

Honors 203/Chemistry 110

Chemistry and Issues in the Environment

Syllabus - Part 1 - The Lecture

Welcome to Honors 203/Chemistry 110! This is a course designed for honors non-science majors to learn about fundamental principles of chemistry and the environment in the context of how chemistry and chemicals affect our lives, our society, and our planet. Chemistry is primarily an experimental science, so we will be exploring chemical concepts in the laboratory as well as in lecture. The course description for Chemistry 110 from the catalog is as follows:

CHM 110 Chemistry and Issues in the Environment: The operations of natural physical environmental systems are studied. Alterations to environmental systems are caused by the use of energy and mineral resources. Use and abuse of these resources lead to air pollution, water pollution and solid waste disposal. Solutions to these problems depend on the progress in science and technology, as well as political decisions and prevailing ethical value systems. No prerequisite.

The course description for Honors 203 from the catalog is as follows:

HON 203 Honors Seminar: Critical and Creative Inquiry: This course is designed to challenge students to further develop the crucial skills of critical and creative inquiry. Students will foster these skills as they study diverse issues from multiple perspectives in varied genres across the curriculum.

This course satisfies the General Education Requirement: Inquiry and Issues in Science and Technology. Headlines from major newspapers, magazines and journals are interspersed throughout this syllabus to illustrate the links between the course content and the rest of the world.

General Information

Instructor:	Dr. Kimberly Lawler-Sagarin
Office:	Schaible Science Center 218
Phone:	x 3202
e-mail:	ksagarin@elmhurst.edu
Office Hours:	W 1:30pm-3:30pm, F 1:30pm-2:30pm, or by appointment <i>These are subject to change. Regular office hours will begin week 2.</i>
Class Meetings:	MWF 10:30 a.m.-11:35 a.m.; Schaible Science 138
Laboratory:	M 1:00-4:00 p.m.; Science 224
Required Materials:	Text: <i>Chemistry in Context: Applying Chemistry to Society (6th ed.)</i> Approved eye protection for the laboratory Scientific calculator
Web Site:	http://www.elmhurst.edu/~ksagarin/honors

“Anger grows over inaction on air pollution” (*South China Morning Post* 1/11/2009).

“Rising Acidity Is Threatening Food Web of Oceans, Science Panel Says” (*New York Times* 1/30/2009).

“Obama’s Order Is Likely to Tighten Auto Standards” (*New York Times* 1/26/2009).

“Energy nominee softens views on coal, nuclear power”
(*Wall Street Journal*, 1/14/2009).

“In fake grass, some see real threat Tests reveal lead in school fields” (*The Boston Globe* 1/19/2009).

“Illinois: Energy Dept. Pulling Support for Clean Power Plant” (*New York Times* 1/30/2008).

“Sulfur in Heating Oil to Be Reduced” (*New York Times* 1/26/2009).

“Wood boilers fueling air quality debate” (*USA Today*, 1/16/2008).

Course Format and Topics

The course is organized around seven major topics discussed in chapters 1-7 of the textbook *Chemistry in Context*. The topics can be described as follows:

1. Air Pollution
2. The Ozone Layer
3. Global Warming
4. Energy
5. Water
6. Acid Rain
7. Nuclear Fission

Class time will be used for a mixture of discussions, lecture and activities. Though the class is organized around these seven broad topics discussed in the text, many class meetings will be based on additional assigned material from other sources. All students are expected to participate in classroom discussions on a regular basis.

Regular homework assignments will concentrate on the chemical fundamentals behind the environmental issues we are studying.

Laboratory meetings will consist of chemical experiments related to course topics, activities (field trip, movies, discussions, presentations) and sample collection and experimental time for laboratory projects.

Environmental chemistry deals with real-life problems, many of which do not have easy or clear answers. Solutions, and indeed even some of the problems themselves, are often seen as controversial. To approach some of the controversial issues in depth, we will engage in a number of structured activities linked to class discussions, role plays, presentations and writing assignments. These activities will factor into the course grade. (Of course, informal discussions on a wide range of topics will happen as well, as a normal part of classroom activities.)

