

Berkeley City College

Chem 1A (#20131) Syllabus Spring 2019

Instructor: Siraj Omar, Ph.D.

(email-1: somar@peralta.edu)

(email-2: sirajomar@sbcglobal.net)

(web: www.berkeleycitycollege.edu/wp/somar)

I. Class Meetings:

| | | | |
|-------------------|-------------|--------|-------------------------------|
| Lecture: | 0800 - 1050 | TTh | (BCC, Rm 431) |
| Lab (Sect-1 & 2): | 1330 - 1620 | T & Th | (BCC, Rm 521, chemistry lab) |
| Office hours: | 1400 - 1600 | MW | (LRC, first floor; Drop-in) |
| | 1530 - 1630 | Th | (Rm 523; by appointment only) |

II. Class Description & Objectives

Chemistry 1A is the first part of a two semester general chemistry course, which will cover topics that include atomic structures, electron configurations, periodic properties, bonding theories, and molecular shapes; the concept of moles, molar mass and stoichiometry; thermochemistry; intermolecular forces and the properties of gases, liquids, solids, solutions and colloids. This class assumes that you have the basic knowledge of basic chemistry that is equivalent to one year of high school chemistry or the successful completion of an introductory chemistry course. Mathematics skills, particularly algebra, are essential for your success in this class. You must be comfortable with word problems, percentages, and logarithm. (Chem 1A is a pre-requisite for Chem 1B. It is a transferrable course to UC and CSU, and is a required subject for all science majors, medical degree, and degrees in dentistry and pharmacy.)

Student Learning Outcome:

Upon completing this course students will acquire the following knowledge and skills:

1. Solve quantitative chemistry problems and integrate multiple ideas, that include incorporating stoichiometric and algebraic relationships, in problem solving processes.
2. Explain qualitative trends in physical and chemical properties of elements and use molecular level concepts (physical and/or chemical) to explain macroscopic properties of matter.
3. Perform experiments according to laboratory safety procedures; collect and analyze experimental data; interpret results that include graphs construction; write organized laboratory reports.

III. Books and Supplies

- Primary textbook: OpenStax (OER): <https://openstax.org/details/chemistry>. (Required)
- Supplementary text: Zumdahl & Zumdahl: Chemistry, 9th Edition, Cengage Learning. (Optional)
- Sapling-Learning Online Homework (Required): <https://www.SaplingLearning.com>
- Chem 1A Laboratory Manual, Siraj Omar, Berkeley City College, Copy World Printing. (Required)
- Lab notebook, safety goggles, and scientific calculators. (Required)
- Lab-coat or apron. (Recommended)

IV. Grading: 1. Weighting factors:

| | |
|----------|-----|
| Tests | 36% |
| Finals | 20% |
| Quiz | 16% |
| Lab. | 20% |
| Homework | 8% |

2. Distribution of Grades:

| | |
|---|----------|
| A | ≥ 90% |
| B | 79 - 89% |
| C | 65 - 78% |
| D | 51 - 64% |
| F | ≤ 50% |

[Note that points accumulated from homework assignments, lab reports, quizzes and tests are not equivalent. It is the percentage score from each section that is important.]

V. Homework Assignments

Homework will be assigned weekly through online homework provider (www.SaplingLearning.com).
(Please go to bottom of page 4 for instructions on how to enroll in Sapling Learning Online Homework.)

VI. Quizzes, Mid-terms and Final Exam:

There will be 9 -10 scheduled quizzes, three (3) mid-terms and a final exam. There will be **NO make-up** on quizzes, tests, or the final exam. All test/exam scores will be counted into your final grades, but only the top eight (8) of the quiz scores will be counted into your final grades; the final exam will be comprehensive. If you have any conflicts on the dates scheduled for quizzes, midterms or the final exam due to prior commitments, please let me know one week before the scheduled dates for quiz or midterm, so that an date could be arranged for you. If you require a specific accommodation for quiz or exam, such as a quieter room or extra time, please make arrangement with BCC DSPS office. (Any such arrangement that you've made at other colleges is nonbinding at this college until it is validated by our DSPS officials.)

