of your understanding. If you find that you are having difficulty with a specific topic, we **strongly recommend** that you take the necessary time to review it again.

9. In-Class Exercises

In-class exercises will be given regularly throughout the semester. For some assignments you will work **individually** and for other assignments you will work in a **group**. Full credit is given for your **best effort** at answering the questions.

In-class assignments are designed to be completed **during the class in which they are given**. A maximum of **two make-ups** will be allowed for excused absence from in-class assignments. Make-ups must be completed within **two weeks** of the original date for the in-class assignment.

10. Laboratory Sessions

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. **Please note:** the section enrollment will **not be increased**. If you are not appropriately registered for a laboratory section by September 18/19, you will be required to **drop the course**.

The laboratory sessions will be held in **Silver 202** and will begin on **September 11 & 12**. There are **no laboratory sessions during the first week of class**. The laboratory instructors for the course are listed below, along with their contact information.

<i>Lab Section</i>	<i>Day and Time</i>
Section 011	Tuesday, 1:00 p.m. – 2:40 p.m.
Section 012	Tuesday, 3:00 p.m. – 4:40 p.m.
Section 013	Tuesday, 5:00 p.m. – 6:40 p.m.
Section 014	Wednesday, 9:00 a.m. – 10:40 a.m.

Section 015	Wednesday, 11:00 a.m. – 12:40 p.m.
Section 016	Wednesday, 1:00 p.m. – 2:40 p.m.

Each weekly lab project is worth 50 points:

Attendance **10 points**

Quiz **10 points**

Lab Assignment **30 points**

Attendance Credit: You are expected to arrive punctually for the beginning of the lab session. 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 partner. 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 serious illness or because you are observing a religious holiday, **you must notify your lab instructor before the start of the lab.** Unexcused lab absences will result in loss of credit for the lab session.

Because of the logistics of using the laboratory room, **no make-up labs are possible.** Permission to attend another lab section to complete a lab project will only be given under special circumstances that must be discussed with Professor Jordan and your lab instructor in advance.