Course Structure and Grading

Overall Grading Philosophy

At first glance, this entire section on grading may seem a little long. As your instructor, my goal is to help and encourage you to learn. All students learn differently, thus I try to utilize a broad range of methods and assignments. This means that there will be a lot of different opportunities for you to apply the concepts we will be investigating this semester. Correspondingly, there are many different ways to earn points and demonstrate your understanding of the material in this course.

Being graded, especially in science courses, can create a certain degree of anxiety. What I have tried to do here is to write out all of my grading policies so that both you and I know what to expect. *Please* read this and subsequent sections carefully. If you find you have a grading situation or question that is not addressed here, please do not hesitate to ask.

Points and Assignments

Grades on all assignments will be given in points. The maximum number of points possible is 1000. Grading criteria within each of these categories varies and is discussed in the individual sections of the syllabus. Grading for the laboratory portion of the course is described in "Chemistry 110 - Syllabus Part 2 - The Laboratory".

	Pts Each	Total	Combined	Percentage of final grade
Exams (3)	100	300	300	30%
Final Exam		160	160	16%
Laboratory				
Experiments/Activities (7)	20	140		
Movies + Reflection (2)	20	40		
Field Trip	20	20		
Project Sample Collection/Experimental	30	30		
Project Lab Report	20	20		
Total Laboratory			250	25%
Assignments				
Problem Sets (10)	10	100		
Clean Cars Essay/Discussion	20	20		
Ethanol Presentation/Role Play	20	20		
Blog Postings (2)	15	30		
Blog Participation (4)	10	40		
State of Fear Paper	40	40		
State of Fear Presentation	40	40		
Total Assignments			290	29%
Course Total			1000	100%

Grading Scale

Students must complete the minimum course requirements to successfully complete the course objectives and receive a passing grade in this course.

The grading scale will depend in part on my assessment of the difficulty of the exams and the final. However, the grading scale, for those students meeting all course requirements, will not be raised above the following:

900-1000	A
800-899	B
700-799	C
600-699	D
599 and below	F

This means if you receive 900 points and complete all course requirements, you will get an A. If you have, 899 points (and you have completed all course requirements) you will be guaranteed *at least* a B. Students not fulfilling all course requirements will be subject to specific grading policies defined in the next section.

Students within 20 points of the next highest grade *may* be given the higher grade at the discretion of the instructor based on consideration of a high homework percentage, regular attendance, instructor evaluation, and overall performance pattern.

Course Requirements

This course is designed with many different types of activities and assignments. Students are asked to participate actively in all portions of the class. A baseline set of course requirements is established below. These baseline requirements are considered essential for success in the course.

To be graded on the grading scale defined in the previous section, you must complete or meet all the following course requirements. These are listed below:

1. Pass the lecture portion of the course (450 points in lecture)
2. Pass the laboratory portion of the course (150 points in lab)
3. Have no more than 1 unexcused absence from the laboratory
4. Adhere to all safety precautions in the laboratory
5. Pass the final exam
6. Miss no more than 1 graded presentation or paper
7. Participate in classroom discussions on a regular basis
8. Accumulate at least 218 (75%) lecture assignment points

Not meeting the course requirements can have a *significant* effect on your grade in the course. Below, you will find the rationale for these policies, as well as the effect they may have on a course grade.

- Both portions of this course, the lecture and the laboratory, are essential to the course objectives. Thus, all students are required to obtain a passing grade in both the lecture and the laboratory portions of the course.
- The laboratory is an experiential learning opportunity, thus attendance and active participation is essential. Because of this essential experiential nature of the lab, having more than one unexcused absence from lab is not allowed
- An essential part of this course is problem-solving and critical engagement in the environmental issues we will discuss. Thus, all students are required to achieve a minimum number of assignment points, participate in class discussions and miss no more than 1 graded presentation or paper, as specified above.
- The final exam will be comprehensive and designed to test broad concepts and ideas discussed in the course. It is expected that all students will receive a passing grade on the final.
- Safety in the chemical laboratory is very important for your own well-being as well as the well-being of others. A recurring disregard for safety precautions may adversely affect your overall grade in the course by as much as an entire letter grade.

