

PHYSICAL SCIENCE: ENERGY AND THE ENVIRONMENT

CORE-UA 203 – Section 001
Fall 2021

Tuesdays and Thursdays
11:00 a.m. – 12:15 p.m.
Silver Center 207

Professor Bart Kahr

Chemistry Department

Brown, Room 656

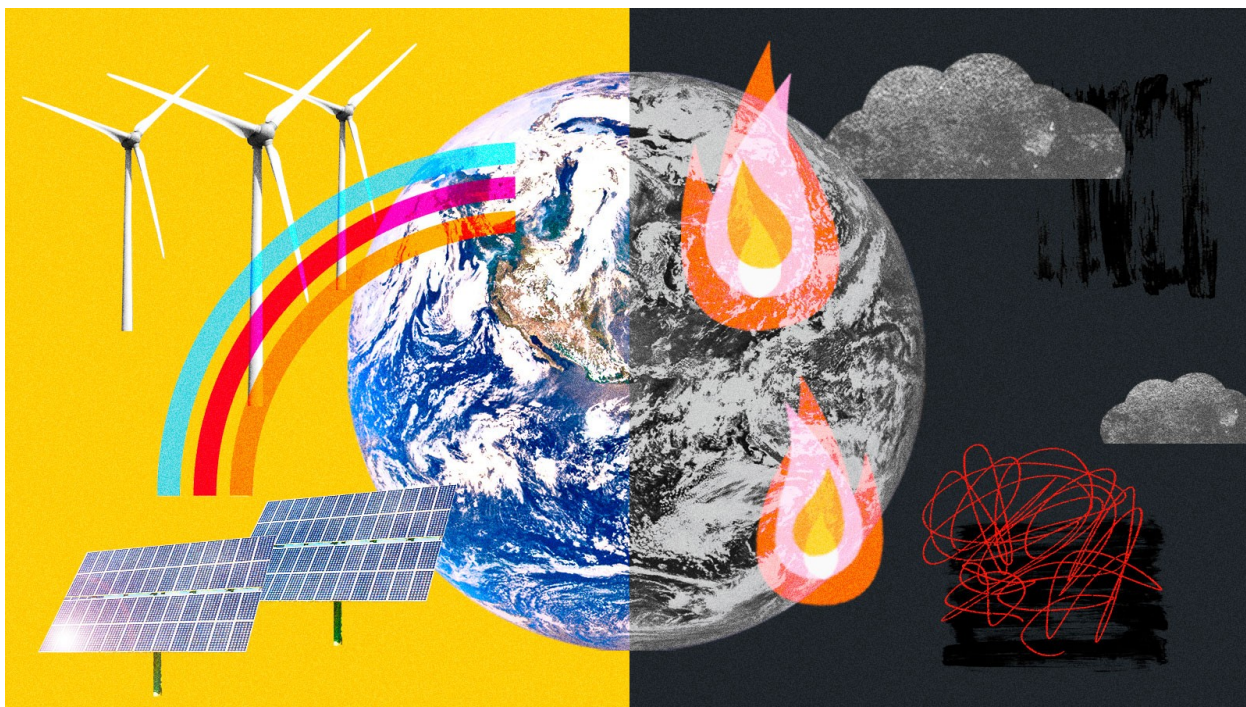
Phone: 212 - 992 - 9579

E-mail: bart.kahr@nyu.edu

Office Hours: Wednesdays, 4PM-5PM by Zoom. Link to be provided.

McGraw-Hill CONNNECT content link for this section.