VII. Laboratory Experiments

Laboratory experiments are very important components in chemistry curriculum. Experiments are designed to supplement lectures and to bring relevance to the course materials. There will be 12-13 experiments assigned for the class, and you are required to write a lab report on each of these experiments. You will NOT be awarded a passing grade if you do not do the experiments or did not turn in at least two-third of the lab reports. (Please read the Guideline for Lab Report writing included in this syllabus.)

Please read and follow the instructions below for laboratory experiments.

1. Before each lab class, you must complete the pre-lab exercises and turn them in at the beginning of the class period. You have any question regarding the prelab, you may ask me at the beginning of the lab period before you begin performing the experiment.
2. You MUST have a laboratory notebook where you keep records of all experimental data and observations. No pieces of paper or pencil will be accepted.
3. Prepare your lab notebook before each laboratory period as follows:
 - Start on a fresh page for each experiment. Write the Title and Objective of the experiment. This is followed by one or more paragraphs of Overview of the experiment, the Experimental Procedure summary or outline, and Data Table(s). During the experiment, data must be entered directly into your lab notebook in INK. Writing experimental data/observation in pencil is not acceptable.
 - After the data table(s), leave enough space for calculations.
4. At the end of the experiment, please show your data and a sample calculation to your instructor for his/her initials before leaving the lab.
5. Your final lab reports must be organized in the following format, or it will be returned ungraded.
 - (i) Title of experiment;
 - (ii) Objective (a brief statement of purpose of the experiment – write in a complete sentence);
 - (iii) An Overview (a brief description of the experiment and its chemical principle with relevant equations and formulas that would be used to achieve the goal of the experiment);
 - (iv) Procedure (list the steps involved).
 - (v) Data Table(s): must be organized and properly labeled. Calculations, and Results of the experiment. (Everything must be organized and properly labeled.)
 - (vi) Summary. (State briefly whether the experiment's objective is achieved and explain if not.)
6. The final lab reports must be submitted within one week after the experiment is completed. Points will be deducted from late reports. All lab report MUST be typed (including the data tables), unless the instructor says otherwise, and the original copy of the raw data must be attached.

*[Note: Lab reports that are more than three (3) weeks overdue will NOT be graded.]

VIII. Safety in the Laboratory

Safety in the laboratory is of primary importance.

1. You **MUST ALWAYS WEAR APPROVED SAFETY GOGGLES** during laboratory classes, regardless of whether you are doing an experiment or not.
2. **SHOES MUST BE WORN** - sandals or flip-flops are **NOT** allowed in the laboratory. It is also strongly recommended that you wear protective clothing.
3. Any kind of experimentation with chemicals, other than those you are assigned to do, is strictly prohibited.
4. You **MUST NOT** eat or drink in the laboratory.

VII. Reading/Studying

- It is crucial that both the reading and pre-laboratory work be completed before you come to class or lab. You are responsible for keeping ahead in reading the chapters.
- Studying is an active process, which includes doing a lot practice problems, summarizing ideas in your own words, and memorizing facts and formulas.
- You should expect to spend a minimum of 10-12 hours per week (sometimes more) that you'll need to read the textbook and lecture materials, do homework assignment and lab reports, and to study for quizzes and exams. Do the homework problems each day a few at a time. **DO NOT** leave the studying to the last minutes. It **DOES NOT** and **WILL NEVER WORK** in chemistry.

VIII. Academic Decorum and Attendance

- Attendance in lectures and labs are important and will be recorded. Be sure to sign the attendance sheets. Please contact me if you find yourself in a situation that might cause you to miss more than a week of classes.
- You are strongly encouraged to take notes during lectures and participate during class discussions. You **WILL NOT DO ANY HOMEWORK PROBLEMS** during lectures.
- Be punctual! If you arrive late, enter quietly. If you must leave the class early, sit where you can leave with the minimum disruption to your fellow students and the instructor.
- Please respect the desire of others to learn and refrain from talking during lectures. If you have any questions regarding the lecture materials, please raise your hand.

