

# Berkeley City College

Chem 1A (#20808) Syllabus Spring 2017

Instructor: Siraj Omar, Ph.D.

(email: [sirajomar@sbcglobal.net](mailto:sirajomar@sbcglobal.net))

(web: [www.berkeleycitycollege.edu/wp/somar](http://www.berkeleycitycollege.edu/wp/somar))

## I. Class Meetings:

Lecture:	0800 - 1050	TTh	(Room 431)
Lab (Section-1):	1330 - 1620	T	(Room 521, chemistry lab)
Lab (Section-2):	1330 - 1620	Th	(Room 521, chemistry lab)
Office hours:	1400 - 1600	MW	(LRC)

## 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

- Zumdahl & Zumdahl: Chemistry, 9<sup>th</sup> Edition, Cengage Learning.
- OpenStax Chemistry (OER; available for free at: <http://cnx.org/content/col11760/1.9>)
- Chem 1A Reader/Laboratory Manual, Siraj Omar, Berkeley City College, (Copy World)
- Lab notebook, safety goggles, and scientific calculators.
- Lab-coat or apron (recommended)

## IV. Grading: 1. Weighting factors:

Tests	40%
Finals	20%
Quiz	15%
Lab.	20%
Homework	5%

## 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. Quizzes, Mid-terms and Final Exam:

There will be ten (10) scheduled quizzes, three (3) mid-term tests and a final exam. There will be **NO make-up** on quizzes, tests, or the final exam. Only seven (7) of your best quiz scores will be counted into your final grades, but all of your test scores will be counted into the final grades, and the final exam is mandatory. If you have any conflicts with the quizzes, midterms, and/or the final exam due to prior commitments, please let me know at least one week in advance so that an earlier date can be arranged for you to take the quiz, test or exam.

## VI. Homework Assignments

Homework assignments on end-of-chapter problems with the due-dates for each chapter are given in this syllabus. It is important that you show the complete solutions for each problem and not just the answer. No credit will be awarded if you simply write the answers without showing the work/calculations how you arrived at the answers. Moreover, working on the solutions will provide you with the necessary practices in problem solving that are essential in this course.

## VII. Laboratory Experiments

Laboratory experiments are very important components of chemistry curriculum. Experiments are designed to supplement lectures and to bring relevance to the course materials. There will be 11-12 experiments that must be completed during the semester, and you are required to write a lab report on each of these experiments. (Please read the guideline on writing lab reports included in this syllabus.)

*Please read and follow the instructions below for laboratory experiments.*

1. Before each laboratory class, you must complete the pre-lab exercises and turn them in at the beginning of the lab period. Otherwise, you will NOT be allowed to proceed with 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 Summary or Outline.
  - (v) Data Table(s), 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.)(A complete guideline for writing lab reports is given in this syllabus.)
6. The final lab reports must be typed and submitted within one week after the experiment is completed. Points will be deducted from late reports (at a rate of 2 points per class meeting). ***Please note that lab reports that are more than three (3) weeks overdue will NOT be graded.*** (It is highly recommended that you type all your lab reports, but the original copy of the data must be attached.)

## 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 2017**

January 23	M	Spring semester begins
February 5	Su	Last Day to Drop Classes with Refund.
February 5	Su	Last Day to Drop Classes without a W appearing on transcript.
February 5	Su	Last Day to Add Regular Session Classes.
February 5	Su	Census Day – Instructor’s Enrollment Verification
Feb 17-20	F-M	Holidays - President’s Weekend
March 17	F	Last day to file petitions for AA/AS Degrees and Certificates
March 31	Th	Holiday - Cesar Chavez Day
April 10-16	M-S	Spring Recess
May 1	M	Last Day to Withdraw and receive a "W";
May 1	M	Attendance Verification Day – Instructors verify Enrollment
May 19	F	Malcolm X's Holiday
May 22-26	M-F	Final Exams Week
May 29	M	Memorial Day Holiday

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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 data. Your lab notebook should only be used for entering and keeping experimental data and writing lab reports. Data must be entered in non-erasable black or blue INK. 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:**

An "Overview" is: (1) an explanation of the chemical concept of the experiment; that is, the chemical principle involved in the experiment, which (2) must includes all the necessary equations (chemical and/or mathematical) that are applicable to the experiments. If an experiment involves chemical reactions, (3) you must write the chemical equations. However, if the experiment is about chemical reactions and writing balanced equations is the objective, then you do not have to write the equations in the Overview, because you will be writing them under the result section. (4) State what data (measurements/observations) will be collected and what calculations will be done to achieve the objective of the experiment. Provide the mathematical formulas or equations that will be used in the calculations to obtain experimental results.

