

Chemistry 103

Summer 2009

<i>Instructor/phone contact</i>	<i>Office/email</i>	<i>Lecture/Location</i>
Dr. Greg Santillan 323.343.2313	Physical Sciences 610 gsantil@calstatela.edu	MWF 8-8:50 a.m. Phys Sci 158

Office hours: P.S. 610: MW 9-11 am, F: 11 am -12 noon

Required Materials

- Chemistry, Moore, Stanitski, Jurs, 3rd edition
- Username and password for e-homework website at owl.thomsonlearning.com
- Experiments for General Chemistry (4th) edition, Goldwhite and Tikkanen
- Bound laboratory notebook
- Scientific calculator and Periodic Table
- Ability to access the Chem. Dept. web site: www.calstatela.edu/dept/chem/class-notes.htm
- E-mail address (this is free at King Hall D-150) and a CSLA NIS account
- Ability to access internet site for electronic homework assignments
- Safety glasses or goggles that meet the Z-87 specification (“Z-87” will be imprinted somewhere on the glasses if they meet it)
- Chemistry Breakage Card (\$10 at cashiers office)

Suggested Materials and Supplies

- Molecular models kit
- Lab jacket or apron

Course Description

Chemistry 103 is a rigorous 5-unit course that demands approximately 20 hours of study per week in addition to lecture, recitation and laboratory attendance. Chemistry 103 is the last of a three-quarter sequence that provides a foundation in the chemical sciences suitable for premedical, pre-pharmaceutical, engineering and science majors.

Electronically graded homework (EHW) will be assigned on a weekly basis and incorporated into your final grade. Each student’s homework set will be identical in difficulty, but different in the problems’ specifics. The deadline to complete each EHW set will be announced by the instructor. You may begin work on EHW sets any time before the weekly deadline. It will be of great help to you and your grade if you review some of the problems at the end of each chapter

and the tutorials and practice problems available on the OWL site before attempting the EHW sets. EHW sets can be accessed at <http://owl.thomsonlearning.com/>

Human graded homework will be due weekly at your recitation meeting. These problems will be *more* difficult than the e-homework and will bear a stronger resemblance to the types of problems you should expect on your examinations. These will be graded by your recitation instructor and returned to you on a schedule set by your instructor.

Course Goals and Objectives

The goals of this course are to contribute to the mastery of scientific literacy, critical thinking, problem solving, and idea integration skills necessary of students pursuing careers in technological disciplines. Reading, problem solving, performing experiments, writing reports, participating in discussions facilitated by the instructor, small-group activities, and lectures will be employed to accomplish these goals.

In the laboratory, students are expected to work individually to learn new skills under the tutelage of the lab instructor and to use those learned in earlier CHEM lab classes to solve more complex problems relevant to the topics covered in CHEM 103. The lab is an integral part of the course and failure to earn a passing grade in the lab will result in failing CHEM 103.

The course objectives are to introduce basic concepts of chemistry including solution chemistry, acid/base chemistry, thermodynamic functions, electrochemistry, nuclear chemistry, and the chemistry of main group and transition metal elements. Chemistry 103 is a core course designed to familiarize students with the basic concepts of chemistry that are necessary for success in higher courses. It will also provide students with the skills necessary to successfully reach their career objectives. Students should consider the time devoted to this course an investment in their future.

Requirements

Students are required to conduct themselves in a professional manner during class. Cell phones, pagers and other electronic devices must be turned off during lecture. Late arrivals, side-discussions and other unprofessional behavior will be addressed at the instructor's discretion. Attendance may be recorded. Students returning from absences are advised to copy lecture notes from students in their study group.

Students are required to take quizzes and examinations designed to measure each individual's understanding of the course objectives cited above, which will include both problem solving and essay responses. Weekly quizzes will be administered during recitation. Students are required to take two midterms and a final examination. Make-up exams will not be available for midterm exams, and will only be made available for the final exam at the discretion of the instructor for medical emergencies or other extreme situations verified in writing by a third party. For example, in case of medical emergency, the student must provide a signed physician's note to the instructor before a make-up exam will be scheduled.

