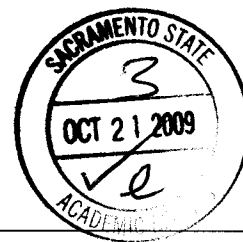




SACRAMENTO
STATE

Course Change Proposal Form A



Academic Group (<i>College</i>): NSM	Academic Organization (<i>Department</i>): Chemistry	Date: 9/16/09
Type of Course Proposal: New ___ Change <input checked="" type="checkbox"/> Deletion ___	Department Chair: Susan Crawford	Submitted by: Susan Crawford
Does this course fulfill a requirement for single-subject or multiple subject credential students? Yes ___ No <input checked="" type="checkbox"/>	For Catalog Copy: Yes <input checked="" type="checkbox"/> No ___ CCE (<i>Extension</i>): Yes ___ No <input checked="" type="checkbox"/>	Semester Effective: Fall ___ Spring <input checked="" type="checkbox"/> , 2010__

This course replaces experimental course Subject Area (<i>prefix</i>) and Catalog Nbr (<i>course number</i>):	
If changing an existing course, should new version be considered a repeat of the original version? If so, the same Course ID will be maintained. If not, a new Course ID will be assigned. Note: In PeopleSoft terminology, the Course ID is the unique system identifier, not the Catalog Nbr.	Yes <input checked="" type="checkbox"/> No ___

Change from:

Subject Area (<i>prefix</i>) & Catalog Nbr (<i>course no.</i>): CHEM 001A	Title: General Chemistry I	Units: 5
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Change to:

Subject Area (<i>prefix</i>) & Catalog Nbr (<i>course no.</i>):	Title:	Units:
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JUSTIFICATION:

The chemistry department seeks to change the format of chemistry 1A from 3 (1 Hr)/week lectures and 2 (3Hr)/week laboratory meetings to a format containing 3 (1 hr)/week lectures, 1 (3 Hr)/week laboratory meeting, and 1(1 hr)/week discussion meeting. The chemistry department believes that we can provide a nearly equal laboratory experience in one laboratory meeting per week due to the removal and redesign of some of the laboratory experiences. We believe that the students would benefit enormously by the addition of an instructor guided discussion section. The added discussion section is geared to help students more clearly understand the course material, provide a link between the lecture and laboratory course material, and assist students in developing correct problem solving and study skills applied to the highly technical concepts in the course. We have changed the math pre-requisite wording in order to better be able to evaluate a sufficient math background critical for student success in the course.

NEW COURSE DESCRIPTION: (Not to exceed 80 words, and language should conform to catalog copy. See <http://www.csus.edu/umannual/acad.htm> - Guidelines for Catalog Course Description)

Fundamental principles and concepts of chemistry, including stoichiometry; thermochemistry; atomic and molecular structure; solution chemistry, including acid-base chemistry; quantum theory; bonding and intermolecular forces; and chemical kinetics. Fairly mathematical, requiring the ability to perform arithmetic and algebraic computations. Lecture three hours, laboratory three hours, discussion one hour.	
Note : Enrollment is predicated on students passing a standardized diagnostic exam given prior to each semester or passing CHEM 4 with a grade of C or better.	
Prerequisite: High school chemistry and college algebra; sufficient performance on the college algebra diagnostic test, or equivalent.	
Enforced at Registration: Yes ___ No ___	
Corequisite:	
Enforced at Registration: Yes ___ No ___	
Graded: Letter <input checked="" type="checkbox"/> Credit/No Credit ___	Instructor Approval Required? Yes ___ No ___
Course Classification (<i>e.g., lecture, lab, seminar, discussion</i>): Lecture; lab; discussion	Title for CMS (not more than 30 characters) CHEM 001A
Cross Listed? Yes ___ No <input checked="" type="checkbox"/>	If yes, do they meet together and fulfill the same requirement, and what is the other course.

