BERKELEY CITY COLLEGE
Chem 1B (#20135) Syllabus, Spring 2019
Instructor: Siraj Omar, Ph.D.
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(web: www.berkeleycitycollege.edu/wp/somar)

I. Meeting Time:

Lecture:	0900 – 1150	MF	(BCC, Rm 032 - Basement)
Lab:	0900 – 1150	W	(Chem Lab; Room 521)
Office hours:	1400 – 1600	MW	(First floor, LRC; drop-in)
	1530 – 1630	Th	(Rm 523; by appointment only)

II. Description & Objectives

Chem 1B, the second part of college general chemistry, will cover materials under the following topics: chemical kinetics; equilibria (chemical and in aqueous solutions); acids, bases and buffer solutions; entropy and free energy; redox reactions and electrochemical processes; the chemistry of main group elements and their uses; the chemistry of transition elements and their coordination compounds; nuclear chemistry, and an introduction to organic and biological compounds.

As in Chem 1A, this course emphasizes on the understanding of basic chemical principles associated with chemical processes occurring in the laboratories and in nature, as well as their industrial significance. Problem solving and laboratory exercises are important aspects in this course. There will be weekly experiments and homework assignments that will help you acquire essential practices and skills. (Pre-requisite: obtain grade C (or better) in Chem 1A)
(Chem 1B is a pre-requisite for organic chemistry 12A. It is a transferrable course to UC and CSU; a required subject for all science majors, medical program, 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 Chemistry, Rice University; (required)
- Sapling-Learning Online Homework (required): https://www.SaplingLearning.com
- Supplementary text: Zumdahl & Zumdahl, "CHEMISTRY" 8th or 9th ed., Cengage. (optional)
- Chem 1B Laboratory Manual, Siraj Omar, Science Department, Berkeley City College. (required)
- Laboratory Notebook; scientific calculators, and safety goggles. (required)
- Lab coat or apron (optional)

IV. Grading: A. Grade Distributions:

Midterms	36%
Final Exam	20%
Quizzes	16%
Laboratory	20%
Homework	8%

B. Grades:

A: $\geq$ 90%
B: 79 - 89%
C: 65 - 78%
D: 51 - 64%
F: $\leq$ 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 at 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, midterms, or the final exam. All 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. **Lab Reports**

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), 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 (at a rate of 1 points per class meeting). All 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 slippers will not be allowed in the laboratory. It is also strongly recommended that you wear protective clothing.
3. Any kind of experimentation with chemicals other than the one you are assigned to do is strictly prohibited.
4. You MUST NOT eat or drink in the laboratory.

IX. Reading and Studying

It is crucial that you read the chapter (or parts of it) before coming to class. You'll find it much easier to follow the lecture after you have read the materials (even once). Review the lecture materials as soon as possible or before the next lecture periods. Do the assigned end-of-chapter problems ASAP, a few problems at a time, and not leave them to the last minutes. DO NOT let things accumulate to a point that you find them too overwhelming. Studying is an active process, which includes doing a lot practice problems, summarizing ideas in your own words, and memorizing facts and formulas.

X. Academic Decorum and Attendance

Attendances in lectures and labs are very important and will be recorded. You may not be allowed to take any test or exam if you chronically miss more than 30% of class meeting without providing a valid reason. Please notify the department or me if you find yourself in a situation that might cause you to miss more than a week of classes.

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 by NOT TALKING during lectures. You are encouraged to ask questions at any point during lecture.

PLAGIARISM AND CHEATING WILL NOT BE TOLERATED IN THIS CLASS.

CHEATING DURING QUIZ OR EXAM WILL EARN YOU AN AUTOMATIC ZERO.

