## Required Materials
- Experiments for General Chemistry (4th) edition, *Goldwhite and Tikkanen*
- Bound laboratory notebook
- Scientific calculator
- Ability to access your CSULA Moodle account
- An official CSULA e-mail 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 (Adm.128))

## Suggested Materials and Supplies
- Molecular models
- Lab jacket or apron

## Course Description
Chemistry 102 is a rigorous 5-unit course that demands approximately 20 hours of study per week in addition to required lecture and laboratory meetings. Chemistry 102 is the second course 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 have received a grade of C- or better in the prerequisite Chemistry 101 course or its equivalent. Prerequisite knowledge for this course includes an understanding of the fundamental concepts in chemistry including nomenclature, stoichiometry, the periodic table, and electronic structure of atoms.
Cal State L.A. will be converting from Quarters to Semesters in Fall 2016. Neither your time to degree nor the cost of your education will be increased because you have been identified as a student who may graduate after semesters begin. Please contact your major program in order to determine your Individualized Advisement Plan (IAP).

**Course Goals and Student Learning Outcomes**

The goals of this course are to contribute to the mastery of scientific literacy, critical thinking, problem solving, and idea integration skills necessary for students pursuing careers in technological disciplines. To accomplish these goals, lectures, reading, problem solving, experimentation, lab report composition, class discussions and group activities facilitated by the instructors will be employed.

The student learning outcomes for CHEM 102 are presented below:

1. Students will increase their scientific literacy by learning foundational concepts in the chemical sciences.
   - Demonstrate knowledge of fundamental concepts in chemistry including: chemical bonding; deduction of and ramifications of molecular structures; properties of liquids and solids; rates of chemical reactions; and qualitative and quantitative aspects of equilibrium.
   - Apply foundational concepts to solve simulated real-world problems.
   - Understand the nature of science.
   - Understand the role of scientists in sustaining the practice of science.

2. Students will learn to engage in scientific inquiry and communicate the results.
   - Generate accurate and precise data and record data clearly.
   - Learn to handle, store and dispose of chemicals safely.
   - Analyze data accurately.
   - Use quantitative reasoning skills and existing knowledge to discuss results.
   - Make critical, creative and interpretive judgments about experimental results.
   - Communicate experimental results in formal written laboratory reports.

3. Students will develop awareness of the skills and attributes of a professional chemist.
   - Identify attributes/skills students would like to emphasis in their professional lives.
   - Develop an awareness of behaviors/attitudes interfering with optimal learning for each individual.
   - Learn to respect differences through collaboration and leveraging these differences for success of the whole.
   - Learn to solve problems competently using approximations, precision, accuracy and statistical validity.
   - Formulate new questions based on existing knowledge.

4. Students will be empowered to become agents of change using the chemical sciences.
   - Identify ways chemistry enriches life and contribute to society.
   - Learn to communicate the benefits and limits of scientific activities to scientists and non-scientists alike.
   - Develop an awareness of the value systems and ethics associated with scientific inquiry.
   - Identify current and future challenges they would like to address in their lifetimes both professionally and otherwise (i.e. sustainability in water and energy resources; public health; environmental justice . . )
CHEM 102, Sections 01, 02, and 13 Winter 2016

Chemistry 102 is designed to introduce students to fundamental knowledge and behavior in the chemical sciences, and provide students with the skills necessary to successfully reach their individual career objectives. Students should consider the time devoted to this course an investment in their future.

**Study Suggestions**
- Study illustrations and read the text before attending lectures.
- Form a small (3 or 4 person) study group.
- Do several problems in addition to the assigned homework without relying on solution keys.
- Review for the exams with study group members.
- Get help from the University Tutorial Services staff and your instructors in a timely manner.

**Requirements**
Students must be concurrently enrolled in Chemistry 102 lecture and laboratory sections to take this course. Both sections work together to meet the student learning outcomes listed above. Students are required to conduct themselves in a professional manner during class. Cell phones and other electronic devices irrelevant to the course must be turned off during lecture and lab. Late arrivals, side-discussions and other unprofessional behaviors will be addressed at the instructor’s discretion. Attendance may be recorded and reflected in your course grades. Students returning from absences are advised to copy lecture notes from other students and access lecture notes posted by the instructor.

Students are required to take quizzes and examinations designed to measure each individual’s understanding of the course material, which will include both problem solving and essay responses. Because academic honesty is imperative to the learning process, students must adhere to the University Academic Honesty policy, which is discussed in the Procedures and Regulations section of the University Catalog. In short, cheating and plagiarism will not be tolerated and will affect your course grades. Weekly quizzes will be administered during laboratory. Unannounced quizzes, including instant response quizzes, may be given during lecture at the discretion of the instructor. Students are required to take two midterms and one 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 can be scheduled.