How Many Times Can This Course be Taken for Credit? 1

Can the course be taken for Credit more than once during the same term? Yes No x

FOR NEW COURSE PROPOSALS OR SUBSTANTIVE CHANGES ONLY:

Description of the Expected Learning Outcomes: Describe outcomes using the following format: "Students will be able to: 1), 2), etc." See the example at <http://www.csus.edu/acad/example.htm>

- Students will be able to:
1. write and understand molecular and chemical nomenclature and technical vocabulary.
 2. identify and write basic chemical reactions.
 3. perform chemical calculations using dimensional analysis and correct significant figures.
 4. write and understand atomic and molecular structure.
 5. show mastery understanding of gas, liquid and solid state behavior.
 6. show mastery understanding of the energetic and kinetic properties of chemical systems.
 7. perform basic laboratory experiments founded in the chemical principles learned in lecture.
 8. perform basic chemical calculations involving quantitative measurements obtained in the laboratory setting.
 9. quantitatively and qualitatively analyze data and results obtained in the laboratory environment to formulate valid chemical conclusions.

**Attach a list of the required/recommended course readings and activities [Note: it is understood that these are updated and modified as needed by the instructor(s).] This attachment should be forwarded only to your Dean's office, not Academic Affairs.

Assessment Strategies: A description of the assessment strategies (e.g., portfolios, examinations, performances, pre-and post-tests, conferences with students, student papers) which will be used by the instructor to determine the extent to which students have achieved the learning outcomes noted above:

exams, quizzes, laboratory reports

For whom is this course being developed?
 Majors in the Dept Majors of other Depts Minors in the Dept General Education Other
 Is this course required in a degree program (major, minor, graduate degree, certificate)? Yes No
 If yes, identify program(s): biology; chemistry; engineering; geology, kinesiology

Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer facilities, faculty, etc.)? Yes No
 If yes, attach a description of resources needed and verify that resources are available.

Indicate which department or programs will be affected by the proposed course (if any). biology, chemistry, engineering, geology, kinesiology _____

The Department Chair's signature below indicates that affected programs have been sent a copy of this proposal form.

Approvals: If proposed change, new course or deletion is approved, sign and date below. If not approved, forward without signing to the next reviewing authority, and attach an explanatory memorandum to the original copy.

Signatures:	Date
Department Chair: <i>Aaron M Crawford</i>	10/19/09
College Dean or Associate Dean: <i>Lauren Diffenderfer</i>	10/20/09
CPSP (for school personnel courses ONLY)	
Associate Vice President and Dean for Academic Programs	

Distribution: Academic Affairs (original), Department Chair and College Dean. Dean's office to send original after approval to Academic Affairs, at mail zip 6016. An electronic copy must also be sent.



SACRAMENTO
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Course Change Proposal Form A

Attachment: Chem 1A substantive course change.

Required course readings

- From the course textbook ("Chemistry & Chemical Reactivity," 7th edition by Kotz, Treichel, and Weaver), Chapters 1-10, 12-15 (excepting sections 5.7, 13.6-13.8, and 14.5).
- Background and procedures which accompany each laboratory experiment.

Required/recommended activities

- Required:
 - Attendance in laboratory and discussion sections.
 - Pre-laboratory and post-laboratory reports as well as participation in each of the experiments (more detail below).
 - Approximately weekly homework assignments.
 - Early semester proficiency quiz testing chemical nomenclature, significant figures, and dimensional analysis.
 - Approximately weekly quizzes and monthly exams.
 - Laboratory and lecture final exams.
- Recommended:
 - Attendance in lecture.
 - Tutorials and extra credit problems included within the homework assignments.
 - Worksheets on nomenclature, significant figures and dimensional analysis, and colligative properties.
 - Tutorials on the use of Microsoft Excel for the graphical analysis of laboratory data.

List of laboratory experiments:

- 1) Density
- 2) Hydrates
- 3) Reactions in aqueous solutions
- 4) Synthesis of alum
- 5) Practice titration
- 6) Titration of an antacid
- 7) Thermochemistry
- 8) Atomic Spectra and Flame Test
- 9) Analysis of an alloy
- 10) Molecular weight by freezing point depression
- 11) Qualitative analysis of cations and anions
- 12) Chemical Kinetics