In the very unlikely case that a student does not meet the course requirements, that student may not receive a passing grade in this course, depending on the nature and extent of the un-met requirements. At minimum, the student will receive a one-letter grade penalty.

College Policies

College policies on incompletes/drops/unauthorized withdrawals will be followed. Also, **read carefully** the Code of Academic Integrity and the Student Rights and Responsibilities section of the current Student Handbook (E Book) to understand College policies regarding plagiarism, cheating, non-discrimination, and policies regarding privacy with regard to student records. All such policies will be strictly enforced.

If you have a diagnosed disability or believe that you have a disability that might require reasonable accommodations for academic instruction please contact the Disability Services Provider (630) 617-3753. It is your responsibility to initiate a request for services from DSP and to provide appropriate verification of disability. Upon disclosure of a disability verified by DSP, any reasonable accommodation will be made.

“States take on global warming; More than half target emissions” (*USA Today*, 1/21/2008).

“GM invests in a cellulosic ethanol startup” (*Automotive News*, 1/14/2008).

“Problems Plague U.S. Flex-Fuel Fleet; Most Government-Bought Vehicles Still Use Standard Gas” (*The Washington Post*, 11/23/2008).

Course Assignments

Homework Problem Sets

Problem sets will be assigned and collected on most Mondays at the beginning of class. Guidelines for preparing homework assignments are as follows:

1. Each problem or question should be written out, with the full solutions following. This is a little more work, but it only takes a few minutes and makes it easier for you to study the problem later. When I grade assignments, I often provide feedback which refers directly back to the problem statement. This makes it easier for me to give you detailed feedback on the assignment, and also makes it easier for you to interpret my feedback later.
2. Show all your work on mathematical problems.
3. Final answers must always include correct units.
4. Please put your name at the top of your homework set.
5. Staple all pages together.

Keys to the homework will be available on the course web site after the due date.

Grading of problem sets is as follows.

1. Each problem set will be worth 10 points.
2. You will receive partial credit on all attempted problems, full credit is awarded for complete and correct answers.
3. Late homework: accepted ONLY with a “Late Certificate” (See the section regarding skipped or late assignments.)

Examining the Issues: Discussions/Presentations/Writing Assignments

- Issue 1: Clean Cars Act

We will investigate whether Illinois should become the 15th “clean cars” state. The Clean Cars Act (Illinois H.B. 3424) would set tougher automobile emissions standards similar to those in California and 13 other states. The proposed law would direct the Illinois Environmental Protection Agency to reduce tailpipe emissions of both smog-forming chemicals and greenhouse gases. These proposed regulations include fuel economy standards that are stricter than current federal standards and thus require approval by the EPA. Students will investigate this issue, prepare a mini-essay on their position, participate in a class discussion and revise their essays after the discussion. You will first research the issue in advance and prepare a draft of a mini-essay (2 pages, double spaced) on your views on this issue. Drafts are due on the day of the discussion and will be worth 5 points. Late drafts will not be accepted, as the draft is intended to prepare you for participation in the discussion. Your participation in the discussion will also be worth 5 points. Following the discussion, you will have the opportunity to rewrite your mini-essay based on the classroom discussion and my feedback. Final copies will be graded out of 10 points.

- Issue 2: Ethanol as an Alternative Fuel

This question will be investigated via role play with individual presentations by students acting as stakeholders in this debate. The details of this and assigned roles will be discussed in class.