**Electronically graded homework (EHW)** will be assigned on a weekly basis, and these scores will be incorporated into your final course grade. You will need to be vigilant in the completion of these assignments – the computer may be set to give you a limited number of tries to obtain the correct answer. The deadline to complete each EHW set will be posed for each assignment. Homework sets completed after the deadline will not be accepted. You may begin work on EHW sets any time before the weekly deadline. It would be of great help to you and your grade if you review problems at the end of each chapter, the tutorials, and practice problems available on the OWL 2 site before attempting the EHW sets. If you are not registered, choose General Chemistry, and specify: *Chemistry, 9th Edition* (Zumdahl).

**Human graded homework** will be due weekly in your laboratory meeting. Laboratory instructors will
determine specific due dates for each human graded homework assignment. 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.

Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation.

**Schedule of Topics and Laboratories**
The scheduled list of topics and laboratory exercises is tabulated below:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics (Chapters)</th>
<th>Laboratory Exercise from G&amp;T (points)</th>
<th>M/W Lab Dates</th>
<th>T/Th Lab Dates</th>
<th>Human-Graded Homework Problems (Due Dates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Atomic Structure Review (7); Bonding: General Concepts (8)</td>
<td>Check-in, Log Review (15)</td>
<td>1/4</td>
<td>1/5</td>
<td>Chap. 8: 27, 30, 35, 39, 47 (Week 2)</td>
</tr>
<tr>
<td>2</td>
<td>Bonding: General Concepts (8)</td>
<td>#11: Synthesis of Benzoic Acid (25)</td>
<td>1/11</td>
<td>1/12</td>
<td>Chap. 8: 84, 87, 88, 103, 111 (Week 3)</td>
</tr>
<tr>
<td>3</td>
<td>Covalent Bonding: Orbitals (9)</td>
<td>#9: Molecular Models (25)</td>
<td>1/20</td>
<td>1/19</td>
<td>Chap. 9: 21, 36, 42, 46, 88 (Week 4)</td>
</tr>
<tr>
<td>4</td>
<td>Liquids and Solids (10)</td>
<td>#12: Paper Chromatography (25)</td>
<td>1/27</td>
<td>1/26</td>
<td>Chap. 10: 37, 40, 41, 43, 45 (Week 5)</td>
</tr>
<tr>
<td>5</td>
<td>Liquids and Solids (10)</td>
<td>#10: Crystal Structure (25)</td>
<td>2/3</td>
<td>1</td>
<td>Chap. 10: 69, 82, 95, 101, 137 (Week 6)</td>
</tr>
<tr>
<td>6</td>
<td>Properties of Solutions (11)</td>
<td>#13 Molecular Weights Freezing Point Depression (25)</td>
<td>1/5</td>
<td>2/9</td>
<td>Chap. 11: 93, 118, 124, 127, 129 (Week 7)</td>
</tr>
<tr>
<td>7*</td>
<td>Chemical Kinetics (12)</td>
<td>#23: Chemical Kinetics – Hydrolysis of t-butyl chloride (25)</td>
<td>2/17</td>
<td>1/8</td>
<td>Chap. 12: 24, 37, 85, 103, 113 (Week 8)</td>
</tr>
<tr>
<td>8*</td>
<td>Chemical Kinetics (12)</td>
<td>#25 Formula and Formation Constant of a Complex Ion (25)</td>
<td>1/12</td>
<td>2/23</td>
<td>Chap. 12: 61, 64, 106, 114, 115 (Week 9)</td>
</tr>
<tr>
<td>9*</td>
<td>Chemical Equilibrium (13)</td>
<td>Equilibrium and Le Châtelier’s Principle (25)</td>
<td>1 1/2</td>
<td>3</td>
<td>Chap. 13: 16, 71, 76, 77, 80 (Week 10)</td>
</tr>
</tbody>
</table>

*NOTE: General Chemistry II lab sections CHEM 102-08 (Nickolaisen) and CHEM 102-12 (Foster) will have alternative laboratory exercises for Weeks 7-9. The point value will be identical to those in other Winter 2015 CHEM 102 lab sections. Details will be shared with the impacted lab sections.
Grading
The grade in this course is assigned largely on the basis of points accumulated through activities in the following categories:

<table>
<thead>
<tr>
<th>Section</th>
<th>Activities (points)</th>
<th>Total Points Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Two midterm exams (150 each), E-graded assignments (100), and the final examination (250)</td>
<td>650</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Laboratory reports (200), eight best 10-point weekly quizzes (80), human-graded homework (45), log review (15), and laboratory technique (10)</td>
<td>350</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>1000</td>
</tr>
</tbody>
</table>

The instructor may make minor changes to the total number of points as necessary. Additional assignments may be used to assign extra credit. You must pass the lecture section with at least 50% of the points, and you must also pass the laboratory section with at least 50% of the points. 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. *If you fail either the lecture or the laboratory, you will not pass the class!*  

Exam Schedules
The first midterm exam will be given approximately during the 3\textsuperscript{rd} or 4\textsuperscript{th} week of classes, and the second midterm exam will be given approximately during the 7\textsuperscript{th} or 8\textsuperscript{th} week. The exact dates for each exam will be announced in class. The final exam will be comprehensive and will be given on the date given in the Winter Class Schedule available on-line.