Mock Spring 2010 Schedule for Chem 001A Lab & Discussion

	Monday/Tuesday (3-hour lab)	Wednesday/Thursday (1-hour discussion)
week 1	diagnostic exam	diagnostic exam
week 2	check-in, safety lecture significant figures & dimensional analysis	quiz #1 nomenclature
week 3	proficiency quiz #1 Exp #1 (density)	quiz #2 hydrate example calculations stoichiometry examples
week 4	proficiency quiz #2 Exp #2 (hydrates)	quiz #3 net ionic equations review for exam #1 (time-permitting) (exam #1 is week 5 in lecture)
week 5	quiz #4 Exp #3 (net ionic equations) [Part A-1 will be assigned as a pre-lab.]	proficiency quiz #3 $q = mC\Delta T$ problems
week 6	quiz #5 Exp #4 (alum)	ΔH for chemical reactions (Hess's Law, ΔH_f° , bond enthalpies)
week 7	quiz #6 titration concepts discussion weigh alum product Exp #5 (practice titration)	gas law example problems (stoichiometry, mixtures of gases, collection of gases over water)
week 8	quiz #7 Exp #6 (antacid)	thermochemistry discussion for Exp #7 review for exam #2 (time-permitting) (exam #2 is week 9 in lecture)
week 9	Exp #7 (thermochemistry)	graphing tutorial electron configurations for atoms and ions
week 10	spring break	spring break
week 11	quiz #8 Exp Spectroscopy Flame Test	H-atom energy levels exercise [Tables 1 & 2 will be assigned as a pre-lab.]
week 12	quiz #9 Exp #9 ($Mg \rightarrow H_2(g)$)	Lewis structures and hybridization
week 13	quiz #10 Exp #10 (colligative properties)	colligative properties review for exam #3 (time-permitting) (exam #3 is week 14 in lecture)
week 14	Exp #11 (qualitative analysis)	molecular orbital theory examples intermolecular forces summary and examples
week 15	quiz #11 Exp #12 (kinetics)	kinetics: connection between method of initial rates and exp #12, carbon-14 dating, integrated rate law examples
week 16	quiz #12 review for lab final check-out, evaluations	lab final late check-out

Notes:

- atomic spectra: moved to week 11 discussion section, but probably only include 2 of 4 spectra
- Lewis structure lab: moved to week 13 discussion, but not a formal lab
- flame test lab: no longer included

- potential changes to some labs:
 - The alum synthesis may be exchanged for an alternative synthesis illustrating stoichiometry concepts which gives better yields (alum ranges typically about 150% for experimental yield) and requires less purification.
 - The gas laws experiment may be modified to eliminate the use of mercury-filled apparatus.

- There will be no discussions expressly devoted to reviews for exams. Rather, the "review" will be considered to have been the individual discussion sections that have focused on reviewing and further explaining topics from lecture. As time permits, review problems can be included.

Laboratory Section Outlines:

note: general structure of most lab days will be:

- 1) quiz (15 minutes)
- 2) review quiz answers (~15 minutes)
- 3) pre-lab lecture (~15-20 minutes)
- 4) experimental time (~2 hours)

Week 1:

- lab orientation and announcements
- diagnostic exam (??/60 to pass)

Week 2:

- locker check-in
- safety lecture
- significant figures & dimensional analysis discussion
- time for students to complete the significant figures & dimensional analysis worksheet

Week 3:

- proficiency quiz #1 (20 minutes)
- pre-lab lecture
- experiment #1 (density)

Week 4:

- proficiency quiz #2 (15 minutes)
- pre-lab lecture
- experiment #2 (hydrates)

Week 5:

- quiz #4 (15 minutes)
- review answers to quizzes #3 & #4
- pre-lab lecture (very brief review of net ionic and experiment overview)
- experiment #3 (net ionic equations)
 - part A-1 is to be completed as a pre-lab
 - remainder of part A and part B will both be completed in this 1 day

Week 6:

- quiz #5 (15 minutes)
- review answers to quiz #5
- pre-lab lecture
- experiment #4 (alum synthesis)

Week 7:

- quiz #6 (15 minutes)
- review answers to quiz #6
- titration concepts discussion (with example problems)
- weigh dried alum
- experiment #5 (practice titration)

Week 8:

- quiz #7 (15 minutes)
- review answers to quiz #7
- pre-lab lecture
- experiment #6 (antacid titration)