IX. Integrity

- All work submitted for grading must be your own work. Copying is cheating and is an unacceptable behavior. Cheating during quizzes or exams will earn you an automatic zero for those quizzes or exams.
- Be a full and active participant when you work on assignment with other students. If you just copy the groups or your partner's data, you have not learned anything and you are wasting your time.

****PLEASE TURN OFF ALL SMART PHONES, I-PAD, TABLETS & LAPTOPS DURING LECTURES**

Academic Calendar for Spring 2019

| | | |
|-------------|-----|--|
| January 21 | M | MLK Birthday |
| January 22 | T | Spring semester begins |
| January 27 | S | Last day to add w/o Permission #, |
| February 1 | F | Last day to add in person with Permission # or Add Card. |
| February 3 | Su | Last day to add a regular class online with Permission #. |
| February 3 | Su | Last day to drop classes without a W. |
| February 3 | Su | Census due – Instructor submit Census Roster |
| Feb 15-18 | F-M | Holidays - President's Day Weekend |
| March 15 | F | Last day to file for AA/AS Degrees and Certificates |
| March 21 | Th | Professional Day |
| April 1 - 6 | M-S | Spring Recess |
| April 1 | M | Cesar Chavez Day |
| April 26 | F | Last day to drop a class and receive a "W"; |
| April 26 | F | Attendance Verification Day – Instructors submit Attendance Roster |
| May 17 | F | Malcolm X's Holiday |
| May 20-25 | M-S | Final Exam Week |
| May 27 | M | Memorial Day Holiday |
| May 31 | F | Final Grades due. |

Student Instructions to Sign-up/Log-in to Sapling Learning Online Homework

- Go to www.saplinglearning.com/login to log in or create an account.
- Under Enroll in a new course, you should see Courses at [Your College]. Click to expand this list and see courses arranged by subject. Click on a subject to see the terms that courses are available.
- Click on the term to expand the menu further (note that Semester 1 refers to the first course in a sequence and not necessarily the first term of the school year).
- Once the menus are fully expanded, you'll see a link to a specific course. If this is indeed the course you'd like to register for, click the link.
- Enter the key code: **omar**
- Review the [system requirements](#).
- **Need Help?** Our technical support team can be reached by phone or webform. Here are their hours and contact information: <https://macmillan.force.com/macmillanlearning/s/contactsupport>

For more detailed instructions on how to register for your course, please follow this link:

<https://macmillan.force.com/macmillanlearning/s/article/Sapling-Learning-Registering-for-courses>

