De Anza College-Spring 2019 (4/8-6/28)

Chemistry 1B, General Chemistry

Chem 1B - Section 01	Chem 1B - Section 02
Lecture MWF 11:30AM-12:20PM, S32	Lecture MWF 11:30AM-12:20PM, S32
Lab MW 7:30AM-10:20AM, SC2204	Lab MW 2:30PM-5:20PM, SC2204

Instructor: Dr. Chris Deming, email: demingchristopher@fhda.edu

Office Hours: Monday 12:30PM-2:00PM, Wednesday 12:30PM-2:00PM, Friday 10:00AM-11:00AM

Course Description: This class will cover the principals of chemical kinetics, intermolecular forces, chemical equilibrium, and thermodynamics.

This course is divided into two separate instructional periods, the lecture and laboratory sections. The lecture portion is primarily devoted to the material discussion while the laboratory portion gives a chance for students to practice chemical experimentation. One registration code will enroll for the lecture and lab sections. Lecture and lab sections must be taken together to pass Chem 1B and will both go towards a single grade.

Course Material:

1. **Lecture Text**: CHEMISTRY: The Molecular Nature of Matter and Change, Silberberg and Amateis, 8e. Other editions will be essentially the same and will work great to study, but practice problems given in this syllabus correspond to the 8th edition.
2. **Lab Manual:** http://www.deanza.edu/chemistry/Chem1B.html. Lab manuals must be read BEFORE performing each lab. Further instructions to follow.
3. **Lab Notebook:** Permanently bound, 8 ½ X 11 notebook
4. **Scientific Calculator.** Logarithm and exponential functions required, NO GRAPHING CALCULATORS. You are encouraged to bring your calculator each day to work through examples as they are presented. Phones will not be allowed for calculations during tests so be sure to bring a calculator those days.
5. **Safety Goggles.** Proper eye protection is required for every lab. Without goggles, the lab cannot be performed and the student receives a score of 0 for that day. Lab approved goggles are available at the bookstore. Any other goggles must seal to the face with an elastic strap and be specifically for chemistry.

Class Registration. This class is a lecture and laboratory-based course, so the registration limit is strictly set at 30 students per section based on the number of people able to safely conduct experiments in the space provided. The class is filled based on the official roster provided by the De Anza Admissions and Records, including an official waitlist. Students on this waitlist may come for the lecture and the lecture part of the lab, but will not be permitted to perform experiments or given a locker until officially enrolled.

Dropping the Course. Students that choose to drop this course are responsible for requesting a withdrawal through the admissions and records department **before** the deadline. Students who drop the class are also be required to officially check-out of the lab locker. Failure to check out by the scheduled check-out date will result in fees and a block placed on future registrations.

Resources: Academic support can be found at the Learning Resources Division https://www.deanza.edu/learningresources/. Information about tutoring can be found at the Math Science and Technology Resource Center https://www.deanza.edu/studentsuccess/mstrc/. Additionally, you are encouraged to email me with class questions.

Academic Integrity: By enrolling in classes at De Anza College, you are agreeing to the academic integrity policy and are held to all standards. Specifics can be found at https://www.deanza.edu/studenthandbook/academic-integrity.html. Cheating will not be tolerated and will result in 0 for that quiz/exam. Working in groups for homework is encouraged but copying is not allowed. Original work must be turned in for homework credit.

Disability Service Support: De Anza is committed to providing support for students with disabilities. Please contact me as soon as possible if you require special accommodations and I will be happy to do what I can to help. For more information, visit Disability Service Support at https://www.deanza.edu/dss/

Other important points.