7. **Procedure:**

Summarize or list what you need to do during the course of the experiment in short sentences so that you or others reading your lab report understand what you did during the lab. Write the reference source from where the experiment is obtained. For example: R.A.D. Wentworth, Experiments in General Chemistry, 8<sup>th</sup> Edition, page ??). If there is any modification in the procedure, describe this briefly. Mention any specific safety precaution if applicable 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 mistakes, cross it with a single line such that the original can still be read. 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: Most experiments are carried out with a partner and you will be sharing data. However, calculations and lab reports write-up must be an individual effort. You MUST NOT COPY your partner's lab reports. Plagiarism is an academic offence and there will a penalty on your reports.]**

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## Spring Semester 2017, Chem 1A Lecture and Lab Schedules

Wk	Date	Lecture/ <sup>†</sup> Lab	Lecture Topics	* <i>Quizzes</i>
1	01/24 01/26	Lecture-1 Lecture-2 <i>Lab-1</i>	Course outline; Chemical Foundations (1.1 – 1.5) Chemical Foundations (1.6 – 1.9); <u>Assessment Test</u> Video on Safety in the Laboratory and Safety Quiz; <u>Experiment-A1: Unit Conversion and Significant Figures</u> ;	
2	01/31 02/02	Lecture-3 Lecture-4 <i>Lab-2</i>	Classification of Matter (1.10); Graphing Technique; Atoms, Molecules, and Ions (2.1 – 2.3); Atoms, Molecules, and Ions (2.4 – 2.7); <u>Experiment-A2: Error Analysis &amp; Graphing</u>	<b><u>Quiz #1</u></b> (Chapter 1)
3	02/07 02/09	Lecture-5 Lecture-6 <i>Lab-3</i>	Nomenclature and Chemical Formulas (2.8); Chemical Quantities & Composition (3.1 – 3.5); <u>Experiment-A3: Paper Chromatography</u>	<b><u>Quiz #2</u></b> (Chapter 2)
4	02/14 02/16	Lecture-7 Lecture-8 <i>Lab-4</i>	Reaction Stoichiometry (3.6 – 3.10) Solution Compositions and Types of Reactions (4.1 – 4.5) ; <u>Experiment-A4: The Empirical Formula of an Oxide</u> ;	<b><u>Quiz #3</u></b> (Chap-3)
5	02/21 02/23	Lecture-9 <b>Test #1</b> <i>Lab-5</i>	Solutions Stoichiometry (4.6 – 4.8); (Chapters 1 – 3) <u>Experiment-A5: Formulas of Hydrates</u>	
6	02/28 03/02	Lecture-10 Lecture-11 <i>Lab-6</i>	Oxidation-Reduction Reactions (4.9 – 4.10) Ideal Gas Laws (5.1 – 5.5); <u>Experiment-A6: Reactions in Aqueous Solutions</u>	<b><u>Quiz #4</u></b> (Chapter 4)
7	03/07 03/09	Lecture-12 Lecture-13 <i>Lab-7</i>	KMT of Gases and Real Gas Properties (5.6 – 5.9); Atmospheric Chemistry (5.10); Thermochemistry (6.1 – 6.3); <u>Experiment-A7: Acid-Base Titrations</u>	
8	03/14 03/16	Lecture-14 Lecture-15 <i>Lab-8</i>	Thermochemistry (6.4 – 6.6); Electromagnetic Radiation and Quantum Theory (7.1 – 7.5); <u>Experiment-A8: Determination of Molar Volume of an Ideal Gas</u>	<b><u>Quiz #5</u></b> (Chapter 5)
9	03/21 03/23	Lecture-16 <b>Test #2</b> <i>Lab-9</i>	Test #2 Review; (Chapters 4 – 6) <u>Experiment-A9: Thermochemistry and Hess's Law</u>	<b><u>Quiz #6</u></b> (Chapter 6)
10	03/28 03/30	Lecture-17 Lecture-18 <i>Lab-10</i>	Quantum Numbers, Orbitals and Electron Configurations (7.6 – 7.11) Period Trends of Atomic properties (7.12 – 7.13); <u>Experiment-A10: Spectrophotometric Analysis of Cobalt(II) Chloride</u>	

Wk	Date	Lecture/†Lab	Lecture Topics	*Quizzes
11	04/04 04/06	Lecture-19 Lecture-20 <i>Lab-11</i>	Ions, Ionic Bonds & Lattice Energy (8.1 - 8.5); Covalent Bonding and Lewis Structures (8.6 - 8.12); <u>Experiment-A11: Qualitative Analysis of Cations</u>	<u>Quiz #7</u> (Chapter 7)
	04/10 – 15 (M-S)		SPRING RECESS	
12	04/18 04/20	Lecture-21 Lecture-22 <i>Lab-12</i>	The VSEPR Model (8.13) Hybridization and Localized Electron Model (9.1); Bonding Theories: Orbital Hybridization (9.2 – 9.5); Problem Solving Exercises on Chapter 7 & 8 (Exercises must be completed in the lab and turn in to the instructor.)	<u>Quiz #8</u> (Chapter 8)
13	04/25 04/27	Lecture-23 <b>Test #3</b> <i>Lab-13</i>	Intermolecular Forces (10.1); Test Review (Chapters 7 – 9) <u>Experiment-A12: Lewis Structures and Molecular Geometry</u>	
14	05/02 05/04	Lecture-24 Lecture-25 <i>Lab-14</i>	Liquids, Vapor Pressure & Changes of State (10.2; 10.8 – 10.9) Types of Solids and Solid Structures (10.3 – 10.7); <u>Experiment-A13: Enthalpy of Vaporization and Enthalpy of Fusion of Water</u>	
15	05/09 05/11	Lecture-26 Lecture-27 <i>Lab-15</i>	Structures and Types of Solids (10.3 – 10.7) Properties of Solutions (11.1 – 11.3); <u>Experiment-A14: Molar Mass by Freezing-Point Depression</u>	<u>Quiz #9</u> (Chapter 10)
16	05/16 05/17	Lecture-28 Lecture-29 <i>Lab-16</i>	V.P. and Colligative Properties of Solutions (11.4 – 11.7) Colloids (11.8); Final Review (Last day to turn in lab reports for Expt#12A)	<u>Quiz #10</u> (Chapter 11)
17	05/23	Final Exam	(Comprehensive)	