Spring Semester 2019, Chem 1A Lecture and Lab Schedules

| Wk | Date | Lecture/Lab [†] | Lecture Topics | Quizzes |
|----|----------|--------------------------|--|----------------------------|
| 1 | 01/22 | Lecture-1 | Course outline; | |
| | 01/24 | Lecture-2 | Classification of Matter; Physical & Chemical Properties (1.1 – 1.3) | |
| | | Lab-1 | Measurement; Significant Figures; Uncertainty & Accuracy (1.4 – 1.5) Dimensional Analysis, Density and Temperature Conversion (1.6) <i>Briefing on Lab and Safety Guideline; Safety Video & Safety Quiz;</i> | |
| 2 | 01/29 | Lecture-3 | Atoms, Molecules, and Ions (2.1 – 2.4); | |
| | 01/31 | Lecture-4 | Atoms, Molecules, and Ions (2.5 – 2.6); | Quiz #1 (Chapter1) |
| | | Lab-2 | <u>Experiment-A2: Error Analysis & Graphing</u> | |
| 3 | 02/05 | Lecture-5 | Nomenclature - Naming Inorganic Compounds (2.7); | |
| | 02/07 | Lecture-6 | Composition of Substances and Solutions (3.1 – 3.3); | Quiz #2 (Chapter2) |
| | | Lab-3 | <u>Experiment-A3: Paper Chromatography</u> | |
| 4 | 02/12 | Lecture-7 | Stoichiometry of Chemical Reactions (4.1 – 4.2); | |
| | 02/14 | Lecture-8 | Stoichiometry of Chemical Reactions (4.3 – 4.5); | Quiz #3 (Chapter3) |
| | | Lab-4 | <u>Experiment-A4: The Empirical Formula of an Oxide;</u> | |
| 5 | 02/19 | Lecture-9 | Thermochemistry: Energy Basic (5.1); Test Review; | *Quiz #4 (Chapter4) |
| | 02/21 | Test #1 | (Chapters 1 – 4) | |
| | | Lab-5 | <u>Experiment-A5: Formulas of Hydrates</u> | |
| 6 | 02/26 | Lecture-10 | Thermochemistry: Calorimetry & Enthalpy (5.2 – 5.3); | |
| | 02/28 | Lecture-11 | Electromagnetic Energy & Bohr Model (6.1 – 6.2); | |
| | | Lab-6 | <u>Experiment-A6: Reactions in Aqueous Solutions</u> | |
| 7 | 03/05 | Lecture-12 | Quantum Theory and Electron Configuration (6.3 – 6.4); | Quiz #5 (Chapter5) |
| | 03/07 | Lecture-13 | Periodic Properties of Atoms (6.5) | |
| | | Lab-7 | <u>Experiment-A7: Acid-Base Titrations</u> | |
| 8 | 03/12 | Lecture-14 | Ionic Bonding & Ionic Bond Strength (7.1 & 7.5); | |
| | 03/14 | Lecture-15 | Covalent Bonds and Lewis Structure (7.2 – 7.5); | *Quiz #6 (Chapter6) |
| | | Lab-8 | <u>Experiment-A9: Heat Capacity & Enthalpy of Dissolution</u> | |
| 9 | 03/19 | Lecture-16 | Molecular Structures and Polarity (7.6); | |
| | 03/21 | No Lecture | Professional Day | |
| | | Lab-9 | <u>*Experiment-A12: Lewis Structures and Molecular Shapes</u> (as homework assignment; due 04/11) | |
| 10 | 03/26 | Lecture-17 | Test Review; | Quiz #7 (Chapter7) |
| | 03/28 | Test #2 | (Chapters 5, 6 & 7) | |
| | | Lab-10 | <u>Experiment-A10: Spectrophotometric Analysis of Cobalt(II) Chloride</u> | |
| | 04/1 – 6 | (M-S) | SPRING RECESS | |

Spring Semester 2019, Chem 1A Lecture and Lab Schedules

| Wk | Date | Lecture/Lab [†] | Lecture Topics | Quizzes |
|----|----------------|---|--|-----------------------------|
| 11 | 04/09 04/11 | Lecture-18 Lecture-19 <i>Lab-11</i> | Valence Bond Theory and Hybridization (8.1 – 8.2); Molecular Orbital Theory (8.3 – 8.4); <u>Experiment-A11: Qualitative Analysis of Cations</u> | |
| 12 | 04/16 04/18 | Lecture-20 Lecture-21 <i>Lab-12</i> | Gas Pressure and Ideal Gas Laws (9.1 – 9.3); KMT; Effusion-diffusion & Real Gases (9.4 – 9.6); <u>Experiment-A8: Molar Volume of Ideal Gas</u> | Quiz #8 (Chapter8) |
| 13 | 04/23 04/25 | Lecture-22 Lecture-23 <i>Lab-13</i> | Intermolecular Forces & Liquid Properties (10.1 – 10.2); Phase Transition & Phase Diagram (10.3 – 10.4) Types of Solids & Lattice Structures (10.5 – 10.6); <i>Problem-Solving Exercises for Chapter-10</i> | Quiz #9 (Chapter 9) |
| 14 | 04/30 05/02 | Lecture-24 Lecture-25 <i>Lab-14</i> | Solution Formation; Solution Properties & Solubility (11.1 - 11.3); Colligative Properties & Colloids (11.4 – 11.5); <u>Experiment-A13: Enthalpy of Vaporization and Enthalpy of Fusion of Water</u> | *Quiz #10 (Chapt-10) |
| 15 | 05/07 05/09 | Test #3 Lecture-26 <i>Lab-15</i> | (Chapters 8 – 10) ? (tbd) <u>Experiment-A14: Molar Mass by Freezing-Point Depression</u> | |
| 16 | 05/14 05/16 | Lecture-27 Lecture-28 <i>Lab-16</i> | Catch-up and Final Review; Final Review (Last day to turn in lab reports for Experiment-A14 & Experiment-A13) | Quiz #11 (Chapt-11) |
| 17 | 05/21 | Final Exam | (Comprehensive) | |

* - Take-home quizzes.