1. If you **miss** a lab lecture or experiment on the **first day** of class, you will be **dropped** from the course unless previous arrangements have been made with the instructor.
2. More than one unexcused absence from lab will result in an automatic "F".
3. If you drop within the first two weeks of class, your lab locker will be inspected for missing items, you will be charged for missing or broken items, and the locker will be reassigned
4. If you fail to check out of the locker for any reason, you will be charged an administrative fee and a hold will be placed on your account until resolved

Grades/Evaluations:

Item	Points	Overall %
Lecture Exams, 3 total (100 points each)	300	32.6
Lecture Quizzes, 3 total (40 points each)	120	13.0
Lecture Final	240	26.1
Lecture Total	660	71.7
Prelabs, 8 total (3 points each)	24	2.6
In-lab Experiments, 1-2 Day Labs, 6 total (3 points each)	18	2.0
In-lab Experiments, 3-4 Day Labs, 2 total (6 points each)	12	1.3
Data and Calculations, 1-2 Day Labs, 6 total (3 points each)	18	2.0
Data and Calculations, 3-4 Day Labs, 1 total (6 points each)	6	0.7
Conclusion, 7 total (6 points each)	42	4.6
Lab Report, 1 total (40 points)	40	4.3
Lab Final	100	10.9
Lab Total	260	28.3
Class Total	920	100.0

Grade Assignment. This rubric is subject to change throughout the quarter.

Grade	Percentage
A+	>98
A	98-93
A-	93-90
B+	90-87
B	87-83
B-	83-80
C+	80-76
C	76-70
D	70-60
F	<60

Tentative Dates. All exam dates, lecture topics/dates, lab topic/dates are listed on page 7 and are subject to change throughout the quarter. The final exam date will not change and is provided on page 7 as well as the De Anza finals schedule page.

Class Lecture

This class (Chem 1B) will cover chapters 5, 12, 16, 17, 18, and 20 from the assigned textbook. The lecture will serve to cover the most important aspects of the chapter but students are still responsible for all material in the book chapter. Below are four helpful tips that make learning much easier this quarter.

1. Read the chapter *before* attending lecture. This will make the presented material much easier to understand. Also, as mentioned before, there is not enough time to go over every topic in extreme detail so reading is essential to obtain the complete picture.

2. Complete all homework problems *and* all of the in-chapter reviews. Although homework will NOT be turned in for credit, extensive practice is the best way to ensure concept mastery. There are plenty of problems to try in the book throughout the chapters as well as at the end of each chapter.

3. Don't fall behind. In chemistry, each new topic will build on the previous so it is essential to understand the topics as they are presented. Following a lecture when you do not understand the previous material is not an effective method for learning and will lead to further problems. To avoid falling behind……

4. Get help. If you are having a difficult time with a topic, it is your responsibility to get help. There are plenty of resources, including myself, for aiding in material comprehension, but it all starts with you making an effort to get this help. You are also encouraged to find a study group or coming to office hours.

Lecture Exams. There will be three lecture exams to test comprehension throughout the quarter. Exams will cover material from lectures, homework, and book chapters. If you are having difficulty completing the homework questions for that chapter, you are urged to get help *before* taking the test. Questions will range from easy to difficult and may require solving problems that have not been explicitly demonstrated before.

Each exam is worth **100 points** and the dates are given in the schedule section. Please note that these dates are subject to change depending on the pace of the material. No late or early finals will be administered. If you feel the grading of any exam is incorrect, please come and talk with me. I am very open to hearing what you have to say, but you must do so within **one week** of the day the exam key is released.

Lecture Quizzes. Since the lecture exams will only be 50 minutes long, the quizzes will provide more opportunity to demonstrate concept mastery and to make sure everyone is keeping

up with the material in between the exams. The quizzes are worth **40 points** each, will take about 25 minutes, and will be given at the beginning of class, so late attendance may result in missing time for the quiz. The day of the quizzes are given on page 7 but may change depending on how quickly we move through the material. Reminders for the quiz and any possible changes in the schedule will be announced through email and on CANVAS.

Lecture Final. The lecture final is worth **240 points** and will cover all chapters. Similar to the lecture exams, the final will cover material from lectures, homework, and book chapters with questions ranging from easy to difficult and some requiring solving problems that have not been explicitly demonstrated before. The date of the final will not change and is given along with the other exam dates on page 7.

