

## Chemistry 1B-03Y Course Outline

Winter 2022

INSTRUCTOR: Dr. Billie Lo

[lobillie@fhda.edu](mailto:lobillie@fhda.edu)

Lecture: MWM Synch 11:30 AM- 12:20 PM Zoom Meeting

Laboratory: 1B-03Y MW In-person: 7:30- 10:20 AM (Burcak Artun)

Credit: 5 units

Prerequisite: Chem 1A with a C or better.

### COURSE DESCRIPTION:

Chem 1B is a pre-professional chemistry preparation for students planning a scientific or science related career field. A rigorous study of the fundamentals of chemistry at the first year level combines the study of thermodynamics, chemical kinetics, and solution equilibrium. The course includes both lecture and lab work designed to prepare students to enter fields of study as chemistry engineering, medicine, dentistry as well as biological sciences.

For the 2022 winter quarter, the course will be hybrid, which means that the students will attend the laboratory in person and on campus (refer to the Laboratory portion below); but the lecture will be online. You will participate in the course using De Anza College CANVAS. and zoom. **Student should have access to a computer, or a smart phone with internet connection.** Refer to Student Hub the De Anza Online Resources for Students on the De Anza web site, <http://www.deanza.edu/online-Winter Student Resource Hub> to see how to join the Zoom lecture or the lab online sessions. You may also use De Anza Library Chat room for help. If you have any specific needs that I should be aware of, please let me know. The PCC Disabled Students Programs and Services is available to assist you during this course.

### **TEXTBOOKS:**

Chemistry, The Molecular Nature of Matter and Change, Martin Silberberg, McGraw Hill. [Silberberg 9 ed.png](#)

Connect Access Code with ebook attached Refer to Canvas for information; you may purchase the code separately if you already have the book.

A simple Scientific Calculator (those can do +.-.X and /, but non-programmable) is required for all exams or quizzes. Safety goggles are provided for students in their lab lockers, and it should stay there when you leave the lab because you are not allowed to be in the lab without goggles.

### THE LABORATORY

In order to help students to get some exposure to lab instrumentation and experience, the chemistry department will offer in-person labs in the winter 2022. All safety precautions will be followed. The lab will be divided into 2 groups, 15 students per group each time. You will follow either the group 1 or group 2 schedule, only come to the lab one time per week. the time when you are not in the lab will be asynchronous. Any questions you may have can be solved in the lab or your lab instructor specified time. . There are only 9 times you need to be in the lab including check-in and check-out times.

### BASIS OF EVALUATION

A. Hourly Exam:

Three hourly exams will be given during the quarter. Make-up exam shall be given for serious and compelling reasons only. Arrangement should be made with your instructor PRIOR TO EXAM TIME by all means. Any late exams if allowed will be subject to 10% deduction in grade. The lowest exam will be dropped.

B. Final Exam:

A comprehensive final exam will be given. Student who misses or fails the final exam will not receive a grade C or better.

C. **Connect on-line homework is optional, but it is strongly recommended.** Not only you can get 100 extra credit points toward your over-all grade on completion of 60% of the total assigned Connect homework; but also, by **doing them on-line you can get instant feedback when you make a mistake, and you can get online tutoring when you need help**

The “Connect” **assignments** are divided into two parts - the conceptual and the selected end of the chapter problems. The program is set to allow late submission; but with **7% deduction** in points per day. You may use the link on Canvas to reach the Connect website for registration.

D Worksheets – **4 Worksheets for a total of 40 extra points**

Worksheet#	Topic	Available	Due Date	Points
1	Molec Geometry (VSEPR)	1/10/22	1/19/22	10
2	Kinetics	1/26/22	2/7/22	10
3	Equilibrium	2/9/22	2/16/22	10
4	PH Review	2/18/22	3/2/22	10

E. Grading:

3 Exams	175 point each, <u>drop the lowest</u>	Total 350 Points
Final exam		270 Points .
Lecture and Lab Class participation		40 Points
Lab Grade		340 Points
2 Lab Exams total	160 points	
Lab Notebook	40.points	
4 Lab Reports-total	140 points)	

Lab Report#	Name	Points
1	Molar volume	20
2	Green Salt	40
3	Kinetics	40
4	Kc	20
5	Ka/Kb	20

Total 1000 Points

**Extra Credit:** Optional, but in order to get the extra points it should be submitted by the due date.

“Connect” on-line Homework\*\* 100 Points.  
4 Worksheets 10 points each total 40 Points.

