

**Course: Natural Science 60 (lab 61), Urban Environmental Issues: Capturing the Public Perspective and Learning about Superfund Site Redevelopment and Community Involvement**

This course will be taught as a part of a learning community. Two courses will be explicitly linked during the Fall semester. Students must enroll in both the Urban Environmental Issues and Urban Studies courses.

**Contact hours:**

Natural Science 60: 11:20-12:50 Tu (GH114) Th (GH 309)

Natural Science 61 lab: Th 2:00-5:00 (GH 309 - optional for Area B - Science credit)

Office Hours: W 1:00-4:00 PM and by appointment

**Course credit:** 1 course

**Course prerequisites:** English 5 and any of the following courses:

Introduction to Communications (Comm 2); Introduction to Sociology (An/So 2); Introduction to Anthropology (An/So 1), Social Problems (An/So 4), History of the United States (Hist 18)

Geology and the Environment (Nat Sc. 40 and 41). Or permission of instructor

**Course Instructor:** Steve Bachofer, Dept. of Chemistry (bachofer@stmarys-ca.edu)

**Co-Instructor:** Phylis Martinelli, Dept. of Anthropology/Sociology

**Course Summary:** To begin our focused look at brownfields and Superfund sites, the Fall semester course will have some assigned readings on environmental pollution and the community's perspective of receiving a Superfund site (in this case the return of Alameda NAS to the city of Alameda). Following a brief historical review and an introduction to some basic Chemistry, the class will be organized using the consultant working group model outlined in a number of successful Environmental Science and Studies programs.<sup>1</sup> A significant portion of the student's grade will be dependent on his or her input to classroom discussions and the student team project however the final assessment of student performance will be the faculty member's responsibility. The student teams should research a few possible sites at one location (dependent on class enrollment). The student teams will begin working on the Superfund site and setup some preliminary videotape materials so that in January another group of students can finish videotaping.

The fall semester class is responsible for outlining a script, determining if individuals would be willing to speak on camera on specific issues, arranging access to artifacts and making photographs of important documents, etc. The final project will have two components, a videotape log, edit list with reference to documentation and a poster presentation made by each team. Each student will submit the log, edit list, and references as a part of the team. The teams will integrate the individual contributions into the poster presentation, which should provide an evaluation of what materials are most important to chronicle in the final video with appropriate references. The final project presentations will be made formally to the campus and community in an open house poster session will allow other students, faculty, staff, administrators, and community members, to come and quiz the class members on the projects.

Students who want this course to fulfill the Area B lab science requirement will also need to enroll in a weekly three-hour lab section. The lab will be graded separately but it will have a focus on the environmental issues of industrial site reuse.

As the class progresses, we will invite in some guest speakers representing government agencies, community outreach organizations, and possibly developers to allow students to explicitly hear from individuals representing the different perspectives involved in the redevelopment of Alameda Point. The class will have also both team and full class discussions. In this way, general resources discovered in one group can be shared with the whole class to enhance all team activities. The class will somewhat indirectly, explore the critical questions that the Bay Area is facing which are maintaining the quality of life, keeping housing affordable, minimizing congestion, retaining sufficient park and recreational, and open spaces and remaining a viable economic center. In focusing on the reuse of urban industrial sites (in particular, a Superfund site), our class will hopefully recognize the need to be good stewards of the resources that we have and to respect the diversity in our region. Our goal is to lay the groundwork so that the videotape, which is created, represents a high quality product that all can take pride in and which directly benefits the community.

#### Grading:

Quizzes on Reading	200 points	Community engagement	100 points
Team project presentation	200 points	Team report	100 points
Student team work	400 points (this includes contributions to class discussions)		

#### Texts:

Two Supplementary Chapters in Stanley Manahan's Environmental Chemistry, 7<sup>th</sup> ed., Lewis Publishers. (provided in class, cost @ \$10)

NAS Alameda Community Reuse Plan, prepared for Alameda Reuse and Redevelopment Authority, January 1996 (provided in class, cost @ \$ 15).