Laboratory

This course will require the completion of 8 different lab-based activities Including preparation, experimentation, calculations, and analysis. The topic of the experiment will loosely mirror that of the lecture to give you an opportunity to prove to yourself what we are learning in class is valid. Towards the end of the syllabus are the guides for lab safety, notebook formatting, and the formal report.

Prelabs. To ensure each student has read the experiment and can perform the experiment safely, a prelab must be completed before every laboratory experiment in a specifically designated lab notebook.

Before each experiment, I will check to see if you have completed the title/date, abstract, hazards, experimental procedure, and data tables. Each prelab is worth **3 points** and must be completed before the laboratory session or the student will not be allowed to complete the experiment and will receive a 0 for that lab for that day. No printouts will be allowed as procedures. Instructions for keeping a proper lab notebook and completing a prelab are given towards the end of this syllabus. The items with purple titles are what need to be completed **before** the experiment for the prelab.

Lab Lecture/Experiment. Students are required to attend all lab sessions. This includes the lecture at the beginning of the lab period and the entire experiment. Timely arrival and proper completion of a lab are worth **3 points** for 1-2 day labs and **6 points** for 3-4 day labs.

Arriving during the lab lecture will result in a loss of 1 point while arriving after the lab lecture has finished will result in the loss of 2 points and potentially prevent the student from participating in the lab that day. Labs are generally broken up into more than one section and all section must be attended for credit for that experiment.

There are no make-up labs. Missing lab will result in a 0 for that lab and more than one unexcused absence will result in an "F" for the class. It is also the student's responsibility to understand all theory and practice of lab experiments as they will be on the lab final and are essential for safe lab experimentation. If there is an excusable absence, you must notify *before*

the missed lab, or this will count as a missing lab. If there is an emergency and you cannot contact me before lab, please do so as soon as possible.

If you miss the lab lecture on the first day of class for any reason, you will be dropped from the course.

Data/Calculations. Students are required to record all laboratory data and perform all calculations in a designated notebook. After each lab session, I will check your lab book to make sure you have recorded the correct data and with the correct number of significant figures for each instrument.

Additionally, before of leave, you will need to demonstrate calculations for one trial's worth of data (you still need to do the calculations for the other trial, but do not need to show this). The data and calculations together are worth **3 points** for 1-2 day labs and **6 points** for 3-4 day labs. Generally, I will generally let you know when you show me the data/calculations if you have something missing so you can complete what is missing and get all the points.

Conclusion. For each experiment, a conclusion will be due that is worth **6 points**. With these conclusions, I hope to give you practice being able to summarize your goals and experimental data as well as connect your results to expected values and deduce practical sources of error. Each conclusion is due at the beginning of the next lab period. A detailed description of what should be in a conclusion is given later in this syllabus.

Laboratory Report. For the green crystals lab, you will be required to do a formal, typed report worth **40 points**. In scientific research, conveying what you have discovered in a clear, concise, manner, is essential to making your new ideas accessible to others and allowing your contributions to help the world.

This may feel like something completely new if you have not done a scientific report and that is okay. We will not be doing everything that a manuscript would require, but rather looking to gain familiarity with presenting an experiment starting from the established scientific ideas that prompt such experimentation to the analysis and conclusion of the collected data. There will be a sample paper provided for some guidance as well as an in-depth instruction guide for the report.

The report is due Friday 5/17 by midnight. There is plenty of time to get help, but that means looking through some of the calculations earlier and making sure to not leave it all for the end.

Lab Final. The lab final will test your understanding of the theories utilized in lab sections this quarter as well as the practices implemented to yield meaningful data. This exam is worth **100 points** and is administered the last week of instruction. You will be allowed to use your lab notebook during this test, so it is beneficial to efficiently organize your notebook and to pay attention to the topic introduction at the beginning of lab. The lab final date is indicated in the following lecture/lab schedule. No early or late exams will be allowed.

Class Schedule

All dates, including exams and quizzes, are subject to change throughout the quarter. The final exam date will not change. Lecture topics are in black, labs are in blue, holidays are in green, quizzes are in orange, and exams are in red.

