

# General Education Course Proposal

Proposed Course: CHEM 170 Chemistry in the Marketplace Units 3  
Prefix No. Title

Department: Chemistry School: Natural Sciences

### GE Category (Indicate one category only):

Foundation: A1 \_\_\_; A2 \_\_\_; A3 \_\_\_; B4 \_\_\_  
Breadth: B1 \_\_\_; B2 \_\_\_; C1 \_\_\_; C2 \_\_\_; D \_\_\_; E \_\_\_  
Integration: B X; C \_\_\_; D \_\_\_; International/Multicultural \_\_\_

Existing Course \_\_\_; Revised Course \_\_\_; New Course X

Course Included in Current GE Program \_\_\_

New courses require the Undergraduate Course Proposal form in addition to this form.

Revised courses require the Undergraduate Course Change Request in addition to this form.

**Proposed catalog description:** Limit course description to 40 words using succinct phrases. Include prerequisites, limitations, lecture/lab hours. Indicate former course number, e.g., (Former Biol 105)

**Prerequisites:** Completion of General Education Quantitative Reasoning and Area B2 Breadth Requirements, completion of General Education Area B1 Breadth with Chemistry 1, 3A or 1A. The impact of chemistry and chemicals on society and individual lives. Topics will be selected from but are not limited to: food products, drugs, petrochemicals, agricultural chemicals, nutrition, chemical ethics, plastics, and personal care products. Not open to chemistry majors. (3 lecture hours) General Education INTEGRATION, Area B

Enrollment limit per section: 50

Expected number of sections per semester - Year 1 1; Year 3 1

### Attachments:

1. A statement presenting the ways in which this course meets the Specifications provided in the appropriate section of the General Education Policy as well as in the Policies for Inclusion and Evaluation of General Education Courses.
2. A statement of elements common to all sections of this course, identifying content, objectives, required student activities, grading policy, representative texts, and an approximate schedule for the course. Required student activities include such things as papers, research projects, homework, laboratory and/or studio performance, recitations, participation, attendance, and exams.
3. A typical syllabus for a particular offering of the course.
4. Any special cost factors associated with this course.

### Approval for Inclusion in General Education

J. Noard 9/22/98  
Department Chair Date

Stanley M. Zupf 9/23/98  
School Dean Date

Brantley Kehoe \_\_\_\_\_  
Associate Provost Date

J. Quamser 9/22/98  
School Curriculum Committee Date

Pedro Amara \_\_\_\_\_  
General Education Subcommittee Date

Forward Original and TWELVE copies to:  
Associate Provost for Academic Affairs, M/S 54

## Common Course Elements

### Common Course Format

*Chemistry in the Marketplace* will be a 3 unit course consisting of 3 lecture hours. We expect 1 lecture section each semester (50 students max).

### Common Course Content

Topics in this course are expected to vary from semester to semester. The individual instructor will determine the specific content based on their own expertise, student interest and current issues in the news. Topics will be drawn from the following categories:

1. petroleum products
2. materials science
3. drugs and alcohol
4. pharmaceuticals
5. food and food additives
6. personal care products
7. agricultural and household chemicals

### Typical Course Grading Format

The structure and weighting of assignments in *Chemistry in the Marketplace* will vary somewhat with the instructor teaching the course. However, each semester the course will contain the following common elements:

- Homework (typically 5-25% of final grade)
- exams and/or quizzes (30-50% of final grade)
- term paper plus additional written assignments (typically 10-25% of final grade)
- a final exam or other cumulating experience (typically 10-40% of final grade).

# Chemistry in the Marketplace

## Area B Objectives, Upper Division Integrated Course

**Imparting knowledge of the facts and principles which form the foundations of living and non-living systems.**

The following principles will be discussed throughout the course.

- chemical properties
- chemical bonding
- structure and function relationships
- chemical reactions
- mechanisms of chemical reactions
- physical properties of compounds

**Promoting understanding and appreciation of the methodologies of science**

The methodologies of science will be explored through the use of primary literature sources. Some topics which address this are listed below:

- the safety of commercial products (throughout course)
- pharmaceuticals and drugs (weeks 5-8)
- environmental studies (weeks 2-4, 12, 14)
- benefits/risks of various chemicals in foods (weeks 9-11)
- experimental design data collection, and statistical significance (throughout course)

**Attention to the influence of scientific knowledge on world's civilizations**

Examples of course topics:

- Pesticide use in agriculture (week 14)
- The development of modern pharmaceuticals and other drugs (weeks 5-7)
- World dependence on petroleum and petrochemicals (weeks 2-4)

## Representative Texts

1. *Chemistry in the Marketplace*; Selinger
2. *Braving the Elements*; Gray, Simon, and Trogler

## 4000 Word Upper Division Writing Requirement

*Chemistry in the Marketplace* will typically include a number of written assignments, rather than just one. In order to allow our instructors to choose pedagogical methods which they believe will work best with their students and with their teaching style, the 4000 word writing requirement will be met in one of several ways of the lecture instructors' choosing.