Students must be concurrently enrolled in Chemistry 103 recitation and laboratory sections to take this course. Students will perform experiments that demonstrate the basic concepts of chemistry and microscopic properties, and prepare written reports describing the principles,

techniques, results, conclusions, and sources of experimental error in these experiments. This is a very important component of this course worth 20% of your grade. ***A student who does not pass the lab will not pass the course!***

Study Suggestions

- Study illustrations and diagrams and read the text before attending lectures.
- Form a small (3 or 4 person) study group.
- Do as many problems possible in addition to the assigned homework and do them without relying on solution keys.
- Work additional problems and review for the exams with study group members.
- Get help from the University Tutorial Services staff and your instructors in a timely manner. The office hours of all Chemistry 103 instructors are posted in the Department office (PS 616).

For more study tips, read the Preface of your text.

Grading

The grade in this course is assigned largely on the basis of points accumulated through activities in the following categories:

Activity	Points Possible
Two midterms @ 150 points each	300
Laboratory Reports and 30 points for lab technique	230
Recitation 80 points for the best 8 quizzes issued during recitation (valued at 10 points each), 50 points for assigned homework,	130
e-graded homework	100
Final Examination	240
TOTAL	1000

The instructor may make minor changes to the total number of points as necessary. Additional quizzes given during lecture may be used to assign extra credit. The class may be “curved” but there is a level of competence that must be achieved to pass the class. The instructor will provide details of the requirements for specific letter grades as the quarter progresses. Plus and minus grades will be issued in this course. ***However, if you fail the laboratory or the recitation, do not expect to pass the class!***

Schedule of Topics and Laboratories

The scheduled list of topics and laboratory exercises is tabulated below. The homework solutions will be posted on the bulletin board outside Physical Sciences 155 and in a library limited loan folder after the due date.

Week	Topics (Chapters)	Laboratory Exercise from G&T (points)	Homework problems (week due)
1	Liquids, Colligative properties (15)	Check In	Chap. 15: 33, 42, 48, 113, 119 Chap. 16: 105 (week 2)
2	Acids and Bases (16)	Expt. 13. Molecular Weights Freezing Pt Depression (25)	Chap. 16: 110, 112, 115, 124, 125, 129 (week 3)
3	Acids and Bases (16); Additional Aqueous Equilibria (17)	Experiment #15: pH and pH Titrations (30)	Chap. 17: 38, 75, 76, 84, 89, 93 (week 4)
4*	Additional Aqueous Equilibria (17)	Experiment #17: Qualitative Analysis (20)	Chap. 17: 107; Chapt 18: 21, 32, 35, 46, 57 (week 5)
5	Thermodynamics: Directionality of Chemical Reactions (18)	Experiment #19: Syn./Anal. of Sodium Bicarbonate & Sodium Carbonate (50)	Chap. 18: 106, 107, 108, 109, 110 (week 6)
6	Thermodynamics: Free energy (18) Redox reactions (5)	Experiment #19: continued	Chap. 18: 123, 126, 127, 129, 130 (week 7)
7	Electrochemistry and Its Applications (19)	Experiment #21: Free Energy Change (25)	Chap. 5: 54, 62; as well as Chap 19: 80, 84, 88 (week 8)
8*	Electrochemistry and Its Applications (19)	Experiment # 16: Redox Titrations (25)	Chap. 19: 90, 92, 94, 96, 98 (week 9) (remember 2 HW are due on week 10)
9	Nuclear "Chemistry" (20)	Experiment #22: Electrochemistry (25)	Chap. 20: 56, 61, 62, 72, 75 (week 10) Note that HW#10 is also due week 10! (see below).
10	Chemistry of Selected Transition Elements and Coord. Compounds (22)	Lab practicum and Check Out	Chap. 22: 51, 94, 95, 98, 101 (to be turned in on Week 10 also)

* Mid-term exams will be administered during these weeks.

