

## Chemistry 103 Summer, 2007

| <i>Instructor</i>                      | <i>Office</i>  | <i>Lecture and Office Hours</i>                                |
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| Gregorio Santillan<br><br>323-343-2313 | Physical Sciences 610<br><a href="mailto:gsantil@calstatela.edu">gsantil@calstatela.edu</a><br><br>Calstate LA site:<br><a href="http://www.calstatela.edu/dept/chem/07Summer/103/">www.calstatela.edu/dept/chem/07Summer/103/</a> | MWF 8-8:50 am<br><br>Office:<br>MWF 9:30-10:30am,<br>TR 3-4 pm |

### Required Materials

- Chemistry, Moore, Stanitski, Jurs, 2nd edition
- Username & password purchased with textbook or at website:  
<http://chemistry.brookscole.com/moore2e>
- Experiments for General Chemistry (4th) edition, Goldwhite and Tikkanen
- Bound laboratory notebook
- Periodic Chart
- Scientific calculator
- Ability to access the Chemistry Class web site:  
<http://www.calstatela.edu/dept/chem/07Summer/103/>
- E-mail address (this is free at King Hall D-150 if you don't already have one) and CSLA NIS account
- Safety glasses or goggles that meet the Z-87 specification (a "Z-87" will be imprinted somewhere on the glasses if they meet it)
- Chemistry Breakage card (\$10 at cashiers office (Adm. 128))

### Suggested Materials and Supplies

- Molecular models kit
- Lab jacket or apron

### Course Description

Chemistry 103 is the third quarter of a three-quarter sequence that provides a foundation in the chemical sciences suitable for premedical, pre-pharmaceutical, engineering and science majors. A grade of "C-" or better in Chemistry 102 or its equivalent is required to enroll in this course. A solid working knowledge of the material covered in the first 15 chapters of the Moore, Stanitski, Jurs, 2nd edition text is presupposed in the presentation of the topics covered in Chemistry 103.

### Course Objectives

Students who pass Chemistry 103 will have developed fundamental conceptual knowledge about equilibrium in aqueous solutions including acids and bases, thermodynamics and its applications, electrochemistry and its applications as well as the special topics listed for the last three weeks of the quarter. The development of skills in solving quantitative and qualitative problems from the above areas will also be required of students passing Chemistry 103.

### Study Suggestions

Don't fall behind and don't rely on the solutions keys either from study guides or the text. Do as many problems as you can in addition to the assigned homework and do them without the solutions nearby. Get help early at the University Tutorial Services and see your lab and lecture instructors without hesitation when you cannot solve problems. Chemistry is a subject that only one in a million can learn overnight! See your recitation and/or lecture instructor for help with

homework before it is due. The office hours of all Chemistry 100 series instructors are posted in the Department office (PS 616) and they are available to give you help at those times and others by appointment.

### Objectives of this course

The goal of this course is for you to use and apply the concepts and skills learned in Chemistry 101 and 102 to attain a qualitative and quantitative understanding of the following new topics; kinetics and mechanisms of reactions; chemical equilibrium; electrochemistry; nuclear processes; and introductory spectroscopy. Your understanding will be measured by examinations that will include both problem solving and written responses. You will also perform experiments that demonstrate these concepts and prepare written reports describing the principles, techniques, results, conclusions and sources of experimental error in these experiments.

### Study Suggestions • Don't fall behind...period

- Do as many problems as you can in addition to the assigned homework and do them without the solutions nearby. Study illustrations and examples and read the text before coming to class.
  - Do get help early at the University Tutorial Services and see your lab and lecture instructors without hesitation when you cannot solve problems. Form a small (3 or 4 people) study group.
  - Do the e-grade assignments—there is a strong correlation between e-grade total points and the total points (overall grade) in the course. Do the optional problems also to get practice.
  - Do as many problems in addition to the assigned homework – without relying on solution keys.
  - Get help from the University Tutorial Services staff and your instructors in a timely manner.
- For more study tips, read the Preface of your text.
- Use the help available on the CD that accompanies your text, and on the on-line site.

### Grading

The grade in this course is assigned largely on the basis of points accumulated out of a total of approximately 1000 points in the following categories:

| Activity  | Points Possible   |
|---|-------------------|
| Two midterms @ 150 points each  | 300               |
| Laboratory Reports  | 200               |
| Recitation (80 pts for 8 best quizzes, 50 pts for 10 homework, 20 points for technique) | 150               |
| e-grade homework  | 100               |
| Final examination   | 250               |
| Group work  | (to be announced) |
| Total points  | 1000              |

The instructor may make minor changes to the total number of points as necessary. The class will be "curved" but there is a minimum level of competence that must be achieved to pass the class. The instructor may provide details of the requirements for specific letter grades as the quarter progresses. Plus and minus grades will be issued in this course only for borderline scores. If you fail the laboratory/recitation, you will not pass the class! You are not allowed to miss 2 or more laboratory experiments if you are to pass the lab

### Schedule of Topics and laboratories

The scheduled list of topics and laboratory exercises is tabulated below. The homework solutions will be posted after they are due in several places: the bulletin board outside Physical Sciences 155; a library limited loan folder and at the Chemistry 103 internet site.