The sample syllabus (attached) includes the following writing assignments:

- |  |                   |
|--|-------------------|
| • one 10 page (2000 word) term paper                                     | 2000 words        |
| • four 2 page ( $2 \times 400 = 1600$ word) short papers journal entries | 1600 words        |
| • homework/exam questions (est. total > 800 words)                       | 800 words         |
| • <b>Estimated Total:</b>  | <b>4400 words</b> |

Alternative formats for meeting the 4000 word writing requirement might be:

- one 20 page (4000 word) term paper
- one 10 page (2000 word) term paper plus various 1-5 page writing assignments such as:
  - journal entries
  - various smaller writing assignments (may include newspaper article commentaries, homework, reaction papers, web site articles, article summaries, article abstracts, etc.)

## Syllabus

A sample syllabus is attached.

## Special Cost Factors

The only special cost factors associated with this course result from the course being an additional department offering and the 3 WTU's required.

# Chemistry in the Marketplace

In this course we will explore the impact of chemistry on society and individual lives. Topics will be selected from: foods as chemicals, food additives, drugs and medication, petrochemistry, pesticides and agricultural chemicals, nutrition, chemical ethics, and current topics in the news. Prerequisites: Completion of General Education Quantitative Reasoning and Area B2 Breadth Requirements, completion of General Education Area B1 Breadth with Chemistry 1, 3A or 1A.

## General Information

**Instructor:** Dr. Kimberly Lawler  
**Office:** Science 250  
**Department Phone:** 278-2103  
**e-mail:** kimberly\_lawler@csufresno.edu  
**Office Hours:** tba  
**Class Meetings:** three lectures a week 50 min each  
**Required Materials:** Selinger, Ben; *Chemistry in the Marketplace*,  
Course Packet for Chemistry in the Marketplace  
Scientific calculator  
**Mailboxes:** Mailboxes for Chemistry Faculty are located in the Chem  
Department office, Science 380 (3rd floor, south side, near lobby)

## Course Organization and Topics

The course is organized around specific classes of consumer products. During our discussion for each of these topics, we will introduce the necessary chemical concepts and principles for complete understanding of the topic as we need them. We will be also be discussing laws and regulations that pertain to the various products covered. In addition to our textbook, we will be reading articles from the primary literature relating to the benefits, risks and health or environmental effects of some of the products we will be discussing. Relevant chapters of the text are shown in the table below. Additional reading from the course packet and links on the web site will be assigned as we go.

Unit	Week	Topic	Chapters
0	1	Introduction and Chemistry Review	1
1	2	Petroleum and Petrochemicals	10
1	3	Gasoline Additives	10
1	4	Plastics and Polymers	6, 7
2	5	Pharmaceuticals	9
2	6	Drug Design	9
2	7	Illegal Drugs	9
2	8	Alcohol	11 (part)
3	9	Fats, Carbs and Protein	3
3	10	Vitamins and micronutrients	11 (con't)
3	11	Food Additives	11, 12
4	12	Soaps and Detergents	2
4	13	Personal Care Products	4
4	14	Pesticides	5
	15	Posters and Review	

## Grading

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 on page 8.

	Points Each	Total Points	Percentage of final grade
Exams (3)	100	300	30%
Final Exams (1)	150	150	15%
Term Paper			
References	10		
Outline	15		
Draft	25		
Final Paper	150		
Total Paper		200	20%
Final Poster			
Presentations		100	10%
Homework (6)	25	150	15%
Short Papers (4)	25	100	10%
Total Points		1000	

## Grading Scale

The grading scale will depend in part on my assessment of the difficulty of the exams. However, the grading scale 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, say, 878 points (and you have completed all course requirements) you will be guaranteed *at least* a B. Students not fulfilling all course requirements are not guaranteed a particular grade. If you elect to take the course credit/no credit you must complete all course requirements and obtain a C average to insure credit (unfulfilled requirements can turn a C into a D or F, see below). Students within 15 points of the next highest grade *may* be given the higher grade at the discretion of the instructors based on consideration of a high homework percentage, regular attendance, class participation, and overall performance pattern.

## Course Requirements

To be graded on the grading scale defined above, you must complete all the course requirements. These are listed below:

1. Have a passing exam average
2. Pass the final exam
3. Complete the term paper and end of semester poster presentation
4. Accumulate at least 50 homework points
5. Complete all 4 short papers

**Important! Please Note:** Not meeting the course requirements can have a *significant* effect on your grade in the course. Not meeting any one of the above requirements will result in an automatic one grade penalty. Failing to meet two or more of the above requirements will result in failing the course.

