

## Chemistry 101 Winter, 2005

<i>Instructor/phone contact</i>	<i>Office/hours/email</i>	<i>Lecture/Location</i>
Dr. Gregorio Santillan  (323)323-2313	Physical Sciences 610,  MWF 11-12 pm  TR 1:30-2:30 pm  gsantil@calstatela.edu	Section 01:  MWF 8-8:50 am  Physical Sciences Bldg 158

Office hours are also posted outside the instructor's office and in the Chemistry Department office, PS 616.

### **Required Materials**

- Chemistry, Moore, Stanitski, Jurs 2<sup>nd</sup> Ed
- Username & password purchased with textbook. at website:  
<http://chemistry.brookscole.com/moore2e>
- Experiments for General Chemistry (4<sup>th</sup>) edition, Goldwhite and Tikkanen
- Bound laboratory notebook
- Periodic Chart
- Scientific calculator
- Ability to access the Chemistry department web site:  
<http://www.calstatela.edu/dept/chem/05winter/101/>
- Clicker for class response system (purchased with text)
- E-mail address (free at KH D-150 if you don't have one) and CSLA NIS account
- Ability to access internet site for electronic homework assignments
- Safety glasses or goggles that meet the Z-87 specification ("Z-87" printed somewhere on the glasses if they meet it)
- Chemistry Breakage Card (\$10 at cashiers office (Admin. Bldg. 128))
- Blue examination book (available in the bookstore, if specified by instructor).

### **Suggested Materials and Supplies**

- Molecular models kit
- Lab jacket or apron

### **Course Description**

Chemistry 101 is a rigorous 5-unit course that demands approximately 20 hours of study per week in addition to lecture, recitation and laboratory attendance. Chemistry 101 is the first quarter of a three-quarter sequence that provides a foundation in the chemical sciences suitable for premedical, pre-pharmaceutical, engineering and science majors. Students are required to pass a chemistry diagnostic exam at the testing office (2<sup>nd</sup> floor Palmer Wing, Library) and receive permission from the department in order to enroll in Chemistry 101. A year of high school chemistry and completion of Math 102 (college algebra) is highly recommended.

**Electronically graded homework (eHW)** will be assigned on a weekly basis and these scores incorporated into your final grade. Each student's homework set will be identical in difficulty, but different in the problems' specifics. You will need to be vigilant in the completion of these assignments—the computer will be set to give you a limited number of tries to obtain the correct answer. The deadline to complete each eHW set will be Friday of each week at 11:59 p.m. PST. Homework sets completed after the deadline will not be accepted. 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>

**Handwritten graded homework** will also be due weekly at your laboratory recitation meeting. These problems will be *more* difficult than the e-graded homework and will bear a stronger resemblance to the types of problems you should expect on your examinations. These will be graded by your instructor and returned to you on a schedule set by your instructor. Solutions to the homework will be posted on the bulletin board outside PS 155, at the library limited loan desk.

### **Course Goals and Objectives**

The goals of this course are to contribute to the scientific literacy, critical thinking, problem solving, and idea integration skills necessary for students pursuing careers in technological disciplines to master. 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.

The course objectives are to introduce the basic concepts on chemistry including nomenclature, stoichiometry, and the nature of gases. Additionally, microscopic properties of compounds including electronic structure and bonding will be addressed. Chemistry 101 is a core course designed to familiarize students with the basic concepts of chemistry that are necessary for success in Chemistry 102 and 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 will be recorded. Students returning from absences are advised to copy lecture notes from students in their study group. In general, students will be fully responsible for all material covered and announcements made during regular class time.

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. Blue-book quizzes will be issued on an impromptu basis during lecture at the discretion of the instructor. Students are required to take two midterms and a final examination. Make-up exams will not be issued for midterm exams, and will only be issued 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 101 recitation and laboratory sections to take this course. Students will also 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**

- Always study illustrations and skim the text before attending lectures.
- 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 small study group members.
- Get help from the University Tutorial Services staff and your instructors in a timely manner. The office hours of all Chemistry 101 instructors are posted in the Department office (PS 616).

For more study tips, read the Preface of your text, *Olmsted and Williams*, pages v – xv.

### **Grading**

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

<b>Activity</b>	<b>Points Possible</b>
Two midterms @ 150 points each	300
Laboratory Reports	240
In-class quizzes	-
Recitation 15 point math review, 80 points for the best 8 quizzes issued during recitation (valued at 10 points each), 50 points for assigned homework, and 15 points for lab technique	160
e-graded homework	100
Final Examination	200
<b>TOTAL</b>	<b>1000</b>

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 will 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 sparingly in this course. ***However, if you fail the laboratory/recitation, you will not pass the class!***

### ***Dropping, Incompletes and Withdrawals***

It is the University's hope that nobody withdraws from any course.

However, before you consider withdrawing from the course you should be aware of the University Policy on withdrawal: you are not allowed to drop a course because you have found the workload to be too heavy, or because you are getting a poor grade. It is your responsibility to be aware of these policies. Also, you should be aware that there are specific policies on the incomplete grade, IN. It is not automatically given—you must request it from your instructor who is not allowed to give an IN grade unless certain conditions are met. Consult the schedule of classes and your University catalog for details.