<https://connect.mheducation.com/class/b-kahr-fall-2021-tr11am>



grist.org

1. Course Description

CAS-UA 203 explores the scientific foundations of current environmental issues and their implications for human welfare. The syllabus is divided into sections that examine current environmental themes. The first section introduces the science of chemistry, and investigate the composition of the atmosphere and the chemical processes that cause air pollution, ozone depletion, and the mechanisms of global heating. The genius of the periodic table of the elements, molecules and their electronic structures, and the energy content of light will be stressed, as well as important atmospheric photochemical (light induced) reactions. The middle part of the course examines the properties of solutions, and threats to our fresh water supplies, as well as energy liberated from chemical reactions, combustion foremost, and the dangers of our continuing reliance on fossil fuels. Chemical concepts include solution concentrations, pH, and the energy inherent in different kinds of chemical bonds. The last third tackles alternatives to burning fossil fuels including nuclear energy, solar energy, and electricity storage in the form of batteries. We will study nuclear transformations, electrochemistry, and photovoltaic (solar) technology. At the very end (but also throughout the course) we will discuss environmental economics and politics that may actualize social changes. While this is a science class, the climate crisis can only be solved if science and technology is coupled with smart social policies. If you are an economics major or business major, we need you. If you are a politics major, we need you. If you are a sociology major, we need you. If you are a history major, we cannot repeat the mistakes of the past. If you are an arts major, we must reach the souls of our neighbors. If you are a global public health major, we need you to anticipate the redistribution of infectious diseases in a warming world. If you are a literature major, read and teach our closely imagined futures: <https://qz.com/1770404/the-seven-most-crucial-climate-change-Novels/>.

Laboratory experiments are closely integrated with the lecture topics and provide hands-on explorations of central course themes.

2. Course Learning Objectives

- Acquire knowledge of foundational concepts, processes, and terminology of chemistry.
- Develop skills in problem solving and use of quantitative reasoning.
- Understand the methods of scientific investigation.
- Evaluate new advances in our understanding of environmental science as reported by news/social media. Has to distinguish credible vs incredible.
- Examine the economic, societal, and policy aspects of environmental issues.
- Use evidence and critical thinking to make informed decisions about complex environmental challenges.

3. Teaching Staff

Professor Bart Kahr, Instructor of record, TR 11:00 am - 12:15 am, Silver 207.

The course is staffed by four graduate students who will be a valuable resource for you during the semester. Meetings with individual instructors can be arranged by appointment.

Leilani Smith (Inns6237@nyu.edu)

Office hours: TBD by Zoom

Zulema Peralta-Saltos (zp466@nyu.edu)

Office hours: TBD by Zoom

Chufan Yang (cy1397@nyu.edu)

Office hours: TBD by Zoom

Isabelle Yardumian (ihy2004@nyu.edu)

Office hours: TBD by Zoom

4. Course Materials

You require three things. (1) Electronic access to text and questions. (2) Laboratory manual. (3) Safety glasses.

(1) *Chemistry in Context*

Custom Electronic Edition for NYU based on 10th edition. See instructions below for electronic (or print) access. Published by the American Chemical Society (founded right here in the Silver Center in 1876 – find the plaque affixed to the outside of the building), the text will be delivered digitally. Registered students will receive an email the week before classes begin, giving them the link to access the material. The book, *Chemistry in Context* by ACS will be delivered to you digitally through the CONNECT platform. The **cost of the book is \$67.75**, which will be added as a “book charge” to your bursar bill, this is a savings of \$94.92 over the publisher’s list price. You can purchase a print book through the CONNNECT website. It will be delivered to you. Should you choose to remove yourself from the program and find your course materials elsewhere, you must login [here to the student portal](#) and opt out of having the course materials provided to you by **September 17th**.

Activate account (Username = school email address) **and select password here:**
<https://includedcp.follett.com/2015>

(2) *Laboratory manual*

Purchased from the NYU bookstore.

(3) *Safety glasses*

Purchased 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 required**. 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.

5. Course Site

The course will be managed through the Brightspace website. Lectures, forms, etc. will be posted at Physical Science I: Energy, Section 001. NYU Brightspace can be accessed using the ACADEMICS TAB on your NYU Home page: <https://home.nyu.edu/academics>.

6. Lecture and Laboratory Schedule

<i>Topic/ Lecture</i>	<i>Week</i>	<i>Date</i>	<i>Lecture</i>	<i>Reading & Homeworks (Smartbook and Questions)</i>	<i>Laboratory</i>
1	1	Thursday September 2	Course Introduction: What is Energy?		
2	2	Tuesday September 7 Wednesday September 8	Periodic Table	Chapter 1	Lab 1: Math Review
3		Thursday September 9	Atoms & Molecules	Chapter 1	
4	3	Tuesday September 14 Wednesday September 15	Atmosphere	Chapter 2 Chapter 1 homeworks due	Lab 2: Properties of Air
5		Thursday September 16	Air Pollution & Acid Rain	Chapter 2	
6	4	Tuesday September 21 Wednesday September 22	Light & color	Chapter 3	Lab 3: Properties of Light 1
7		Thursday September 23	Ozone Production	Chapter 3	
8	5	Tuesday September 28 Wednesday September 29	Ozone Destruction	Chapter 3 Chapter 2 homeworks due	Lab 4: Properties of Light 2