Week 9:

- pre-lab lecture (focusing on experimental considerations)
- experiment #7 (thermochemistry – both parts will be completed in this one day)

Week 10:

- spring break

Week 11:

- quiz #8 (15 minutes)
- review answers to quiz #8
- pre-lab lecture
- brief graphing demonstration
- experiment #8 (gas laws)

Week 12:

- quiz #9 (15 minutes)
- review answers to quiz #9
- pre-lab lecture
- experiment #9 ($\text{Mg} \rightarrow \text{H}_2(\text{g})$)

Week 13:

- quiz #10 (15 minutes)
- review answers to quiz #10
- pre-lab lecture
- experiment #10 (colligative properties)

Week 14:

- pre-lab lecture (including reviewing this pre-lab assignment)
- experiment #11 (qualitative analysis)

Week 15:

- quiz #11 (15 minutes)
- review answers to quiz #11
- pre-lab lecture
- experiment #12 (kinetics)

Week 16:

- quiz #12 (15 minutes)
- review answers to quiz #12
- review for the lab final
- locker check-out
- evaluations

experiment due dates

experiment #1	week #4 (M/T)
experiment #2	week #5 (M/T)
experiment #3	week #6 (M/T)
experiment #4	week #7 (W/R)
experiment #5	in class week #6 (M/T)
experiment #6	week #9 (M/T)
experiment #7	week #11 (M/T)
experiment #8	week #12 (M/T)
experiment #9	week #13 (M/T)
experiment #10	week #14 (M/T)
experiment #11	week #15 (M/T)
experiment #12	week #16 (M/T)

other due dates:

H-atom energy levels exercise – due week #12 (W/R)

Lewis structures & hybridization exercise – due week #14 (M/T)

Discussion Section Outlines:

Week 1:

- diagnostic exam

Week 2:

- quiz #1 (15 minutes)
- nomenclature review

Week 3:

- quiz #2 (15 minutes)
- hydrate example calculations
 - determining waters of hydration
 - analysis of a mixture
- stoichiometry examples
 - limiting reactant
 - decomposition reaction

Week 4:

- quiz #3 (15 minutes)
- net ionic equations
 - precipitation, neutralization, gas-forming reactions
 - solubility rules
 - strong/weak acids/bases
- review for exam #1 (time-permitting)

Week 5:

- proficiency quiz #3 (15 minutes, for those for which it is necessary)
- $q = mC\Delta T$ problems from thermochemistry

Week 6:

- ΔH for chemical reactions
 - Hess's Law
 - enthalpies of formation
 - bond enthalpies

Week 7:

- gas law example problems
 - stoichiometry
 - mixtures of gases
 - collection of gases over water

Week 8:

- discussion of thermochemistry for experiment #7
- review for exam #2 (time-permitting)

Week 9:

- graphing tutorial (x-y scatter plots, labeling, modifying axes)
- electron configurations
 - reviewing orbital filling orders
 - examples of atoms and ions

Week 10:

- spring break

Week 11:

- hydrogen atom energy levels exercise
 - Tables 1 and 2 due as a "pre-lab" assignment
 - spectrograph for only 2 (down from 4) atomic spectra (use hydrogen and neon)
 - complete worksheet due in Week 12 discussion section

Week 12:

- Lewis structure and hybridization exercise
 - part 1 (known molecules) will be shortened, and central atom hybridization will be added
 - part 2 (unknown molecules) and part 3 will remain as homework portions, to be due in the Week 13 discussion section

Week 13:

- colligative properties
 - concentration units
 - vapor pressure lowering, boiling point elevation, melting point depression
 - molecular weight determination
- review for exam #3 (time-permitting)

Week 14:

- molecular orbital theory example problems
- intermolecular forces
 - summary of strongest to weakest forces
 - example questions

Week 15:

- kinetics discussion
 - connection between method of initial rates and experiment #12
 - carbon-14 dating examples
 - using plots of $\ln [A]$ vs. t or $1/[A]$ vs. t and the integrated rate laws to get reaction orders and rate constants

Week 16:

- lab final (50 minutes)
- late check-out at the end