**>1000 A+, 885+ pts A, 780+ pts B, 650+pts C, 500+pts D**

**\*\*\*The grading in this course will follow what is written in this syllabus and according to the scale listed above.** From time to time, I will show a spreadsheet summarizing your grades. It is **your responsibility** to let me know the

discrepancies so I can make corrections as soon as possible. **Please note that all the single relevant grades recorded in Canvas are correct and will be exported to this spreadsheet. As a precaution though, don't trust your grade total, %, or the A, B, C etc. listed in Canvas.**

The best way to figure out how you are doing in the class is to calculate how many points you have lost by subtracting your scores from the maximum possible points for each exam or assignment and deduct it from 1000 points. The worksheets and the Connect assignments are extra points which may be used to make up for the points you've lost. Then, by the point standard above you can figure out how many points you can afford to lose and still get your desired grade. For example, if you have lost total 90 points in the exams, to get an "A", you can only lose 25 more points; but if you have a perfect score on 4 worksheets (10 points each), then you may lose a total of 65 points still get an "A"; furthermore, if you've earned 100 extra Connect points, you can lose 165 points total still get an "A"

**Academic Dishonesty: Any form of academic dishonesty will be ground for dismissal from the course.**

F. Attendance and withdraws:

Attendance at every meeting is required and will be counted towards your lecture or lab participation grade.

G. For Chem 1B we cover the following chapters in this order Chapter 5, Chapter 12, Chapter 16, Chapter 17, Chapter 18 and Chapter 20.

**To do well in the course You should.:**

- (1) Read each chapter carefully before coming to class. Not every detail will be covered in lecture, but you are still expected to understand the whole chapter.
- (2) As you read the chapter, attempt to do the in-chapter sample and follow up problems and the corresponding end-of chapter practice problems. In fact the "Connect assignments are selected end of the chapter problems. The exam questions will often be very similar to the problems mentioned above; therefore, make sure you can do all of these problems comfortably before an exam. Do the Connect homework in a timely manner will help you do well in class.
- (3) **DO NOT FALL BEHIND WITH THE READING OR HOMEWORK!!** This is the number one mistake you can make. Concepts in chemistry are like building blocks. Initially, you learn one topic to build up to larger concepts. If you are shaky on a topic early on, your whole foundation will be unstable. To avoid this, try to read ahead of the scheduled lecture topics and keep up with the homework.

H. **Laboratory: For class has more than 15 students, the lab will be divided into 2 groups with maximum 15 students per group.** Group I and group II will perform the same experiment each week except on different days (Mondays or Wednesdays). Each laboratory experiment must be completed within the specified time. When that period is over, no make-up labs. All lab work not conducted in the lab will be graded as a zero.

The safety Goggles are provided by the school and stored in the student's locker. Students should wear goggles whenever they are in the laboratory including the check-in and check-out days. When leave the lab, make sure you keep your safety goggles in your drawer ready for use the next time you attend the lab.