- Issue 3: Global Climate Change (and the media)

Two recent attempts to persuade the American public on this issue include the novel *State of Fear* by Michael Crichton, and the movie featuring Al Gore's slide show *An Inconvenient Truth*. Part of our agenda from this term will be to critically analyze the material presented in the book *State of Fear* through group presentations, individual papers and class discussion. We will begin reading the novel immediately. A laboratory meeting will be devoted to group presentations (in pairs) and discussion of the novel. Following the presentations, students will prepare a five page (double spaced) analysis of the book. Presentations will be focused on specific topics addressed in the novel and will be assigned in class. Individual analysis may focus on one specific issue, or may address the book as a whole. We will also watch *An Inconvenient Truth* or another movie on climate change or energy use during a laboratory period. The class will decide which movie to watch from a selection provide by the instructor. In-class discussion and a short reflection paper (in-lab) will follow the movie.

- Issue 4: Grass Roots and Environmental Issues (Science, Policy and Web 2.0)

In this activity, the class will construct and maintain a blog designed to inform members of the Elmhurst College community about a specific environmental issue or issues. The class will determine the topics to be addressed and the scope of the site. Each student will be required to make two written postings to the course blog and participate in the blog four additional times through comments and additional postings (these will be described in class).

Attendance on formal presentation/discussion days is mandatory.¹

Late Assignments

Because everyone has a bad week, gets sick, or just runs behind, you will receive four "Late Assignment Certificates". Late assignments will NOT be accepted for regular grading unless accompanied by a certificate, or the assignment is postponed for the entire class. Exceptions to this policy will only be made in the case of serious (and documented) illness or tragedy. (See: "What if I run out of certificates?" below) Each certificate will allow you to turn in a problem sheet or other assignment **1 class period late** (by 5 p.m. the day of the NEXT class period). These certificates may be combined if needed.

"What if I run out of certificates?"

If you run out of certificates for routine mishaps and delays and have to miss any additional assignment(s), you may turn in the assignment(s) at the end of the semester. You will not receive homework points for the late assignment, but it will be counted toward the assignment completion course requirement (completing 75% of assigned work) and will be considered in the instructor evaluation.

"North Korea Limits Tests of Nuclear Site" (*New York Times*, 11/13/2008).

"Plug-in hybrids put U.S. on the road to energy independence" (*Chicago Sun-Times*, 12/15/2008).

"Heat causes chemical to leach from plastic" (*USA Today* 1/30/2008)

"FDA Draft Report Urges Consumption of Fish, Despite Mercury Contamination" (*The Washington Post* 12/12/2008).

¹I will assign an alternate activity if the absence is due to any one the following: (1) serious illness; (2) an order from the US Military; (3) officially representing the College; (4) death in the immediate family. All such instances will require documentation.

Exams

There will be three midterm exams. Each exam will be given at the beginning of class and may include: lecture and discussion material (as specified), issue discussions, homework assignments completed since the last exam, assigned reading material (as specified), and any video segments shown in the lecture or laboratory since the last exam. I will never give “pop” quizzes in lecture, however it is your responsibility to be aware of scheduled exam dates and any rescheduled exams. Rescheduled exams will be announced in lecture or laboratory.

No exams will be dropped. I will grant permission to make up an examinations if the absence is due to any combination of the following: (1) serious illness; (2) an order from the US Military; (3) officially representing the College; (4) death in the immediate family. All such instances will require documentation.

The Class Web Site:

<http://www.elmhurst.edu/~ksagarin/honors> is the URL for the course web site. The web site will serve as a clearing house for information regarding the course. Links, assignment information and course documents will be placed here. Keys to the homework will be available on Blackboard, along with grading information. Answers to exam questions will be discussed in class after the exams are returned. Various resources will appear on the site as the semester progresses.

Getting Help:

There are many resources available to you for helping you complete this course successfully. Please take advantage of my office hours. You may also feel free to stop by my office at times other than those posted. An open door usually indicates I am available for questions.

One of the best ways to contact me is by e-mail (ksagarin@elmhurst.edu). I will generally respond via e-mail fairly quickly.

The class web site will have many resources. Check it frequently for announcements, updates, and helpful links.

To protect your privacy, I will not leave any information relating to your assignment, exam or course grade on an answering machine. If you call me with a question, please leave me a time frame when you can be reached, or specific instructions that I can leave the requested information on an answering machine. Otherwise, I may wait to answer your question in class, or send you e-mail later. I check my e-mail more frequently than my voice-mail, so you may want to try that if you are in a hurry.