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.

Laboratory
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. 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 any time in the lab.
● Before beginning the first experiment, familiarize yourself with the location of safety equipment in the lab. These include the fume hoods, fire extinguishers, safety shower, 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.

**Formal Laboratory Reports**
A student’s ability to develop their written communication skills is supported by formal laboratory report assignments. All laboratory reports will contain the sections described below. The percent value presented in parenthesis under the Section Subheading column reflects the percentage of the total grade that will be attributed to the quality of this subsection. For example, there are a total of 3 points possible for an excellent Data Table/Summary section if the formal laboratory report is worth 30 points:

<table>
<thead>
<tr>
<th>Section Subheading (Grade %)</th>
<th>Section Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover</td>
<td>Begin the report with the student’s name (and lab partner’s name if applicable), date, and experiment title.</td>
</tr>
<tr>
<td>Purpose (5%)</td>
<td>The Purpose is a 1-2 sentence description of the experiment that clearly states each experimental objective w/ brief experimental description.</td>
</tr>
<tr>
<td>Theory/Principles (20%)</td>
<td>This section presents a concise lead-in to the report with all theories, essential chemical reactions and mathematical equations included. Just writing equations is not enough!</td>
</tr>
<tr>
<td>Experimental Procedures (5%)</td>
<td>This section may cite the laboratory manual (<em>see format instructions in the Reference section below</em>) without repeating the content. Deviations from or improvements to the published procedure are reported here.</td>
</tr>
<tr>
<td>Data Tables/Summary (10%)</td>
<td>Report quantitative data in neatly formatted data tables complete with units and titles. Results may be included with reference to sample calculations below. Qualitative data should be summarized here, and copies of signed raw data must be attached to the report.</td>
</tr>
<tr>
<td>Results (25%)</td>
<td>In this section students must include sample calculations used to generate experimental results, and summarize the results in tables and/or graphs. Results from calculations used to assess accuracy and precision of quantitative results must be included here.</td>
</tr>
</tbody>
</table>
## Discussion (20%)
A discussion is a logical explanation of the experimental results presented in paragraph form. A logical explanation is based on comparisons of results calculated from student data and literature values, possible only after the accuracy and precision of calculated values has been assessed. Many of the Goldwhite and Tikkanen Discussion Questions can be used to generate quality discussions. Answer these prior to drafting your discussion and weave your responses into the text whenever possible. Make sure to properly cite literature values (see References below). A good source is the CRC Handbook of Chemistry and Physics, which is in the reference section of the library. Students should identify the most critical measurement (that which has the greatest uncertainty) and point out approximations that may affect the accuracy of the calculated results.

## Conclusions (10%)
Student must generate conclusions from the Discussion section that reflect on the experimental objectives stated in the Purpose section of the report. Quantitative results must be summarized here.

## Formatting (5%)
The formal report must be presented clearly, concisely and professionally. For full credit, the cover page must contain the name and date information described in the Cover section above. Students are required to reference all citations used in the preparation of the report. Please reference the ACS Style Guide for an expanded discussion on acceptable reference formats. Recommended are presented below:

- **Books without Editors**: Author1; Author2; Author3; etc. Chapter Title. *Book Title*, Edition number; Series Information (if any); Publisher; Place of Publication, Year; Volume Number, Pagination.
- **Internet Resources**: Author (if any). Title of Site. URL (accessed date), other identifying information.
- **Periodicals**: Author1; Author2; Author3; etc. Title of Article. *Journal Abbreviation Year*, Volume, Inclusive Pagination.

### Formal Laboratory Report Submission
The instructor will tell students when final written reports are due. The total points possible for each report is 25 points.

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. Simply stated, plagiarism is the submission of text or images in a new document that originated elsewhere, without a proper citation of the original work. This includes work a student may have created themselves, but submitted a previous assignment. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. You may submit your papers in such a way that no identifying information about you is included. Another option is that you may request, in writing, that your papers not be submitted to Turnitin.com. However, if you choose this option you will be required to provide documentation to substantiate that the papers are your original work and do not include any plagiarized material. All lab reports, independent of the mode of submission, must include a copy of the raw data signed by the laboratory instructor. Do not remove the raw data from the original laboratory notebook.