

About This Course

Environmental chemistry is the study of the distribution and interactions of matter (chemicals) in the environment, which includes both the outdoors and the indoors. This is a chemistry course, but equally important it is part of your liberal arts education. The core of a liberal arts education is learning to think critically about complex subjects by applying broad knowledge and transferable skills in a socially responsible manner. In this course the emphasis is on how the specific discipline of chemistry can help us understand contemporary environmental issues, and what it tells us about possible solutions to environmental problems the world is facing. Some of the questions we will address in this course are:

- How do scientists think about sustainability as it relates to the environment?
- How can chemistry help prevent, diagnose and cure environmental problems?
- How do technical, political and social issues impact the effectiveness of our environmental stewardship?

Instructor	Office	Phone	E-mail	Web Site
Dr. Jonathan Gutow	HS-412	424-1326	gutow@uwosh.edu	http://www.uwosh.edu/facstaff/gutow
Office Hours	MW 10 – 11, TTh 10:30 – 11:30, F 10:10 – 11, or by appointment.			

This is a Quest II Course

The focus of Quest II courses is to help you learn to think critically about complex issues and ask questions (See the [USP website](#) for more details). This course is meant to follow your Quest I course and precede your Quest III course, in which you will have a chance to contribute to campus or local community efforts.

Signature Question: How do people understand and create a more sustainable world?

Ethical Reasoning: A key part of thinking critically is ethical reasoning. This course will have opportunities for you to critically examine how ethical decisions are made. You will be encouraged to become aware of the details of your own perspectives and reference frames, contrast that with those of other groups and articulate your reasoning.

Learning Outcomes: After taking this course you should be able to:

1. Describe the make-up of matter in terms of its elemental and molecular composition.
2. Use chemical bonding models and molecular composition to recognize potential environmental impacts of substances (eg. water solubility, acidity, greenhouse effect).
3. Utilize quantitative concepts, such as concentration, exposure levels and exposure limits, as part of the evaluation of the environmental impact of a substance.
4. Describe how some chemical techniques are used to quantify the distribution and concentration of substances and use this kind of data as part of an evaluation of environmental impacts.
5. Use the concept of the "triple bottom line" (also called the "three pillars of sustainability") to assess the competing interests that must be balanced while dealing with issues related to sustainability.
6. Demonstrate the ability to use ethical reasoning to articulate a position on an environmental issue.

Course Overview

Course Credits: 4

Modes: 3 hrs/wk Lecture-Discussion, 2hrs/wk Laboratory

Most course content will be distributed through **D2L**. Get assignments, handouts and answer keys there.

Lectures: 11:30 – 12:30 MWF (HS-175). Each class will be devoted to several topics related to the reading and exercises you will be assigned to complete before class. Bring your calculator to class as the quantitative aspects of this course will require us to do some calculations, which you will want to practice in class. Some credit will be available for participation in class discussions and doing group worksheets (see grading section below).

Labs: Meet in HS-401 on Tuesdays (Sec 3: 12:40 – 2:50, Sec 4: 3 – 5:10). Laboratory experiments are chosen to illustrate concepts being discussed in class and to be FUN. To prepare for lab you should read the experiment before attending lab. Don't forget to bring your lab book, pen, goggles and calculator.

Reading: Reading to be completed before each class meeting will be assigned in the online chemistry text (you will receive credit for doing these on time) or the paper environmental issues text (completing these readings will prepare you to participate in, and thus get credit for, the class discussions).

Homework: Homework will consist of two parts: 1) ungraded online practice exercises that you should try to complete before each class to help you figure out what to ask about in class; 2) graded homework, which will be due roughly weekly. The graded homework will be primarily time-limited online quizzes on material we have covered in class. These quizzes will give you an indication of what to expect in an exam situation.

Exams: There will be four 60 minute exams. Although the exams are not cumulative you will need to know material from the earlier chapters to understand things covered on the later exams.