The publishers of the textbook have created a web site for use with the text. You can reach it by going to <http://www.mhhe.com/cic/>. Included are interactive tutorials, study quizzes, and web exercises.

The Elmhurst College Learning Center provides a variety of services to Elmhurst College students. Students can receive one-on-one tutoring in math, reading, writing, and study skills areas. A variety of other resources are also available including workshops, handouts, videotapes and on-line resources. The Learning Center is located in Frick Center 229. (x 3155)

The Writing Center, located inside the Learning Center in the Frick Center, offers one-on-one tutorials to help students at all levels to improve their writing. (x 5689)

Extra class handouts will be placed outside my office door (Science 218, 2nd floor, south side) immediately following the class and/or will be placed on the web site. If for some reason you have to miss class, please check these for information and handouts.

“In 51 U.S. cities, cleaner air means longer life” (*Chicago Tribune*, 1/22/09).

Goals and Objectives

This course fulfills the General Education Requirement for the Issues in Science and Technology Category. Goals of the General Education program and linked course objectives follow.

General Education - Issues in Science and Technology Category Objectives	Chemistry 110 - Course Objectives After completing this course, the student should be able to:
<p>OBJECTIVE 1: Development of critical thinking and problem solving skills through active exploration of natural science concepts and methods within a scientific discipline.</p>	<p>1. Discuss, explain, and apply a minimum knowledge of scientific facts, concepts, and principles about the interaction of the natural environment with modern technology.</p> <p>2. Demonstrate intellectual skills and abilities, as well as, apply the scientific method to analyze, solve, and evaluate problems and proposed solutions involving the environment and modern society.</p>
<p>OBJECTIVE 2: Explicit identification and consideration of social, philosophical, and ethical questions associated with scientific and technological topics.</p> <p>OBJECTIVE 3: Recognition of the strength and power of scientific and technological knowledge, as well as, its limitations.</p>	<p>3. Appreciate the context and limitations within which scientific information is used in decision and policy making which in turn depends on ethics and value systems.</p> <ul style="list-style-type: none"> • Know that the nature and method of science is to observe, measure, and evaluate information. • Understand that in solving any problem that there are risks and benefits inherent in the application of any science or technology. • Understand that a limitation of science is that nothing is proved conclusively, but rather science deals with probabilities. • Understand that ethical and value decisions involve the weighing of relative advantages and disadvantages in deciding when and how to apply science to technology.
<p>OBJECTIVE 4: Internalization of scientific values such as intellectual integrity, curiosity, skepticism, tolerance for ambiguity, and openness to new ideas.</p>	<p>4. Students will demonstrate scientific values in process of conducting experiments and discussions/debates/role plays. The discussion questions and issues are designed to foster the examination, evaluation, and internalization of values.</p>

“Researcher turns up heat on global warming skeptics” (*Chicago Sun-Times*, 1/26/2009).

“Repurpose: Recycling, refurbishing and repurposing are three ways to cut costs and reduce your carbon footprint in style” (*Chicago Sun-Times*, 11/9/2008).

“UN nuclear watchdog says no major damage to quake-hit Japanese plant” (*Associated Press*, 2/1/2008).

Tentative Schedule:

The text, *Chemistry in Context*, takes a non-traditional approach to exploring chemical issues. Chemical concepts are introduced on a need-to-know basis as a particular environmental or societal issue is raised. Many of you may enjoy this approach. However, several basic chemistry texts with more traditional approaches are available from me should you wish to supplement your study with these additional materials. You are also welcome to borrow a text from me. We will study the environmental issues and chemical concepts discussed in chapters 1-7. There is some flexibility in the schedule and the dates for the topics and chapters listed in the schedule are approximate.

