Chemistry 1
Chemistry and the Environment
Fall 2000

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Office Hours: M 5:00-6:00 p.m.

Prerequisite: An interest in understanding environmental issues.

Objectives: Upon completion of the course, each student should have an understanding of global and local environmental problems, as well as ways of alleviating such problems.

Textbook: Reading assignments will be mainly from *Environmental Chemistry* by Colin Baird (2nd edition, W.H. Freeman and Company: New York; 2000). Additional materials will be provided as handouts or as web-based assignments.

General Procedures: Lecture will be on Tuesdays and Thursdays from 8:00 a.m. to 9:45 a.m. There will be one midterm examination and one comprehensive final exam. Absence from an exam without sufficient reason will result in a zero. If you have a valid reason for your absence, see me and bring with you reasonable proof of your circumstances (note from your doctor if ill). Make up exams will not be given.

Problems related to basic chemistry topics and readings will be assigned and graded. Course grades will be based on two exams (one midterm and a final), environmental assessment project (lab), problem sets and participation (attendance in class, project contribution, etc.).

Grading:

Participation	50
Problem Sets	100
Midterm	150
Final Exam	150
Project	250
Total	700 points

Project: *Chemistry 1* is scheduled with an evening lab Wednesdays from 5:30 – 8:20 p.m. and is linked to Political Science 50 (World Geography) as part of a learning community. The Laboratory Component will allow for an expansion of environmental resource assessment (ERA) projects that have been a part of the course for several years. Since *Chemistry 1* will be linked with a World Geography course, the scientific aspects of environmental problems around the world will be discussed. Poor water quality and access to potable water are a global environmental theme for the course. Consequently, projects this Fall will focus primarily on water analysis (projected sources: reclaimed, SCU well, bottled, residence hall, local Superfund sites, Guadalupe River and Lexington Reservoir). The following methods of testing are available: field water testing kits, atomic absorption spectroscopy, and fluorescence methods (typically for biological contamination).

The project will involve a proposal, three written reports and a final poster presentation. The proposal should be a 1-2 page description of the project including objectives and relationship to previous campus assessment studies if appropriate. The preliminary report should describe what you intend to do, a timetable for your project and any preliminary findings you may have. A record of all your project activities should be maintained in a notebook or journal. The progress report should be an update on your project and will include background information related to your topic, description of methods if appropriate and initial findings. The final report will include the necessary background information, data and information, and recommendations (with justification!). Details related to poster preparation will be provided later.

Proposal (1-2 pages)	20 points (group)
Preliminary Report (2-5 pages)	30 points (individual)
Progress Report (2-5 pages)	50 (individual)
Written Report (10-15 pages)	100 (group)
Poster Presentation	50 (group)
Total Project	250 points

Project Learning Outcomes: As you work on a project, you will be participating in a scientific research endeavor: identifying a problem, collecting preliminary information (previous ERA work, literature or other sources, observations), developing hypotheses, proposing, designing and conducting experiments, analyzing data and developing a list of recommendations for SCU based on the results of their work. You will be asked, based on your hypotheses, to use field test kits and one of the more sophisticated spectroscopic methods. You will be asked to compare the data and results obtained using the two methods (evaluate evidence and tolerate ambiguity). Furthermore, you will have to provide recommendations for the campus and local community based on your work. For example:

do not use the well water because….

we tested for X and Y (they will have decide to test for X and Y based on their hypothesis and considering what is available/feasible- real world issues…) and found no contamination (detection limits?) but we did not test for Z therefore we can not definitively state the water is safe to use ….
the water is safe for what purpose … to drink, to water grass…what is safe?

Chemistry and the Environment: Summary of Important Dates:

Oct. 4	Student Planning Day (no lab)
Sept. 28	***Project Proposal***
Oct. 13	Last Day to withdraw without a W
Oct. 26	***Preliminary Project Report***
Nov. 2	**Midterm**
Nov. 16	***Project Progress Report***
Nov. 17	Last Day to withdraw from a class
Nov. 20-24	Thanksgiving
Nov. 28	***Project Written Reports Due***
Nov. 30	***Poster Presentation of Projects; Last Day of Class***
Dec. 7	**Final Exam; 1:30 p.m.**

Chemistry 1 Outline:

Week	**Topic**
Sept. 18	Chemistry Basics
Sept. 25	Metric system
	Temperature units/conversions
	Periodic Table
	Basic Atomic Structure
	Quantum Mechanical Model of Atomic Structure
	Atomic Number and Isotopes
	Atoms, Molecules, Moles
	Chemical Equations and Unit Conversions
	Stoichiometric Calculations
Oct. 2	Chemistry of Natural Waters (Chapter 8)
	Oxidation and Reduction
	Acid-Base Chemistry
	Acids and bases
	pH scale
Oct. 9	Purification of Polluted Water (Chapter 9)
Oct. 16	Photochemical Smog (Chapter 3)
	Smog “road map”
	Brown cloud and tropospheric ozone
	Acid Rain (Chapter 3)
	coal burning and smelting
Oct. 23	Global Warming (Chapter 4)
	Greenhouse effect
	Greenhouse gases
	Absorption of IR radiation
	Feedback mechanisms
	Climate predictions
Oct. 30	Energy: Fossil Fuels, Solar Energy (Chapter 5)
	Basics of electrical production
	Coal and acid rain, smog, and global warming
	Gasoline and photochemical smog and global warming
	Photovoltaic cells
	Passive and active solar designs
Nov. 6	Nuclear Energy (Chapter 5)
	Types of nuclear decay
	Radiation, RADs and REMs
	Fission and fusion
	Chernobyl
Nov. 13	Ozone Depletion (Chapter 2)
	Types of electromagnetic radiation
	Ozone layer
	CFCs
	CFC replacements and the Montreal Protocol
Nov. 27	Hazardous Waste (Chapter 10)
	Recycling
	Household Hazardous Waste
	Low and High Level Radioactive Waste