† - All formal lab reports must be typed with 1.5 spacing, including experimental data; please use a font size no smaller than size 10. Data must be organized in table format; the calculations and chemical equations may be hand-written. Each lab report must be organized according to the format that contains the following sub-headings:

1. Title of experiment;
 2. Objective(s)
 3. Overview
 4. Procedure
 5. Data Table(s)
 6. Calculations (including error analysis when applicable)
 7. Results Summary and Conclusion
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Guideline for Writing Lab Reports

In this class, you are required to have a standard lab notebook where you will keep all experimental raw data. Your lab notebook must be a permanent bound and NOT a spiral bound copy. The lab notebook should only be used for entering and keeping experimental data. Data must be entered in non-erasable black or blue INK. Please prepare your lab notebook and complete the pre-lab exercises before coming to the lab.

Before each lab period you must prepare your lab notebook as follows:

- Start on a fresh page for each experiment and enter the date.
- Write the title and objective of the experiment to be carried out;
- Under Experimental Sub-Heading, list the chemicals and/or equipment that would be used in the experiment;
- Prepare a Data Table for your experimental data.

Format for Formal Lab Reports

Your formal Lab Reports MUST be organized according to the following format and must be typed. The formal lab reports must contain the following sub-headings and organized as such:

1. **Experiment Number and Title**
2. Date of Experiment: _____
3. **Your Name:** _____
4. **Partner:** _____

5. **Objective:**

State the purpose of the experiment, that is what the experiment intends to show, prove or determine, in one sentence (or in separate sentences if there are more than one objectives).

*6. **Overview:**

This is a summary of the chemical concept of the experiment. Under this sub-heading, you have to explain what the experiment is all about and the chemical principle involved. If the experiment involves a chemical reaction, such as determining the product of a reaction or to determine concentration using titration method, you must provide the balanced chemical equation of the reaction. However, if the experiment is about chemical reactions and writing balanced equations is the objective of the experiment, then you do not have to write the equations in the Overview section, because you will be writing them under the Result section. Also, state what data will be collected and what calculations will be performed in order to achieve the objective of the experiment. Your explanation should also include all the relevant mathematical equations that will be used in the calculations to achieve the objective(s) of the experiment. [All the required materials that you need to write the experimental Overview can be found in the Introduction section of each experiment in the lab manual.]

7. **Procedure:**

List in sequential manner the things that you need to do/measure during the course of the experiment in short sentences so that you or others reading your lab report can understand what you did during the lab. Mention any specific safety precaution and waste disposal information.

8. **Data Table**

Data MUST be presented in the tabulated form.

All data and observations MUST be entered directly into the lab notebook in black or blue INK. If you make a mistake, cross it with a single line such that the original value is still legible. If you make mistakes, cross it with a single line such that the original can still be read. Label data clearly so that you as well as other readers know what each piece of data represents.

9. Calculations

All calculations must be clearly written, properly labeled and organized. Data and calculated results must be presented in correct significant figures and appropriate units. (Note that data values obtained from equipment such as electronic balances MUST NOT be rounded off.)

10. Error Analysis (only if applicable)

Some experiments may require you to calculate the means and standard deviation of your results, where

$$\text{Mean, } \bar{x} = \frac{1}{n} \sum_{i=1}^n x_i \quad (\text{where data } x_i \text{ is obtained } n \text{ times.})$$

$$\text{Standard Deviation, } S = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

If the true value of the determined quantity is known, express the accuracy of your result in term of percentage error:

$$\% \text{ Error} = \frac{(\text{Experimental value} - \text{True value})}{\text{True value}} \times 100$$

If several values are obtained for a given quantity and an average value is calculated, express the precision of your results in term of Relative percent deviation,

$$\text{Percent Relative Range (PRR)} = \frac{(\text{Highest value} - \text{Lowest value})}{\text{Average value}} \times 100$$

11. Summary and Conclusion:

Summarize your experimental results and state whether the experimental objective(s) is/are achieved. Mention source(s) of errors that might affect your results.