| Week | Topics (Chapter)   | Laboratory Exercise (points)                            | Homework problems (week due)                    |
|------|--|---|---|
| 1    | Acids and Bases (Chapt16)  | Check in  | Ch. 16: 105, 108, 112, 115, 124 (due week 2)    |
| 2    | Acids and Bases (16)<br>Additional Aqueous Equilibria (17)           | Expt #15:<br>pH & pH Titrations (30 points)             | Ch. 16: 125, 127<br>Ch. 17: 76, 77, 84 (week 3) |
| 3    | Additional Aqueous Equilibria (17)                                   | Expt #17:<br>Qualitative Analysis (20 pts)              | Ch. 17: 89,93,100,101,107 (week 4)              |
| 4*   | Thermodynamics: Directionality of Chemical Reactions (18)            | #19: Synth/Analys. of sodium Bicarb & sodium carbonate. | Ch. 18: 106, 107, 108,109, 110 (week 5)         |
| 5    | Thermodynamics: Directionality of Chemical Reactions (18)            | Experiment #19: Continued. 50 pts total for expt)       | Ch. 18: 123, 126, 127, 129, 130 (week 6)        |
| 6    | Electrochemistry and its applications (19)                           | Expt # 21:<br>Free Energy Change (25)                   | Ch. 19: 79, 80, 81, 84, 88 (week 7)             |
| 7    | Electrochemistry and its Applications (19)                           | Expt #16:<br>Redox Titrations(25)                       | Ch. 19: 90, 92, 94, 96, 98 (week 8)             |
| 8*   | Nuclear Chemistry (20)   | Expt #22:<br>Electrochemistry(25)                       | Ch. 20: 56, 61, 62, 72, 75 (week 9)             |
| 9    | Chemistry of Main Group Elements                                     | Expt #26:<br>Spectroscopy(materials to be supplied)     | Chapt 21: 62, 66, 73, 74, 77 (week 10)          |
| 10   | Chemistry of Selected Transition Elements and Coordination Compounds | Check out; Review for the Final                         | Chapt 22: 93, 94, 95. 98, 101 (week 10 also)    |

\*Midterm exams will be administered during these weeks.

### 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 specified, it will be held on the Friday of that week. The final exam will be given on the date assigned in the Summer, 2006 Class Schedule. (Most likely dates for midterm exams will be: Exam#1-July 13,2007; Exam#2- August 10, 2007). The Final Exam is scheduled for Monday, August 27, 2007, 8-10:30 am.

### 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 and laboratory. 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. Unannounced quizzes may be given during lecture at the discretion of the instructor. Students are required to take two midterms administered in the 4th and 8th weeks of the quarter and a final examination.

Make-up exams will **not** be given for midterm exams, and will only be given for the final exam at the discretion of the instructor for medical emergencies, and 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 basic concepts of chemistry 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 24% of your grade. A student who does not pass the lab will not pass the course!

### **Laboratory and Recitation**

You must be concurrently enrolled in Chemistry 103 recitation and laboratory sections to take this course. The recitation is devoted to reviewing the topics related to the homework and the theoretical and technical aspects of the laboratory exercise. You will have a quiz in your recitation on a weekly basis and your homework is due when your recitation meets. Your laboratory instructor will provide details in your 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-S7 standard 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, you will enter the data into your bound laboratory notebook in ink. In the few experiments, in which you work with a partner, you both need to enter the data into your respective notebooks before you leave the laboratory. After completing the experiment, your instructor will initial the page in which you entered the data in your laboratory notebook.

Your instructor will tell you when your final written report is due. Your final, graded report is to be either neatly written in your notebook following the data and prelab page(s) or printed with a word processor containing a photocopy of the initialed data page(s). All laboratory reports must contain the sections described below:

- 1) **Prelab:** a detailed description of how you plan to perform the experiment. This section must be completed before coming to lab. Your instructor has the discretion to grade the prelab assignment and use that grade for that week's quiz grade.
- 2) **Raw Data:** The initialed data (or photocopy) that you 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, you will receive ZERO credit for that experiment.

### **Formal Report (Graded)**

**O. Experiment Title, your name** (and partners name (if applicable)) and **date**

**I. Purpose:** A brief description of the experiment, what you intend to accomplish

**II. Data:** a table containing the data you collected in the experiment complete with units. In

some cases you may also want to include results in this table.

**III. Theory/Principles:** A section that contains the chemistry principles and the appropriate chemical equations of any reactions occurring. If there are mathematical equations that you use in your calculations, they are derived and explained here. This section is one of the most valuable sections in your reports in terms of the number of points. Just writing equations is not enough! If graphing is included as part of your analysis, explain it here as well.

**IV. Experimental:** A section which may refer to your laboratory manual, but also describe deviations from or improvements to the procedure.

**V. Analysis:** This section includes all forms of processing of your raw data: such as calculations and graphs. For repetitive calculations, a sample calculation showing how you obtained your results is sufficient.

**VI. Results:** The final results of your experiment should be summarized in a table.

**VII. Conclusions/Discussion:** This section also carries a large share of points. In this section you compare your results to the accepted values, if possible (make sure you reference your literature value; a good source is the CRC Handbook of Chemistry and Physics which is located in the reference section of the library). You 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.

**VIII. Questions:** Answer the questions at the end of the experiment. Note that some of these questions are based on your experimental results. Note that the points allotted to your answers to these questions may be up to 40% of the total point distribution for the experiment.

### 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, learning and understanding 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 laboratory 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.

### Dropping, Incompletes and Withdrawals

It is the University's hope that nobody withdraw from any course. However, before you consider withdrawing from a course, you should be aware of the University Policy on withdrawal, because it is not done for reasons such as workload or 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. Consult the schedule of classes and your University catalog for details regarding the time limits of an incomplete grade and the specific situations for which an incomplete grade is warranted.