Exam Schedules

Mid-term exams will be given on the Friday of the 4th and 8th weeks of the term—the exact dates for each exam will be announced in class. The schedule for the final exam is listed in the schedule of classes.

Laboratory and Recitation

The recitation section is devoted to reviewing the topics related to the homework and the theoretical and technical aspects of the laboratory exercise. Students will have a weekly quiz

during their recitation section. Written homework is due when their recitation section meets. Laboratory instructors will provide details during the first class meeting.

The laboratory section meets immediately after the recitation section. In all experiments you are required to wear safety glasses that meet the Z-87 standards at all times during the laboratory period. ***If you do not have appropriate eye protection, you will have to leave the laboratory and lose the points for that experiment.***

During the experiment students will enter data into bound laboratory notebooks. In experiments where students work with a partner, both need to enter the data into their respective notebooks before leaving the laboratory. After completing the experiment, the instructor will initial the page on which the student entered the data in their laboratory notebook.

The instructor will tell students when final written reports are due. Final reports submitted for grading will be either **neatly** written in each student's notebook following the data pages or prepared with a word processor with a photocopy of the original raw data attached. This assignment is an original writing assignment and reflects on your critical thinking and writing skills.

All laboratory reports will contain the sections described below:

- I. **Prelab:** A detailed description of how the student plans to perform the experiment. **This section must be completed before coming to lab.** The instructor has the discretion to grade the prelab assignment and use that grade for that week's quiz grade.
- II. **Raw Data:** The initialed data (or photocopy) that the student collected in the lab period. Neatness is not imperative here, but it must be readable, with the data clearly labeled and the units of measurement listed. If this section is missing, the student will receive **ZERO** credit for that experiment.

Formal Report (graded)

- III. The student's name (and lab partner's name [if applicable]), date, and experiment title.
- IV. **Purpose:** A brief description of the experiment and what the student intends to accomplish
- V. **Data:** A table containing the data the student collected in the experiment complete with units. In some cases the student may also want to include results in this table.
- VI. **Theory/Principles:** A summary of the concepts explored in the experiment. If there are mathematical equations used in your calculations, they are derived and explained here. This section is one of the most valuable sections in the reports in terms of the number of points. Just writing equations is not enough!
- VII. **Experimental:** A section that may refer to the laboratory manual, but also describe deviations from or improvements to the procedure.
- VIII. **Calculations:** A sample calculation showing how the student obtained their results.
- IX. **Results:** The results of each student's experiment in a table.
- X. **Conclusions/Discussion:** This section also carries a large share of points. In this section you compare your results to the accepted literature values whenever possible. Make sure to reference literature values; a good source is the **CRC Handbook of Chemistry and Physics**, which is in the reference section of the library. The student should also identify

the most critical measurement (that which has the greatest uncertainty) and point out approximations that may affect the accuracy of your answer.

XI. Questions: Answer the questions at the end of the experiment. Note that some of these questions are based on experimental results.

Laboratory Safety

Safety must be a primary consideration for all persons entering and working in a chemistry laboratory. The experiments have been chosen for their relation to lecture topics and to teach basic techniques. However, students have the responsibility to preview the experiment, learn and understand the appropriate safety precautions for each experiment and to consult with the instructor when safety procedures are not clear. Finally, the following general rules must be observed:

- Safety glasses must be worn at all times when *anyone* is doing experimental work in the lab.
- Smoking, eating or drinking are not permitted at anytime in the lab.
- Before beginning the first experiment, familiarize yourself with the location of safety equipment in the lab. These include the fire extinguishers, safety shower, fire blanket and eye wash. Your instructor will describe their appropriate use.
- Read your experiment and note any specific safety precautions.
- Work is not permitted in the labs except during regular class hours in the presence of an instructor. Performance of unauthorized experiments is not allowed.