University policies on incompletes/drops/unauthorized withdrawals will be followed. Also, **read carefully** the Legal Notice section of the current Schedule of Courses to understand University policy regarding plagiarism, cheating, disruptive classroom behavior, drug-free workplace, nondiscrimination, 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 Disabled Student Services (DSS). It is your responsibility to initiate a request for services from DSS and to provide appropriate verification of disability. Please keep in mind that it is also the responsibility of the student to disclose to the instructor a disability prior to requesting reasonable accommodations. Upon disclosure of a disability verified by DSS, any reasonable accommodation will be made.

## Homework Problem Sets

Six problem sets will be assigned. Each is due at the beginning of the lecture on the assigned due date. 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 the grader and easier for you to study the problem later. Show all your work on mathematical problems. **NO** credit will be given for such problems if your work is not shown. Final answers must include correct units. Please put your name at the top and staple all pages together. I recommend you photocopy your homework assignments. Each student will receive one 1-week-late certificate to be used with one problem set, no explanation is required. This is to be used when you get sick, your car breaks down, your computer crashes, or you have too much to do. When you use it is up to you - no explanation is required. Save it until you really, really need it as exceptions for minor emergencies (such as those listed above) will not be given. Exceptions will be made for serious illness, hospitalization or other catastrophic emergencies with documentation.

## The Term Paper

One 10 page term paper will be required. Your topic must relate to the chemistry, safety, marketing and/or regulations regarding a substance used in a consumer product or used to produce a consumer product. For instance, you might examine the safety issues and regulations surrounding a particular type of food additive. Another idea would be to discuss the environmental ramifications of the use of a particular pesticide. Yet another type of topic would be to research the effects of a particular drug on the human body. Pick something you have always wanted to know more about. Your topic must be approved in advance, prior to the due date for the references. You may change your topic, but you must get approval for your new topic.

Specific requirements for the paper are as follows:

1. 10 typewritten pages, 12pt type, 1 inch margins
2. You must use at least 8 references
3. References should be in the form of endnotes in ACS or APA format
4. At least three references should be print sources
5. Specific guidelines regarding web site references will be passed out in class.
6. The outline and draft are each worth 25 points.

More details about the format of the paper, expected content and grading will be discussed in class.

## Short Papers

Four short papers (2 pages each) are also required in addition to the term paper. Each is designed to complement one unit in the course and is worth 25 points. A description of each is below.

### Short Paper 1

Assume you are sitting around a dining room table with some non-scientist relatives. One of your relatives knows you are enrolled in a consumer chemistry course and asks you about gasoline and automobiles. Specifically, your relative would like to know how the following:

- What is oxygenated fuel and why do we need it?
- What was leaded gasoline, why was it used, and why was it phased out?
- What is an octane rating?
- How do cars produce CO and hydrocarbons - those things they test for during emissions?

What would you tell them? Develop your response in the form of a two page (typed, double-spaced) essay. Include any references and suggest at least two other places your relative



could go for more information. You might want to include a description of the combustion process and consider mentioning such things as photochemical smog, incomplete combustion and catalytic converters.

### Short Paper 2

Look at the ingredients in 4 common cold/flu/allergy/sinus/pain multi-symptom medications that each contain *at least two different* active ingredients. These products might be something like NyQuil, DayQuil, Sudafed Sinus, Sinarest, Contact, etc. These types of products contain several different chemical compounds - each to relieve different symptoms. Fill out a table like the one below. Once you have your table, identify the pain-killers in each. Determine the purpose of any of the other compounds (decongestant, antihistamine, etc.). Which active ingredients and symptom relief claims do the products have in common? Do they contain the same compounds? Identify any compounds which might make you drowsy. Look up each of the active ingredients in the Physician's Desk Reference or other medical reference. How does the over the counter dose compare to the prescription dose? Prepare a 2 page typed double-spaced summary of your findings and attach your table. Be sure to include all your references.

#	Product Name	Form (liquid, caplet, gelcap, etc.)	Claims to Do What or Relieve What Symptoms? (decongestant, etc.)	Active Ingredients
1	Joe's Sinus Stuff	tablets	decongests, pain relief, no drowsiness	acetaminophen pseudoephedrine hydrochloride
:				
:				
4				

### Short Paper 3

Many food products list a toll free number on their labels. Choose a product that interests you and phone the manufacturer. Ask the manufacturer about the purpose of any two unfamiliar substances listed in the ingredients. In addition, look up the substances in the library or on the web. Prepare a 2 page typed double-spaced summary of your findings. At the top, list the product type, brand name and toll-free number. In your summary, discuss the purpose of the various ingredients. Also, comment on how the ingredients might influence marketability, and the value of including the ingredient from the manufacturer's viewpoint. Include any concerns you or someone you know might have as a consumer. You should have at least 3 references: the phone interview with the manufacturer and two additional references.