### ***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.

<b>Week</b>	<b>Topics (Chapters)</b>	<b>Laboratory Exercise from G&amp;T (points)</b>	<b>O&amp;W Homework problems (week due)</b>
1	Nature of Chemistry (1)	Check-in, math review (15) & Cookie Statistics (20)†	Chap. 1: 82-86 (due week #2)
2	Atoms and Elements (2)	#1: Density (25)†	Chap. 2: 96, 98, 111, 112, 114 (week3)
3§	Chemical Compounds(3)	#3: Molecular sizes (25)†	Chap. 3: 98,100,103,106,121 (week4)
4*	Quantities of Reactants and Products (4)	#2: Nine Bottles (20)	Chap. 3: 122, 127 Chap. 4: 77, 81, 83 (week5)
5	Quantities of Reactants and Products (4) Chemical Reactions (5)	#4: Formula of a Solid (25)	Chap. 4: 90, 99, 102, 103, 106 (week 6)
6	Chemical Reactions (5) Energy and Chemical Reactions (6)	#14: Acid-base Stoichiometry (30)	Chap. 5: 111, 112, 113, 117, 121 (week 7)
7*	Energy and Chemical Reactions (6)	#5: Heat and Temperature: Law of Dulong & Petit(25)	Chap. 6: 111,112,117, 120,123 (week 8)
8	Electron Configurations & the Periodic Table(7)	#7: Solution Calorimetry(30)	Chap. 6: 135, 137, 139 Chap. 7: 120, 129 (week 9)
9	Electron Configurations & the Periodic Table(7) Covalent Bonding (8)	Check-out, #8 H-atom spectrum (20)	Chap. 7: 133, 144, 149 Chap. 8: 78, 84 (week 10)
10	Covalent bonding (8)	#9: Molecular Models (25)	Chap. 8: 85, 99, 115, 117, 119 (TBA)

† see attachments for additional procedures

\* Midterm Exams will be administered during these weeks.

§Jan. 17, 2005 is a campus holiday (Martin Luther King Day)

### **Exam Schedules**

Mid-term exams will be given during the 4<sup>th</sup> and 8<sup>th</sup> weeks of the term—unless otherwise changed, the dates for each exam will be:

Test #1 Jan 26, 2005 (Wed) and Test#2 Feb 18, 2005 (Friday)  
Final Exam: Mar 14, 2005 (Mon)

It goes without saying that any student cheating or attempting to do so will be reported to the appropriate University body to whom all appeals will have to be directed. In addition, the student will receive a zero for the involved. This will usually result in a failing grade.

### **Laboratory and Recitation**

The recitation is devoted to reviewing the topics related to the homework and the theoretical and technical aspects of the laboratory exercise. Students will have a quiz in their recitation on a weekly basis and O&W homework is due when their recitation meets. Written laboratory reports will be due at the discretion of the laboratory instructors. Laboratory instructors will provide details during the first class meeting.

The laboratory section meets immediately after the recitation. 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, each student will directly enter the data in ink into his/her bound laboratory notebook. In the few 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. Writing the data in pencil first, and/or on a separate “scratch” sheet is not allowed.

The instructor will tell the students when final written reports are due. Final reports submitted for grading will be either **neatly** written in each student’s notebook following these pages or prepared with a word processor with a photocopy of the original raw data attached. **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. An instructor may require that a timed flow chart be part of the prelab. The actual (“real time”) times when the procedural steps are done would then be estimated by the student before the experiment. This allows the student to know the minimum pace that the student is to carry out the experiment within the allotted laboratory time.
- 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. If an unknown is to be analyzed, make sure that the label for the unknown is recorded in your data. The unknown # (or letter) must be written as part of the data and in the results section.

**Formal Report Format. (graded)**

- I. The student's name (and lab partner's name (if applicable)), date, and experiment title.
- II. **Purpose:** A brief description of the experiment and what the student intends to accomplish
- III. **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. Remember to have your data page signed to avoid penalty.
- IV. **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!
- V. **Experimental:** A section that may refer to the laboratory manual, but also describe deviations from or improvements to the procedure.
- VI. **Calculations:** A sample calculation showing how the student obtained their results.
- VII. **Results:** The results of each student's experiment in a table.
- VIII. **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.
- IX. **Questions:** Answer the questions at the end of the experiment. Note that some of these questions are based on experimental results. It is important to answer these questions. Students should know that this section may carry as much as 40% of your grade for the lab!

**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.

**Additional procedures for Week 2 experiment:****Experimental confirmation of sucrose percentage.**

Take a small vial (supplied by instructor) and label it with your name and section number. Then weigh it accurately (using the analytical balance) and record the mass of the empty dry vial. Add about 3 mL of one of your sucrose solutions to the vial (ask your instructor which one) and record the identity in your notebook. Weigh the vial and solution and record that mass in your notebook. Give the vial containing the solution to your lab instructor- The vials will be placed in the oven until the following week to evaporate all the water. When you return to the lab next week, record the mass of the vial and its contents and calculate the % sucrose that was in your solution. Submit your data and this result with your write for week 3's experiment. Write a brief (one paragraph) discussion of your result (does it agree with the value that you prepared?).

**Additional procedures for week 3 experiment:****Determination of dissolved solids in water.**

Take a clean dry 150 mL beaker and label it with your name and section number. Weigh it accurately and record the mass in your book. Add about 50 mL of water (you may use tap water from the lab, a sample of bottled water or mineral water- your lab instructor may provide instructions) and record the mass of the beaker and water. Place the beaker in the oven or give it to your instructor to place in the oven. At the next class meeting, take your beaker and allow it to cool. Weigh the beaker and its contents and record this value. Calculate the amount of dissolved solids in PPM. Submit your data and this result with your write up for week 3's experiment. Write a brief discussion regarding your result (are you surprised at the level of dissolved solids in your sample- does your result agree with other analyses of the water (bottled water often has this data on it; the City of Los Angeles has this data available at the following web site: <http://www.ladwp.com/water/quality/Annual/index.htm>).