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

Chem 1B Lecture and Lab Schedules for Spring 2019

Wk	Date	Lect./*Lab*♣	Lecture/Lab Topics
1	01/21	No Class	MLK Birthday
	01/23	*Lab-1*	Course Outline; Lab Safety Briefing and Safety Video; Safety Quiz
	01/25	Lecture-1	Chemical Equilibrium & Equilibrium Constants (13.1 - 13.2)
2	01/28	Lecture-2	Calculations involving Equilibrium & Le Chatelier's Principle & (13.3 - 13.4);
	01/30	*Lab-2*	Experiment- B2: *Le Chatelier's Principle*
	02/01	Lecture-3	Acids, Base and pH of Solutions (14.1 – 14.3) ***Quiz*-1** (Chap-13)
3	02/04	Lecture-4	Polyprotic Acids & the Hydrolysis of Salt Solution (14.4 – 14.5)
	02/06	*Lab-3*	Experiment- B3: *Determining an Equilibrium Constant*
	02/08	Lecture-5	Buffers and Acid-Base Titrations (14.6 – 14.7)
4	02/11	Lecture-6	Solubility and Solubility Equilibrium (15.1) **Quiz-2** (Chap-14)
	02/13	*Lab-4*	Experiment- B4: *Acid-Base Equilibrium and Buffer Solutions*
	02/15	No Class	***Holiday*** – President's Day Weekend
5	02/18	No Class	***Holiday*** – President's Day Weekend
	02/20	*Lab-5*	Experiment- B5: *Acid-Base Titration pH-Curves*
	02/22	Lecture-7	Complex Ion Formation & Multi-Equilibrium System (15.2-15.3);
6	02/25	Lecture-9	Test Review; ***Quiz-3** (Chapter15)
	02/27	*Lab-6*	Experiment- B6: *Determination of Solubility Product Constant*
	03/01	**Midterms #1**	(Chapters 13, 14 & 15)
7	03/04	Lecture-8	Chemical Kinetics (12.1 – 12.4)
	03/06	*Lab-7*	Experiment- B1: *Determination of Reaction Rates and Rate Law*
	03/08	Lecture-10	Chemical Kinetics (12.5 – 12.7)
8	03/11	Lecture-11	Spontaneity, Entropy & Chemical Thermodynamics (16.1 – 16.3)
	03/13	*Lab-8*	Experiment- B7: *Thermodynamics of Borax Solubility*
	03/15	Lecture-12	Free Energy and Equilibrium (16.4); ***Quiz*-4** (Chapter12)
9	03/18	Lecture-13	Electrochemistry: Redox Reactions & Galvanic Cells (17.1 – 17.4);
	03/20	*Lab-9*	Experiment- B8: *Oxidation-Reduction Reactions*
	03/22	Lecture-14	Batteries, Corrosion & Electrolysis (17.5 – 18.7); ***Quiz*-5** (Chapter16)
10	03/25	Lecture-16	Test review ****Quiz*-6** (Chapter17)
	03/27	*Lab-10*	Experiment-B9: *Electrochemical Cells*
	03/29	**Midterms #2**	(Chapters 12, 16 & 17)
	04/01 – 04/06		SPRING RECESS
11	04/08	Lecture-15	Representative Elements: Metals, Metalloids & Nonmetals (18.1 – 18.4);
	04/10	*Lab-11*	Experiment- B11: *Qualitative Analysis of Cations*
	04/12	Lecture-17	Representative Elements (18.5 – 18.8);

Wk	Date	Lect./*Lab*♣	Lecture/Lab Topics
12	04/15	Lecture-18	Representative Elements (18.9 – 18.12);
	04/17	*Lab-12*	Experiment- B12: *Qualitative Analysis of Anions*
	04/19	Lecture-19	Transition Metals & Coordination Compd (19.1 – 19.2) ; ***Quiz*-7** (Chapter18)
13	04/22	Lecture-20	Coordination Compounds: Spectroscopic & Magnetic Properties (19.3);
	04/24	*Lab-13*	Experiment- B13: *Thermochemistry of Complex Formation*
	04/26	Lecture-21	Nuclear Chemistry (21.1 – 21.3)
14	04/29	Lecture-22	Nuclear Chemistry (21.4 – 21.6);
	05/01	Lecture-23	Test Review; ***Quiz*-8** (Chapter19)
	05/03	**Test #3**	(Chapters 18 & 19)
15	05/06	Lecture-24	Organic Chemistry (20.1 – 20.2);
	05/08	Lecture-25	Organic Chemistry (20.3 – 20.4);
	05/10	Lecture-26	?(tbd)
16	05/13	**ACS Exam**	(This exam covers Chem 1A and Chem 1B materials);
	05/15	Final Review	***Quiz*-9** (Chapter 21)
	05/17	No Class	Malcolm X Holiday
17	05/20	**Final Exam**	(Comprehensive, except 18 & 19)

(* - These quizzes maybe given as take-home exercises.)
(♣- All lab reports must be typed (including data tables) with 1.5 spacing and please use a minimum font size 10. Lab reports must be organized according to the format shown below. (Explanations of each section (or sub-heading) are provided in a separate section of this syllabus: see "**Guideline for Writing Formal Lab Reports**".)