Required Texts: We will be using three:

1. Online access to the Connect/LearnSmart™ version of *Chemistry in Context: Applying Chemistry to Society*, 8th Edition. The code to register for this is included in the bundle available from the bookstore (do not lose the code). Potentially you could buy access separately, but it is going to be more expensive. The cost in this form is about 50% the cost of buying the paper version.
2. The Laboratory manual that accompanies the 8th Edition of *Chemistry in Context*. A paper version is required so that you can bring it to lab. Included in the bundle available from the bookstore.
3. A paper version of *Taking Sides: Clashing Views on Environmental Issues*, 16th Edition by Thomas Easton. You will want this text in class for some of our discussions. Included in the bundle available from the bookstore.

Required Equipment: A **calculator** capable of handling scientific notation, square roots, powers and logs. A **pen** for writing in lab (no pencils may be used in lab). **Chemical Splash Safety Goggles** (available at the bookstore or from the chemistry club at the chemistry stockroom window).

Grading

	Details	Scaled % of Grade
Exams	4 @ 100 points each	40%
Labs (Two or more unexcused absences will result in a failing grade for the course)	10 points for doing lab and getting worksheet checked off before leaving lab. 5 points for turned in part of assignment.	24%
Worksheets	In class exercises, credit for honest effort	8%
Participation	Points will be given for substantive contributions to in-class discussions and short essays* reporting on your attendance at selected events. Maximum of 50 points.	8%
Reading Exercises	Online directed reading using the LearnSmart Text	10%
Graded Homework	Primarily from the online homework	10%

*Participation Essay(s): Each essay will be graded out of 25 points. No more than two essays will be accepted from any individual. Specific due dates and what will be required of the essay for each event will be provided through the class D2L site. Appropriate events will be announced as they come to the instructor's attention. As of the compilation of the syllabus these events include: Celebration of Scholarship (April 27, 2017), Earth Week (April 17(?) – 22(?), 2017) and Free College (April 1, 2017).

The minimum percentage necessary for each grade range is listed below. These cutoffs will not be adjusted upward, but the instructor reserves the right to lower them.

A	B	C	D	F
> 90%	> 80%	> 68%	> 55%	≤ 55%

Course Policies

Absences: The reason for any excused absences must be reported to your instructor (before the absence, if possible). Assignments and tests missed because of an excused absence will not count against your record, but you will be held responsible for material covered during your absence.

Two (2) unexcused lab absences **WILL CAUSE YOU TO FAIL THIS COURSE**: Because this class counts towards your laboratory distribution requirements, you cannot pass the course without participating in the majority of the lab meetings.

Grading Errors: To be considered for possible regrading any mistakes must be brought to the attention of your instructor within one week of the time the item is returned to you.

Final Grade Check: You are responsible for checking that your final score is correct. Save all work until the final course grade has been determined.

Academic Dishonesty: Cheating (not doing the work yourself) on exams and quizzes will not be tolerated. Plagiarism will not be tolerated. By turning in a written assignment you are certifying that the assignment represents your own work, and that you have properly cited your sources.

Tentative Schedule (Exam and Lab schedules are definite)