The due dates for many course assignments are posted on the schedule. Due dates not already on the schedule will be added at a later date. I reserve the right to change due dates for other assignments if the need arises. Also, I may substitute some lab experiments, depending on the weather, equipment and chemicals available. Any delayed due dates or lab substitutions will be announced as soon as possible. More serious modifications will be announced well in advance.

“California to sue government over car emissions” (*The Guardian*, 1/4/2008).

“Smoggy Beijing Plans to Cut Traffic by Half for Olympics, Paper Says” (*New York Times* 1/24/2008).

“Bush policy stakes U.S. claim in Arctic; Seeks rights to waterways and resources” (*The Washington Times*, 1/13/2009).

“Quality of replacement plutonium triggers for aging nuclear warheads questioned” (*Associated Press*, 1/20/2008).

“Ethanol maker wins big financing; GM investment could speed plan to make fuel from cheaper ingredients
Coal gasification held back by cost” (*USA Today*, 1/24/2008).

“ Nations attending Hawaii conference work to refine road map for facing climate change” (*Associated Press*, 2/1/2008).

Wk. #	Day	Date	Text Chpt.	What's Due?	Exams & In-Class	Topic	Lab This Week
1	M	Feb. 2	1				Light
	W	Feb. 4	1			atoms and molecules	
	F	Feb. 6	1			air pollution	
2	M	Feb. 9	1			air pollution	Spectroscopy I
	W	Feb. 11	1			EPA, ppm	
	F	Feb. 13	2	homework 1		atomic structure	
3	M	Feb. 16	2			molecular structure	Spectroscopy II
	W	Feb. 18	2			UV light, O ₃ cycle	
	F	Feb. 20	2			CFC's	
4	M	Feb. 23	3	homework 2		energy balance	CFCs/ozone
	W	Feb. 25	3			shape, molar mass	
	F	Feb. 27	3	Clean Cars draft	CC Disc	CAFE Standards	
5	M	Mar. 2	3	homework 3		greenhouse gases	H ₂ O hardness I
	W	Mar. 4	*			greenhouse gases	
	F	Mar. 6	3		Exam 1		
6	M	Mar. 9	3	Clean Cars final		climatic modeling	H ₂ O hardness II
	W	Mar. 11	3			IPCC conclusions	
	F	Mar. 13	3			Kyoto, CO ₂ seques	
7	M	Mar. 16	4	homework 4		energy, natural gas	Energy/fuels
	W	Mar. 18	4			coal, petroleum	
	F	Mar. 20	-			petroleum refining	
8	M	Mar. 23	-		No Class, Spring Recess!	
	W	Mar. 25	-		No Class, Spring Recess!	
	F	Mar. 27	-		No Class, Spring Recess!	
9	M	Mar. 30	4	homework 5		gasoline additives	Project
	W	Apr. 1	4			concentrations	
	F	Apr. 3	5			hard/soft water	
10	M	Apr. 6	*	homework 6	Simul.	ethanol?	Project
	W	Apr. 8	5			water treatment	
	F	Apr. 10	5		No Class, Spring Recess!	
11	M	Apr. 13	5			water quality	Project
	W	Apr. 15	6			Exam 2	
	F	Apr. 17	6			acids and bases	
12	M	Apr. 20	6	homework 7		pH calculations	State of Fear presentations
	W	Apr. 22	6			acid rain	
	F	Apr. 24	6			more acid rain	
13	M	Apr. 27	6	homework 8		SO ₂ solutions	(M) field trip
	W	Apr. 29	7			radioactivity	
	F	May 1	7			radioactivity	
14	M	May 4	7	homework 9		nuclear power	<i>Movie: TBA</i>
	W	May 6	7			nuclear waste	
	F	May 8	7			<i>Nuclear Reaction</i>	
15	M	May 11	7	homework 10		nuclear weapons	<i>Movie: Day One</i>
	W	May 13	*		Exam 3		
	F	May 15	tba	SoF paper		review, evaluations	
16	W	May 20	*	10:30 a.m. - 12:30 p.m.	Final Exam		Have a Great Summer!

Table 1: Tentative Schedule - Honors 203/Chemistry 110 - Spring 2009