9		Thursday September 30	Climate Change & the Greenhouse Effect	Chapter 4	
	6	Tuesday October 5	Flexible time		
		Wednesday October 6			Midterm 1 Review
		Thursday October 7	Midterm Exam I Chapters 1-3		
	7	Tuesday October 12	No Class – Tuesday running on a Monday Schedule	Chapter 4 Chapter 3 homeworks due	
		Wednesday October 13			Lab 5: Molecular Structure and Vibrations
10		Thursday October 14	What Can We Do? The Drawdown		
11	8	Tuesday October 19	Water, concentration	Chapter 5 Chapter 4 homeworks due	
		Wednesday October 20			Lab 6: Studying Reactions to Aqueous Ions
12		Thursday October 21	pH and logarithms	Chapter 5	
13	9	Tuesday October 26	What is Energy, Again?	Chapter 6 Chapter 5 homeworks due	
		Wednesday October 27			Lab 7: Determining Water Hardness
14		Thursday October 28	Petroleum and Whale Oil	Chapter 6	
15	10	Tuesday November 2	Chemical Energy & Combustion	Chapter 6 Chapter 6 homeworks due	
		Wednesday November 3			Lab 8: Energy Change of Chemical Reactions
16		Thursday November 4	Nuclear Chemistry	Chapter 7	
	11	Tuesday November 9	Flexible time		
		Wednesday November 10			Midterm 2 Review
		Thursday November 11	Midterm Exam II Chapters 4-6		
17	12	Tuesday November 16	Nuclear Reactors	Chapter 7 Chapter 7 homeworks due	
		Wednesday November 17			Lab 9: Solar Cells and Fuel Cells
18		Thursday November 18	Conductors and Semiconductors	Chapter 7	
19	13	Tuesday November 23	Photovoltaics (Solar)	Chapter 7	
		Wednesday November 24			No Lab - Thanksgiving
		Thursday November 25	No Class - Thanksgiving		
20	14	Tuesday November 30	Electron Transfer Reactions	Chapter 8 Chapter 8 homeworks due	
		Wednesday Dec 1			Lab 10: Building Batteries
21		Thursday Dec 2	Batteries	Chapter 8	
22	15	Tuesday Dec 7	Environmental Economics	S. Smith, <i>Environmental Economics</i> , 2011, Amazon, \$6 optional	
		Wednesday Dec 8			Final Exam Review
23		Thursday Dec 9	Environmental Politics & Social Change	A. Dobson, <i>Environmental Politics</i> , 2016, Amazon, \$6, optional	

	16	Tuesday Dec 14	Flexible time		
		TBD	Final Exam Chapters 1-8	TBD	

Color code: Blue is lab related. Red is exam/homework date. Green for no class. Purple material will focus on material outside of the textbook/CONNECT content. It won't be tested or used in determining your grade, but necessary for the comprehensive discussion of a world changing subject.

I will post my ppt lectures on Brightspace. For student unable to attend class, I will include a text to go along with the lectures where that is necessary. That provided, nevertheless, students who attend class perform better than those who don't. This shouldn't be a big surprise, but it is borne out by decades of comparing grades with attendance. (Is this a scientific judgment? Think about it.) Nevertheless, I would encourage you to come to class if you are able and hedge your bets.

7. Grade Components

	%	points	
Midterm Exam 1	15 %	150	
Midterm Exam 2	15 %	150	
Final Exam	20 %	200	
SmartBook Homework	10%	100	12.50 points each/8 assignments. If you complete the reading by the date provided, you get these points.
Homework Questions	15 %	150	18.75 points each homework/8 assignments of 15 questions. (each question worth ca. 0.1% of total score)
Laboratory	25 %	250	Total lab score possible (500 for 10 labs @ 50 each) divided by 2 50 points per lab. 5 for attendance, 10 for quiz, 30 for lab assignment, 5 for clean-up
	100%	1000 points	

8. Homework

I no longer understand the meaning of *homework*. The answer to any question can be found foraging online. Whether you are studying online with a friend or paying a dubious service to provide answers is the difference between a few keystrokes. The notion of *practicing* has changed during my career.