Please organized each lab report as follows:

1. Title of experiment;
2. Objective(s)
3. Overview:
4. Procedure:
5. Data Table(s): (data and observations must be organized in tabulated format.)
6. Calculations (including error analysis if applicable)
7. Summary and Conclusion: summarize the results of the experiment and state whether the objective(s) of the experiment has been achieved. List sources of errors in the experiment.

(Items 1 – 5 & item 7 MUST be typed; calculations maybe hand-written)

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.]

For example:

Suppose that the objective of the experiment is to determine the equilibrium constant for the following reaction

$$Fe^{3+}(aq) + SCN^{-}(aq) \rightleftharpoons Fe(SCN)^{2+}(aq)$$

The Overview may be described as follows:

In this experiment, we will determine the equilibrium constant for the following reaction:

$$Fe^{3+}(aq) + SCN^{-}(aq) \rightleftharpoons Fe(SCN)^{2+}(aq)$$

Where the equilibrium constant is given as: $K_{eq} = \dfrac{[Fe(SCN)^{2+}]}{[Fe^{3+}][SCN^{-}]}$

All concentrations in the expression for K_{eq} are equilibrium concentrations. Since $Fe(SCN)^{2+}$ is strongly colored, its concentration at equilibrium can be determined using the Beer's law, such that A = kc, where A is the absorbance at λ_{max}, k is the Beer's constant and c is the molar concentration of $Fe(SCN)^{2+}$. The Beer's constant k will be determined in the first part of this experiment, by applying the Le Chatelier's principle. That is, by using a very low concentration of SCN^- and a very high concentration of Fe^{3+}, we can assume that the equilibrium is driven all the way to the right (Le Chatelier's principle) and all of SCN^- will form the complex ion $Fe(SCN)^{2+}$. The concentration of the complex ion $Fe(SCN)^{2+}$ in the mixture is then equal to the initial concentration of SCN^-. By measuring the absorbance of several solutions with different $Fe(SCN)^{2+}$ concentrations, we can obtain the data for the Beer's plot of "Absorbance (*A*) *versus* $[Fe(SCN)^{2+}]$" and obtain the Beer's constant k. We will use the value of *k* to calculate the concentrations of $[Fe(SCN)^{2+}]$ in other equilibrium mixtures, and use the ICE table to obtain the equilibrium concentrations of Fe^{3+} and SCN^-, and calculate K_{eq} for each equilibrium mixtures.

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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

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

    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:

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

    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,

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

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 partnet. 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 1B Spring 2019
(Student Academic Background Survey)

Student's Name: _____

Phone No. _____ (optional) Preferred email:_____
(Please write clearly)

1. What is your academic major or career goal?

2. Where and when did you take Chem 1A and what grade did you get?

   [Note: Due to occasional "glitch" in the Peralta District passport system, I may ask you to show me the transcript as proof you have taken and passed Chem 1A. You will not be allowed to enroll in Chem 1B if you did not pass with a minimum grade C in Chem 1A.]

3. Will you be taking organic chemistry 12A after completing Chem 1B? Yes/No

4. What is your academic load? _____units/semester; _____hrs of lecture/wk

5. Are you working? Yes/No. If Yes, what is your workload? _____hr/wk

6. Which learning styles apply to you? (Choose all that are applicable)

   A) Visual and Verbal Learning Style
   B) Visual/Nonverbal Learning Style
   C) Tactile/Kinestatic (or hands on) Learning Style
   D) Auditory/Verbal Learning Style

7. Rank the following topics discussed in Chem 1A from 1 to 5: (1) = very easy, and (5) = most difficult).

(a) Atomic Structures and Periodic Properties;	(1)	(2)	(3)	(4)	(5)
(b) Bonding Theory and Hybridization;	(1)	(2)	(3)	(4)	(5)
(c) Lewis Structures and Molecular Geometry;	(1)	(2)	(3)	(4)	(5)
(d) Properties of Gases, Liquids, and Solids;	(1)	(2)	(3)	(4)	(5)
(e) Solution Properties and Composition;	(1)	(2)	(3)	(4)	(5)
(f) Stoichiometry of Reactions;	(1)	(2)	(3)	(4)	(5)
(g) Thermochemistry	(1)	(2)	(3)	(4)	(5)

8. Do you have any questions or concerns regarding this course?

[Note: If you require special accommodation for taking quizzes and/or exams, please make arrangement with the DSPS office.)