

# Chemistry in Context

Spring 2011

Class: Tuesday and Thursday 2:30 – 4:20 Nobel 201

Lab: Tuesday or Thursday 4:30 – 5:20 Nobel 107

## Instructor

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Office Hours:: By appointment

### Overview:

This course will address the chemistry behind a range of environmental and other societal-technical issues. Among the topics will be drinking water, the ozone layer, fuel cells, acid rain, global **warming**, and **green** chemistry. Given this year's Global Insight Theme, Food, we will also cover a chapter on nutrition. The chemical principles in the course will be developed on a need to know basis. In addition to the text, readings will be taken from a range of sources and policy and ethical contexts will be explored through discussions in the classroom and exploration in the laboratory.

### Text:

*Chemistry in Context: Applying Science to Society*, 6<sup>th</sup> edition, Lucy Pryde Eubanks, Catherine Middlecamp, Carl Heltzel, and Steven W. Keller, American Chemical Society/McGraw-Hill Higher Education, 2009. Website: <http://www.mhhe.com/cic>

### Topics:

TENTATIVE SCHEDULE: <a href="#">CHEMISTRY IN CONTEXT SPRING 2011 SCHEDULE</a>	
The Air We Breathe	1
Protecting the Ozone Layer	2
The Chemistry of Global Warming	3
Energy, Chemistry, and Society	4
The Water We Drink	5
Neutralizing the Threat of Acid Rain	6
Energy from Electron Transfer	8
Nutrition	11

*Project:*

The project will focus on a topic selected near the beginning of the semester. You will write a research paper on an environmental or alternative energy topic/issue. The research paper will describe the topic and weigh different sides (e.g., environmental vs. “smokestack”, pro vs. con, economics vs. environment, etc) of the issue buttressed with scientific evidence. This project will culminate with a presentation that will bring together the body of work. A revision of the research paper will be due at the time of the presentation. There will be some class time dedicated to working on these projects.

*Participation:*

Class discussion and laboratory work will play an integral role in the course and thus the quality of the discussion is dependent on preparation for each class period. Your attendance in class and laboratory is critical and as such you will be penalized 5% of your participation grade for one absence, an additional 10% for your second absence, and then 15% extra for your third absence with each subsequent absence adding 5% more (20%, ...).

*Problem Sets:*

Working problems is essential to gaining chemical understanding. This understanding is critical to evaluating environmental issues and presenting clear and sound arguments in class discussion, in your papers, and in your laboratory work. Problem sets will be assigned each Tuesday and collected the following Tuesday. Late assignments will not be accepted.

*Laboratory:*

The laboratory is a central part of the course and your participation is mandatory. The scientific method will be applied to record and analyze data with an environmental relevance. Short reports and data sheets will be completed as a part of the laboratory; details will be provided each week in lab. You must pass the laboratory portion to pass this class. You must also come prepared for lab each week – including bringing your safety goggles and handouts!

*Exams:*

Two exams will be given during the semester in addition to a final exam. Students must arrange **in advance** to take an exam at any other than the scheduled time, and may do so only for a valid health or school-related activity. Exams missed without pre-arrangement are entered as zero credit and cannot be made up. The exams are scheduled for March 24<sup>th</sup> and May 10<sup>th</sup>. Make arrangements now!

*Grading:*

Several components figure into the final grade including participation and the writing of two formal papers on your project. Exams will be given during class and may include a take-home portion. A final exam will be given during the final exam time scheduled by the registrar. The break-down of the graded portion of the class is given in the table below.

Participation	100
Homework	150
Hour Exams	200
Final	150
Laboratory	200
Paper and Presentation	200
	1000

Absolute exam grading scale: Grade ranges for final grades, expressed as a percentage of the maximum possible points (i.e., 1000 pts) are:

	B+ 88 - 90 %	C+ 78 - 80 %	D+ 68 - 70 %	F < 60%
A 94 - 100 %	B 82 - 88 %	C 72 - 78 %	D 62 - 68 %	
A- 90 - 94 %	B- 80 - 82 %	C- 70 - 72 %	D- 60 - 62 %	

Curved exam grading scale: Depending on the class performance, at the end of the semester (after the final exam) the cutoffs above may be *lowered* (but they will not be raised) if needed to *raise* the average course grade to between a B- and C+. That is, the above absolute grading scale may be modified by a curve in the favorable direction, if needed to ensure that at least half of the students receive course grades in the A or B range (including +/-).

*Gustavus Honor Code:*

Gustavus has adopted an honor code. Each of you is required to abide by the following pledge: "As a community of scholars, the faculty and students of Gustavus Adolphus College have formulated an academic honesty policy and honor code system, which is printed in the Academic Bulletin and in the Gustavus Guide. As a student at Gustavus Adolphus College I agree to uphold the honor code. This means that I will abide by the academic honesty policy, and abide by decisions of the joint student/faculty Honor Board." Pledge: "On my honor, I pledge that I have not given, received, or tolerated others use of unauthorized aid in completing this work." The penalty for not adhering to the honor code will range from taking a zero on the particular piece of work in question to referral to the honor board depending on the circumstances.

*Accommodations:*

If you have a physical, psychiatric/emotional, medical, or learning disability that may have an effect on your ability to complete assigned course work, please let me know. I will provide assistance and accommodations upon receiving verification from Laurie Bickett in the Academic Advising Center. The Gustavus Adolphus College policies on this matter can be found at [www.gustavus.edu/oncampus/advising/disability.cfm](http://www.gustavus.edu/oncampus/advising/disability.cfm).

## *Course Goals: Spring 2011*

1. Increase science literacy
2. Introduce basic chemistry knowledge
  - a. Vocabulary of chemistry (elements, compounds, periodic table, etc)
  - b. Chemical reactions and nomenclature
  - c. Interaction of light and matter
  - d. Quantitative measurements: accuracy, precision, and hands-on experience
  - e. Chemical bonding
  - f. Molecular structure
  - g. Acids and bases
3. Increase interest in and understanding of modern scientific issues, specifically alternative energy options and environmental issues (greenhouse gases, ozone hole, climate change, air pollution, acid rain, clean water)
4. Develop observation skills and encourage exploration in the laboratory