When Smoke Ran Like Water, Devra Davis, Basic Books, 2002 (ISBN 0-465-01521-1).

#### Reference Texts (on reserve in library and on the Internet)

The Upside of Base Closures; Tools for Reinvesting in Communities, East Bay Conversion and Reinvestment Commission, 2000, Library of Congress 99-75766.

Additional Government, private enterprise, and public non-profit organization documents. Since this is a research-oriented course, most library resources should be available through interlibrary loans, Link+, or the internet.

#### References:

1. An Undergraduate Course as a Consulting Company, James F. Hornig, in Acting Locally, Concepts and Models for Service-Learning in Environmental Studies, Harold Ward, ed., AAHE, 1999.

## Lab Experiment Summary

**Lab Check-in & DEMO on What is an acid or a base [Bronsted definition] ? (Week 1, Sept. 4)** Simple chemical reaction balancing using models sets. Plus, faculty demo.

**Gas reactions in large syringes (Week 2, Sept 11).** This experiment will have the class prepare gases. The reactivity and characteristics of various gases will be investigated. This experiment will probably become the experiment used in the civic engagement component too with some development by the class. Bubbling CO<sub>2</sub> through other solutions should yield important precipitates.

**Reaction Chemistry – What are selected observable features? (Week 3, Sept. 18)**

- Heat absorbed or released.  Solids formed or dissolved from reaction.
- Gases absorbed or released.  Solutions yielding a color change.
- Solutions yielding a physical property change.
  - I. H<sub>2</sub>O<sub>2</sub> decomposition with added catalyst.
  - II. Follow up assignment - Web search on remediation technologies show example such as MERL CD or Lead-Check Tests.
  - III. Recall gas reaction from previous week.

**Introduction to Spectroscopy analysis - iron salicylate to quantify salicylate (Week 4, Sept. 25)** Using Spec 20 instruments and five or more standards make a Beer's law plot. Use this iron salicylate complex to quantify the aspirin in a common tablet.

Field Trip to Alameda Point (Week 5, Oct. 2)

**Soil Screening Field Study (Week 6-8, Oct. 9, 16, 23)** – FP-XRF sampling at proposed nursery parcel, near public garden and possibly adjacent to other buildings – investigate possible lead in soils).

- Collect, map, and possibly start XRF analysis dependent on weather (2 weeks)
- reflection/write letters to community [with EPA toxicologist present] (1 week )

**Gas Reaction Experiment Returns (Week 9 & 10, Oct. 30, Nov. 6)** Students plan for community visit and shared experiment. Student revise a lab handout for middle school children from community, plan to supervise middle school children on site, and implement experiment the following week.

**NO<sub>2</sub> Gas Analysis using diffusion tubes (Week 11 & 12, Nov. 13, 20)**

Obtain permission to place diffusion tubes at various sites at Alameda Point.

Thanksgiving Holiday (Week 13, Nov. 25)

**Lab Check out & Web storyboard activity on an element of concern such as lead or cadmium (Week 14, Dec. 4)** Map out a few web pages that could be created using EPA Superfund kids page as a template. Consider what is important content and ideas to present to protect the community from being exposed to a hazardous material.

## Course Activity Schedule

Week	Reading Assignment	Class Activity	Writing Assignment	Speakers & Events	Labs
1 Sept 1-5	DD Preface & Chap. 1 Intro to Gen. Chem.	Review Syllabus, View video, DTSC doc.	One page on DD- C1		Check-in; Balancing Reactions activity
2 Sept 8-12	DD Chap.2 &3 Reuse Chap.1	Chem worksheets; Disc-DD 1 Ed's intro		Ed introduces video aspect	Gas Reaction
3 Sept 15-19	DD Chap. 4 Read Intro on Superfund web	Review Gen. Chem. (PT); disc-EPA docs; share speaker	So what is your picture of a Superfund site?	APC speaker, J. Shepard or J. Thomas	Reactions (thermal)
4 Sept 22-26	DD Chap.5 Organic Chapter	Begin Organics; Quiz Gen. Chem.; Disc-DD 2,3			Intro to Spectra
5 Sept 28- Oct 3	Read more Superfund web; Brownfield definition; Reuse Environmental	Disc-DD 4,5	After visit, consider what is the potential of Alameda?	Afternoon field trip to Alameda – city persons	Field Trip to Site
6 Oct 6- 10	Marsh Crust ROD; H. Needleman & S. Cummins papers	Organics more; EPA <b>tox lecture?</b> Team focus		EPA tox (Tu) Possibly attend RAB	XRF field work
7 Oct 13-17		Review Marsh Crust ROD; Case study; Full day on site		Full Day in Alameda (APC morn, lunch, more plus lab)	XRF field work
8 Oct 20-24		Quiz on Org; Risk Lead Spread activity; people for videos	EPA Video assignment both content and form.	<b>Toxicologist in lab</b>	Reflection