For this reason, the homework will be easy, drawn randomly for individuals from pools of multiple-choice questions on the McGraw-Hill CONNECT, and progressive reading in the SMARTBOOK platform (do SMARTBOOK first) will be awarded points for execution. Both parts of the homework will be scored automatically. I will draw the exam questions likewise from a McGraw-Hill pool albeit distinct from the homework questions, but in the same style. If you can do the homework, you can do the exams. There should be no mystery here.

While some grading structure is required of me, I am less concerned with your performance than your engagement with what is one of the most urgent problems of our time. The temperature of the planet will be rising after this class ends. We all must decide how we are going to engage with this material. If ever there was a class where what we are discussing is more important than the class itself, this is it.

Homeworks incur 25% penalties for each day late. These will be imposed automatically.

9. Exams

Midterm Exam I (chapters 1-3) Thursday, October 7 In class 11:00 – 10:45am Silver 207

Midterm Exam II (chapters 4-6) Thursday, November 11 In class 11:00 – 10:45am Silver 207
Final Exam (chapters 1-8) TBD

If miss a midterm exam because of religious observance contact Professor Kahr by e-mail **before the start of the exam**. You will be excused if you notify your instructors **in advance** of your obligation. **No make-up exam** will be given for the midterms. Instead, the final exam will count as 35% of your course total.

The final exam is scheduled by the NYU Registrar's Office and **no alternative exam date will be possible**. Do not book travel plans until you know your final exam schedule. If you miss the final exam for illness or emergency, you must take the final exam of one of the Spring 2021 sections. A grade of **incomplete** will be given for the course until next semester's instructor reports the final grade to me. Should you take a make-up final exam in future, you must have the instructor sign your examination so as to establish that you were present, and so as to remind the instructor that your exam should be set aside.

10. Laboratory Sessions

You must be registered in a laboratory section 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 cannot be increased. If you are not registered for a laboratory section you will be required to drop the course.

The laboratory sessions will be held in **Silver 202** and will begin on **Wednesday September 8**. There are no laboratory sessions during the first week of class. Our lecture section (001) has Wednesday labs, below.

002	Wednesday	09:30 pm - 10:45 pm	Silver 202
003	Wednesday	11:00 am - 12:15 am	Silver 202
004	Wednesday	12:30 am - 1:45 pm	Silver 202
005	Wednesday	02:00 pm - 03:15 pm	Silver 202
006	Wednesday	03:30 pm - 04:45 pm	Silver 202
007	Wednesday	04:55 pm - 06:10 pm	Silver 202

Each weekly lab project is assigned 50 laboratory points assigned as follows: Attendance (5 points), Quiz (10 points), Lab Assignment (30 points), Clean-Up (5 points). Total lab points will be dividend by 2 to scale with other components of class.

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. Quizzes will be available on the course's Brightspace site. Quizzes will be released on Fridays at 9 AM, the week before the laboratory, and due at 11:55 PM on the Tuesday before the first Wednesday labs.

Laboratory Assignment: This assignment should be completed by working collaboratively (albeit not just copying) with your laboratory partner. Laboratories assignments should be turning in to your adjunct instructor during the next lab period. They will be returned after one additional laboratory period. Ex. Week 3 lab, Week 4 turn in assignment, Week 5 collect graded assignment.

Like homeworks, lab assignments will incur a 25% penalty for each day late.

Clean-up: You are expected to clean-up your lab bench before you leave the lab.

Lab Absence Policies. It is strongly advisable not to miss **any** of the lab sessions. However, it sometimes happens that you cannot attend a lab session because of illness or because you are observing a religious holiday. In those cases, you should complete the **LAB ABSENCE FORM** (posted on the course site) and submit it to your laboratory instructor before the missed lab. Logistics preclude make-up labs. Permission to attend another lab section to complete a lab project will only be given under special circumstances that must be discussed with Professor Kahr and arranged with your lab instructor in advance, space permitting. Performing experiments and analyzing data are central to scientific inquiry. For this reason, the lab component of the course is an essential part of your experience.

11. Email

In email subject lines, please includes “203” and your “name” in subject line.

12. And Finally...

Your grade in this class is not nearly as important as what we will be discussing. Keep that in perspective. According to the philosopher Kathleen Moore, "It is wrong to wreck the world." First and foremost, we must figure out how not to wreck the world.