## Short Paper 4

Choose one type of personal care product that interests you. This might be something like toothpaste, hair spray, after-shave, contact lens solution or shampoo. Choose 4 different brands (3 brand name, 1 generic) and make a list of all the ingredients in each. Do the products have any ingredients in common? Do the products have any ingredients which are similar? Discover the purposes of these common ingredients. You may do this by calling one or more of the manufacturers' toll-free numbers, searching the web, viewing print sources or from consumer related publications. Prepare a 2 page typed double-spaced summary of your findings. Attach a table including the names of the products and all of their ingredients. You should have at least 2-3 references.

## Exams

There will be three hour exams. I will not 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.

Exam rules: closed book, no talking, no sharing calculators, no hats. Bring pens/pencils, scientific calculator. Only simple function, non-programmable calculators with small rectangular windows are allowed on exams. When you enter the room on exam days, you should spread out and leave one space between you and the person next to you. I reserve the right to utilize a seating chart or to ask students to change seats to spread people throughout the room to avoid any misunderstandings.

No exams will be dropped. A missed exam (for any reason) can ONLY be made up at the end of the semester. You will be given the opportunity to make-up or re-take ONE exam at the end of the semester. The make-up/re-take period is \_\_\_\_\_. You have all semester to plan for having that time period free, so plan ahead. I will make exceptions only for those having another class at that time and for emergencies. Specific guidelines for makeup/retakes are below:

- The make-up time is \_\_\_\_\_.
- You may make-up ONE exam for any reason.
- If you did not take the exam the first time, you must get at least 40% on the make-up exam in order for your score to be counted. Anything under 40% will remain a zero.
- If you did take the exam the first time and you receive a higher score on the make-up it will replace your previous score. If you receive a \*lower\* grade, the two scores will be averaged.
- You must inform me by \_\_\_\_\_ that you wish to take a make-up exam and you must choose which one you will be taking.

## The Class Web Site:

You can reach the Chemistry in the Marketplace Web Site from the Chemistry Department Web Site: <http://www.csufresno.edu/chem/>. The course web site will serve as

a clearing house for information regarding the course. The easiest way to access the site is by going to the university home page ([www.csufresno.edu](http://www.csufresno.edu)) and following the links to the Chemistry Department's home page, where we have links to all our on-line course materials (CSUF home - Departments - Chemistry - Courses - Chemistry in the Marketplace). Keys to the homework will be available at the Web Site shortly after the class in which the assignment was turned in. Keys for exams will generally be up by the week following the exam. Announcements made in class will also be placed on the site. Other resources will appear on the site as the semester progresses.

### Tentative Schedule:

Week #	Day	Date	Unit	Homework Due	Exams	Topics
1	M W F	Jan. Jan. Jan.	0 0 0			Chemistry Review
2	M W F	Feb. Feb. Feb.	1 1 1	Prob. Set. 1		Petroleum and Petrochemicals
3	M W F	Feb. Feb. Feb.	1 1 1	Short Paper 1		Gasoline Additives
4	M W F	Feb. Feb. Feb.	1 1 1	Prob. Set. 2		Plastics and Polymers
5	M W F	Feb. Feb. Feb.	2 2 2	Short Paper 2	Exam 1	Pharmaceuticals
6	M W F	Mar. Mar. Mar.	2 2 2	Prob. Set. 3		Drug Design
7	M W F	Mar. Mar. Mar.	2 2 2	Paper References due		Illegal Drugs
8	M W F	Mar. Mar. Mar.	2 2 2	Prob. Set. 4 Paper outline due		Alcohol
9	M W F	Mar. Mar. Mar.	3 3 3		Exam 2	Fats, Carbohydrates and Proteins
10	M W F	Mar. Apr. Apr.	3 3 3	Prob. Set. 5 Short Paper 3		Vitamins and Micronutrients
*		Apr.	-			Have a Wonderful Spring Break!
11	M W F	Apr. Apr. Apr.	3 3 3	paper Draft due		Food Additives
12	M W F	Apr. Apr. Apr.	4 4 4	Short Paper 4	Exam 3	Soaps and Detergents
13	M W F	Apr. Apr. Apr.	4 4 4	Term Paper Due		Personal Care Products
14	M W F	May May May	4 4 4	Prob. Set 6		Pesticides
15	M  W F	May  May May	rev  rev rev	Poster Session A  Poster Session B		Exam Make-up this week  Optional review session - Q&A Format
16	W	May	-		Final Exam	

Table 1: Tentative Schedule - Chemistry in the Marketplace