WEEK	DATES	LECTURE	LABORATORY
1	1/3/22 (M)	<b>Ch 5 Gases</b> – Properties of gases <b>Pressure. units</b> , Boyle’s law (V & P), Charles’s law (V & T), Avogadro’s law (V & n); combined ideal gas law	<b>Check-In (Group I)</b>
	1/5/22(W)	<b>Ch 5 Kinetic molecular theory</b> molecular energy distribution, an ideal gas; diffusion and effusion;	<b>Check-In (Group II)</b>
	1/7/22 (F)	<b>Ch 5</b> Van der Waal’s equation; vapor pressure; vapor pressure and boiling point; partial pressure & Dalton’s law	
2	1/10/22 (M)	<b>Review, Molecular shape/ polarity</b> - Electronegativity; periodic trends of electronegativity; bond polarity; <b>12.1 Intermolecular forces</b> (IMF), relative strength of IMFs: ions versus permanent dipoles versus temporary dipoles; hydrogen bond, <b>Water</b>	<b>Molar Volume (Group I)</b>
	1/12/22 (W)	<b>Ch 12 IMF</b> heat of fusion, heat of vaporization; heating-cooling curves	<b>Molar Volume (Group II)</b>
	1/14/22 (F)	<b>Ch 12 Phase diagrams</b> , phase changes: melting, freezing, evaporation, condensation, sublimation, deposition;	
3	1/17/22 (M)	Martin Luther King	
	1/19/22 (W)	<b>Ch 12</b> continue - crystalline versus amorphous solids; crystal lattices; unit cells: simple cubic, body-centered cubic, face-centered cubic semiconductors, and insulators; liquid crystals	<b>VSEPR Review (Worksheet 1)??</b>
	1/21/22 (F)	<b>Ch16 Kinetics</b> – Reaction rate, Rate Law, determining the reaction order and rate constant <b>experimentally</b>	
4	1/24/22 (M)	<b>Exam 1 •</b>	Green Salt (1) (Group I)
	1/26/22 (W)	<b>Ch16 Rate laws Integrated Rate Laws</b> , concentration changes over time, <b>half life</b>	Green Salt (1) (Group II)
	1/28/22	<b>Ch16</b> Theories of Chemical kinetics - <b>Collision theory, Arrhenius equation,</b>	
5	1/31/22 (M)	<b>Transition state theory, activation energy, reaction energy diagram, Catalysts</b>	Green Salt (2) (Group I)
	2/2/22 (W)	<b>Ch16 Reaction mechanisms</b> –reaction steps from reactants to products, Elementary steps, molecularity,	Green Salt (2) (Group II)
	2/4/22 (F)	<b>Ch16 Reaction mechanisms</b> –Elementary steps, molecularity, (RDM), intermediates. The over-all reaction, the rate law	
6	2/7/22 (M)	<b>Ch17 Equilibrium, Equilibrium constants, and Reaction quotients (similarity and difference between K and Q); Predicting direction of reaction by comparing Q and K</b>	Kinetics (I) (Group I)
	2/9/22 (W)	<b>Ch17</b> Kc versus Kp , Predicting direction of reaction by comparing Q and K Manipulation of Q or K’	Kinetics (I) (Group II)
	2/11/22 (F)	<b>Ch 17 Solving equilibrium problems – the “ICE” approach</b>	
7	2/14/22 (M)	<b>Ch17 Solving equilibrium problems</b> – using quadratic equation or simplify the calculation when K is very small or very large. <b>Ch17 Le Châtelier’s Principle</b>	Kinetics (I) (Group I)
	2/16/22 (W)	Exam 2	Kinetics (I) (Group II)
	2/18 (F)/22	<b>Ch18</b> Definitions of acids and bases: (1) Arrhenius(2) Brønsted-Lowry acid base (proton transfer)(3) Lewis acid base (electron transfer) acid and base dissociation constants (Ka & Kb)	
8	2/21/22 (M)	President’s Day	
	2/23/22 (W)	<b>Ch 18 The pH scale</b> Auto-ionization of water; definition of neutral versus neutralized; pH scale; temperature dependence of neutral pH; pOH; Kw	Lab Midterm

	2/25/22 (F) 2/25/22 (F)	<b>Ch18</b> <i>Strong versus weak acids</i> , Conjugate acid-base pairs; relative acid strength and direction of neutralization; determining $K_a$ from; relationship between $K_a$ and $K_b$ ; <i>Polyprotic acids</i> <b>Last day to drop classes with "W"</b>	
9	2/28/22 (M)	<b>Ch18</b> Conjugate acid-base pairs; relative acid strength and direction of An A-B reaction; determining $K_a$ from; relationship between $K_a$ and $K_b$ ; <b>Ch18 Salts</b> - Salts that yield acidic, basic, and neutral solutions; solutions of weakly acidic cations and weakly basic anions; salts of amphoteric	Kc by SPECTRO 20 (1) (Group I) <i>Polyprotic acids</i>
	3/2/22 (W)	<b>Ch18 Salts</b> - Salts that yield acidic, basic, and neutral solutions; solutions of weakly acidic cations and weakly basic anions; salts of amphoteric	Kc by SPECTRO 20 (1) (Group II)
	3/4/22 (F)	<b>Ch20 Spontaneity - Free energy</b> - entropy; microstates; first, second, and third laws of thermodynamics	
10	3/7/22 (M)	<b>Ch20 Free energy</b> standard molar enthalpies; entropy changes in common chemical and physical processes	$K_a/K_b$ of weak acid/base (Group I) 20
	3/9/22 (W)	<b>Exam 3</b>	$K_a/K_b$ of weak acid/base(GroupII)
	3/11/22 (F)	<b>Ch20</b> Predict the spontaneity of a reaction, <b>temperature effects</b>	
11	3/14/22 (M)	<b>Ch20</b> Relationship between free energy and equilibrium; free energy outside of the standard state; reaction progress diagrams	Lab Check out (Group I)
	3/16/22 (W)	<b>Ch20</b> Relationship between free energy and equilibrium; free energy outside of the standard state; reaction progress diagrams	Lab check-out (Group (II)
	3/18/22 (F)	<b>Ch20</b> Review	<b>Lab Final??</b>
12	3/21/22 (M)	Final	

**Student Learning Outcome(s):**

\*Evaluate the principles of molecular kinetics.

\*Apply principles of chemical equilibrium to chemical reactions.

\*Apply the second and third laws of thermodynamics to chemical reactions.