Week	Topics	Lab
1/30 M	Introduction, Environmental Movement, Green Chemistry	• Lab: Check-in, Units, Conversions and Significance
W	Limits of Growth, Actual versus perceived risks	
F	Air, Units, Scientific Notation, Pollutants, Risk	
2/6 M	Air Quality, Troposphere, Classifying Matter, Molecules	• Lab: Exp #1 Gases in Air & Graphing Lab
W	Reactions, Primary Pollutants,	
F	Ozone, Indoor Air, Sig. Figs.	
2/13 M	Ozone, Atomic Structure, Lewis Structures, Light	• Lab: Exp #5 What Protects Us from Ultraviolet Light?
W	Photons, Ozone, UV, Ozone Destruction	
F	CFCs et al, Ozone Hole, Politics of Pollution	
2/20 M	Discussion/Review	• Lab: Exp #6 Color & Light.
W	Exam 1	
F	Greenhouse Earth, Why CO ₂ ?	
2/27 M	Why CO ₂ ?, Carbon Cycle, Mass	• Early Alert marks released. • Lab: Exp #8 – Molecular Models.
W	Moles, Other Greenhouse Gases, How Warm?	
F	Climate Change Consequences and Responses	
3/6 M	Electricity from Heat, Coal	• Exp #13 – Biodiesel
W	Petroleum, Fracking for natural gas, the low CO ₂ fossil fuel.	
F	Fracking, Continuing to rely on Fossil Fuels	
3/13 M	Bond Energies, Gasoline	• Exp #13 – Biodiesel
3/15 W	Alternative Ways of Using Coal, Discussion/Review	Last day to drop without a late drop form
F	Exam 2	
3/20	SPRING BREAK	
3/27 M	Alternative Fuels	• Exp #16 – Water Hardness
W	Water (properties, uses, sources, contamination)	
F	Ionic Solutes	
4/3 M	Covalent Solutes, Purification of Drinking Water	• Exp #17 – Chloride in Water
W	Local Water Issues	
F	Acid Rain, Acids, Bases, pH	
4/10 M	Ocean Acidification, Measuring pH, SO ₂	• Exp #19 – Effects of Acids
W	NO _x , Nitrogen Cycle, SO ₂ vs. NO _x	
F	Acid Deposition, Lakes and Streams	
4/17 M	Discussion (Water issues in the News)/Review	• Exp #20 – pH of Common Substances Dissolved in Water
W	Exam 3	
F	Nuclear Energy	
4/24 M	Nuclear Energy	• Exp #18 – Analyzing Water
W	Nuclear Energy	
F	Energy and Batteries	
5/1 M	Battery Cradle-to-Cradle Analysis, Hybrid Vehicles	• Exp #24 – Electrochemistry
W	Fuel Cells	
F	Photovoltaics, Renewables	
5/8 M	Do we have a population problem?	• Lab Checkout.
W	Wrap-up/Review	
F	Exam 4	

Class Specific Resources

The Instructor: In addition to class time please come see me in my office if you have any issues or questions. Office hours are when I guarantee I will be in my office, but I am often around at other times and welcome drop in visits. You can also make an appointment for a specific time.

D2L: Course content will be distributed through D2L. I will try to send out e-mail notices with direct links to each new posting. However, you should check the site regularly to make sure you do not miss anything.

Early Alert: During the 5th week of the semester you will receive an "Early Alert" grade. This is a grade estimate based on performance in the class so far. This grade will not appear on your transcript. The goal is to give you an early check on how the course is going. Please take the recommendations that accompany this grade seriously.

Other Resources

Dean of Students Office: This is the office to contact (<http://www.uwosh.edu/deanofstudents>) if you have a serious issue that impacts your ability to meet your academic obligations. They can provide you with accurate advice on your options and serve as a single contact point so that you do not initially need to contact each instructor individually.

Center for Academic Resources: The Center for Academic Resources (CAR) provides free, confidential tutoring for students in most undergraduate classes on campus. CAR is located in the Student Success Center, Suite 102. Check the Tutor List page on CAR's website (www.uwosh.edu/car) for a list of tutors. If your course is not listed, click on a link to request one.

Writing Center: The Writing Center (<http://www.uwosh.edu/wcenter>) helps students of all ability levels improve their writing. Trained peer consultants help writers understand an assignment, envision possibilities for a draft, and improve their writing process. They even help writers learn to identify their own proofreading errors.

Reading Study Center: The Reading Study Center (<http://www.uwosh.edu/readingstudycenter>) is an all-university service whose mission is to facilitate the development of efficient college-level learning strategies in students of all abilities. The center offers strategies for improved textbook study, time management, note-taking, test preparation, and test-taking.