9 Oct 27-31	Reports on sites	More field footage; review docs; Disc-EPA videos	Create outline on story line		Class tries outreach (Gas) expt.
10 Nov 3-7	Review newer gov doc (ASTDR)	Ed critiques logs, etc., lecture on other factors		Community comes to campus	Demo Gas expt. For community
11 Nov 10-14		Review stat of projects; Powerpoint	Assign added issues		NO2 expt in field
12 Nov 17-21	Case Study of a site	Disc-Added issues; Final Review with <b>toxicologist?</b>			NO2 expt in field
13 Nov 24-26		Final Review with <b>toxicologist?</b>	Thanksgiving		No Lab
14 Dec 1-5		Final project review; collect video and logs	Poster Presentation	Presentation and final lab – storyboard ?	Activity; Checkout; Evaluation
15 Dec 8-12	Finals				

## **Course Lab : Natural Science Lab 61: Urban Environmental Issues**

### Laboratory Summary:

The laboratory experiments are designed to be instructional. In particular, two field experiments are planned to yield useful data for the community of Alameda Point. The gas generation and reactivity experiment is planned to serve two purposes: introduce this class to gaseous compounds and as an educational tool to middle school children of Alameda Point.

The laboratory gives the student a tactual sense for the concepts of chemistry in the course. Students can “learn by doing” in the laboratories and the experiments match aspects of the course readings. This is an opportunity to hone observational skills, to gain simple laboratory skills, and to develop writing skills. The use of spectroscopic methods is highlighted in the course. The field sampling experiences allow the students to discover how difficult it is to demonstrate whether a chemical is or is not present at a field site. The two field sampling experiments also serve to inform the community and challenge the students to learn to clearly explain the data collected. The outreach to the community children requires the students learn the material to adequately plan a good educational experience. The laboratory experience also provides complimentary instructional focus to the two linked courses in this learning community.

The laboratory requires students keep a laboratory notebook and turn in their observations and conclusions on the experiments to be graded. Students will also write reports with cover letters for the two field sampling experiments to communicate the results to the community. The letters and reports will be graded for content and clarity. The lab work requires preparing before participating in the lab and completion of the designated follow-up exercises. There are five different experiments since the gas reaction experiment is proposed for use in the community outreach experience. This experience is the formal civic engagement element in the course although the two field experiments also provide the community a direct benefit too.

### Grading:

Laboratory attendance is mandatory. For each lab period, students' notebooks should have a record of the plan of action, observations and data (qualitative and quantitative), and conclusions with the exception of the two field experiments which are multiple week assignments. For each one week lab period is the lab notebook work is valued at 50 points. The composing of the letters and reports to the community will be weighed so the two field experiences are 100 points each. The civic engagement planning lab day should have the regular plan of action and observations but have a detailed outline for the actual civic engagement experiment day, therefore be valued at 50 points. The planned field trip will

provide general introduction to Alameda Point. The first lab day chemical reaction balancing activity and the final lab day web page activity will be both worth 25 points each.

A student who is ill should contact the professor in advance. Makeup opportunities will not be possible since the lab meets on only one day each week and the lab field work is planned for explicit dates. A grading scale of 70 % C, 80% B, and 90 % A will be applied to the laboratory work.