(\* - Each quiz will cover materials discussed in the previous week.

† - All formal lab reports must be typed with 1.5 spacing and please use a minimum font size 10. However, 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

## Homework Assignments for Chem 1A, Spring 2017

Textbook: Chemistry by Zumdahl & Zumdahl, 9<sup>th</sup> Edition.

- Chapter-1: 27, 30, 31, 37, 38, 42, 49, 55, 57, 59, 63, 65, 68, 70, 71, 78, 83, 87, 97, 98, 101, 118, 119, 120, 121. (Due: 02/02/2017)
- Chapter-2: 19, 23, 34, 37, 38, 40, 44, 47, 48, 55, 62, 67, 68, 69, 71, 72, 76, 77, 80, 83, 94, 95, 99, 111, 121 (due: 02/09/2017)
- Chapter-3: 37, 48, 65, 67, 71, 74, 77, 83, 89, 95, 101, 107, 110, 115, 117, 125, 129, 133, 134, 141, 163, 164, 167, 170. (due: 02/23/2017)
- Chapter-4: 23, 27, 32, 36, 37, 44, 45, 49, 51, 56, 59, 65, 66, 71, 75, 77, 80, 84, 88, 94, 95, 106, 113, 134, 137. (due: 03/07/2017)
- Chapter-5: 38, 41, 44, 47, 49, 54, 63, 65, 67, 74, 77, 78, 83, 85, 91, 93, 103, 105, 108, 112, 120, 136, 139, 149, 157. (due: 03/14/2017)
- Chapter-6: 25, 28, 31, 39, 40, 45, 47, 54, 55, 58, 59, 62, 64, 65, 75, 76, 79, 81, 84, 93, 95, 99, 103, 110, 127. (due: 03/23/2017)
- Chapter-7: 21, 22, 37, 41, 49, 53, 55, 63, 67, 69, 72, 74, 81, 85, 87, 94, 100, 106, 110, 113, 115, 137, 138, 151, 163. (due: 04/06/2017)
- Chapter-8: 29, 30, 35, 38, 46, 52, 56, 57, 58, 65, 70, 71, 73, 77, 78, 82, 83, 87, 88, 94, 101, 106, 115, 116, 150. (due: 04/20/2017)
- Chapter-9: 9, 12, 16, 18, 19, 20, 29, 42, 45, 47, 49, 52, 55, 63, 64, 69, 70, 73, 75, 83, 85, 89, 91, 93, 98. (due: 04/27/2017)
- Chapter-10: 14, 21, 35, 37, 41, 42, 47, 51, 54, 57, 61, 62, 67, 70, 82, 85, 91, 93, 96, 101, 102, 103, 118, 143, 144. (due: 05/11/2017)
- Chapter-11: 20, 21, 29, 30, 37, 39, 46, 50, 53, 57, 59, 63, 64, 66, 69, 71, 78, 82, 90, 93, 99, 100, 102, 123, 125. (due: 05/23/2017)
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## **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 2017  
Student Academic Survey Form

Your Name \_\_\_\_\_

Tel. No. (\_\_\_\_)-\_\_\_\_\_

email: \_\_\_\_\_  
(please write clearly)

1. What are your academic majors or career goals?
2. Have you taken a year of high school chemistry, Chem 30A, or other introductory chemistry classes? If yes, when and where did you take them? (Name the schools or colleges).
3. What other classes are you taking this semester? \_\_\_\_\_
4. Will you be taking Chem 1B after completing this course? \_\_\_\_\_
5. What is your academic load this semester? \_\_\_\_\_ units/semester; \_\_\_\_\_ hrs of lecture/wk
6. Are you working or doing other nonacademic work? Yes/No.

If Yes, what is your workload? \_\_\_\_\_ hr/wk

(\*Note: This class will require you to spend 12-16 hours per week outside your lecture periods. Normally it will use up 60-65% of your study time.)

7. Which of the following learning styles apply to you? (Choose all that apply to you.)  
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?
9. What do you hope the lectures will do for you?
10. Please list any questions or concerns.