[Not every experiment will require an error analysis. Only those experiments where the correct value(s) are known or more than one results of the same parameters are determined will require an error analyses.]

(*Overview and Error Analysis are not required in lab reports that do not require formal lab report write-up.)

[Note: In the lab you will be working with a partner. Therefore, you'll be sharing experimental data with your partner. However, you must perform your own calculation and write your own report. You MUST NOT COPY or share your partner's lab reports. Plagiarism is an academic offence and there will a penalty on your reports. If I find two identical lab reports, I will award only 50% of the normal grade to each report.]

Five Reasons Why Students Fail Chemistry

1. Insufficient Math Preparation

Math, especially algebra, is an essential tool in chemistry. To be able to solve chemistry problems requires that you understand basic algebra and you must have the ability to transform word problems into mathematical expression. If you think that your math is a bit rusty, get help immediately. Don't wait until you're halfway through the semester.

2. Not Getting of Reading the Text.

Textbook and lab manual are NOT optional items in the chemistry class. Even if the lectures are fantastic, you'll need the text to do the homework assignments. The best way to understand the lectures is to read the chapter before coming to each lecture. You will find it much easier to follow the lectures after you have read the chapter. Reading before class is especially critical when you want to do an experiment, that you must read the entire experiment before coming to the lab to conduct any experiment. Otherwise, you will be conducting the experiment without actually understanding what it is all about and, most importantly, you might compromise on the laboratory safety issues.

3. Procrastination

If you intend to pass and do well in chemistry you MUST study the lecture materials and do the homework promptly. NEVER put off studying and doing the homework assignment until you are halfway through the semester. It will be too late and you will never catch up. If you miss the basics, you'll get yourself into trouble. To master chemistry you must understand the concept. This requires that you study and do the homework on a daily basis. Build the concept a little at a time. Set aside a small segment of time each day for chemistry. It will help you gain a long-term mastery. Do not cram at the last minute.

4. Not Doing Your Own Work

Homework assignments are helpful if you do the exercises yourself. Study guides and solution manuals are useful only if you use them for help or for checking your work, but not as an easy way to get your homework done. Don't let a book or someone else do your work for you. They won't be available during examinations, which will account for a major portion of your grade.

5. Psyching Yourself Out

You must have a positive attitude toward chemistry. If you truly believe you will fail you may be setting yourself up for a self-fulfilling prophecy. If you have prepared yourself for the class, you must feel reasonably confident that you will succeed.

BERKELEY CITY COLLEGE

Chem 1A, Spring 2019
Student Academic Survey Form

Your Name _____

Tel. No. (____) - _____

email: _____
(please write clearly)

1. What are your academic major and career goals?
2. What chemistry class or classes have you taken before enrolling in this class?
High School Chemistry ? Yes/No (circle one); School name: _____
Chem 30A? Yes/No (circle one); Name of College: _____
Other Equivalent Chemistry Class (specify): _____
3. Did you take the California State Diagnostic Test for General Chemistry? When? What was your score?
4. Will you be taking Chem 1B after completing this course? _____
5. What is your academic load this semester? _____ units/semester; _____ hrs of lecture/week
6. Are you working? Yes/No. If Yes, what is your workload? _____ hr/week
(Note: This class will require you to spend a minimum of 12 hours per week outside class periods.)
7. Which of the following learning styles apply to you? (Choose all that apply.)
 - A) Visual and Verbal Learning Style
 - B) Visual/Nonverbal Learning Style
 - C) Tactile/Kinesthetic (or hands-on) Learning Style
 - D) Auditory/Verbal Learning Style
8. What major challenges are you expecting from this class? What do you hope the lectures will do for you?
9. Please list any questions or concerns.

[Note: If you require special accommodation for taking quizzes and/or exams, please make prior arrangement with the DSPS office; I will not be providing any accommodation during class time.]