Week Of	Week #	Monday	Wednesday	Friday
4/7/19	1	Chapter 5 (Gases)	Chapter 5 (Gases)	Chapter 5 (Gases)
4/14/19	2	Chapter 5 (Gases)	Chapter 5 (Gases) Chapter 12 (IMFs)	Quiz 1 Chapter 12 (IMFs)
4/21/19	3	Chapter 12 (IMFs)	Chapter 12 (IMFs)	Chapter 12 (IMFs)
4/28/19	4	Chapter 16 (Kinetics) Exam 1 Review	EXAM 1 Chapters 5 and 12	Chapter 16 (Kinetics)
5/5/19	5	Chapter 16 (Kinetics)	Chapter 16 (Kinetics)	Chapter 16 (Kinetics)
5/12/19	6	Chapter 17 (Equilibrium)	Quiz 2 Chapter 17 (Equilibrium)	Chapter 17 (Equilibrium) **LAB REPORT DUE**
5/19/19	7	Chapter 17 (Equilibrium)	Chapter 17 (Equilibrium)	Chapter 18 (Acids/Bases)
5/26/19	8	MEMORIAL DAY	Chapter 18 (Acids/Bases) Exam 2 Review	EXAM 2 Chapters 16 and 17
6/2/19	9	Chapter 18 (Acids/Bases)	Chapter 18 (Acids/Bases)	Quiz 3 Chapter 20 (Thermodynamics)
6/9/19	10	Chapter 20 (Thermodynamics)	Chapter 20 (Thermodynamics)	Chapter 20 (Thermodynamics)
6/16/19	11	Exam 2 Review	EXAM 3 Chapters 18 and 20	Final Review

LECTURE FINAL EXAM
MONDAY June 24, 11:30AM-1:30PM

Week Of	Week #	Monday	Wednesday
4/7/19	1	Check In	Molar Volume (1)
4/14/19	2	Molar Volume (2)	Vapor Pressure (1)
4/21/19	3	Vapor Pressure (2)	Green Salt (1)
4/28/19	4	Green Salt (2)	Green Salt (3)
5/5/19	5	Green Salt (4)	Iodine Clock (1)
5/12/19	6	Iodine Clock (2)	Iodine Clock (3)
5/19/19	7	Iodine Clock (4)	Kc by Spec 20 (1)
5/26/19	8	MEMORIAL DAY	Kc by Spec 20 (2)
6/2/19	9	Ka of Weak Acid (1)	pKa Indicator (1)
6/9/19	10	pKa Indicator (2)	Calcium Hydroxide (1)
6/16/19	11	Calcium Hydroxide (2)	Check out/Lab Final

Homework

Homework will **NOT** be turned in for credit, but doing all of these is highly recommended for practice and overall concept mastery. These problems are chosen as the minimum needed to practice the topics, but you are strongly encouraged to beyond the listed problems and try other problems throughout the book. Test questions will be similar to homework questions, so it is important to practice each problem and get help when you need it. I will release an answer key for the problems, but it will correspond to the 8th edition only.

Chapter	Problems
5	2, 7, 8, 9, 11, 14, 20, 23, 24, 27, 30, 33, 37, 45, 49, 55, 73, 74, 77,82, 84, 87, 92, 98, 116
12	1, 4, 10, 11, 13, 15, 18, 24, 32, 38, 39, 40, 42, 49, 52, 63, 70, 72, 81, 88, 89, 96
16	1, 3, 8, 10, 15, 20, 25, 26, 35, 44, 48, 49, 51, 56, 61, 70, 73, 74, 78, 79, 85, 90, 94, 112
17	2, 3, 4, 7, 12, 13, 18, 22, 29, 31, 35, 42, 45, 50, 51, 57, 59, 67, 68, 72
18	3, 5, 10, 13, 22, 24, 25, 30, 43, 44, 48, 49, 60, 63, 70, 72, 84, 99, 111
20	2, 4, 5, 9, 13, 14, 17, 22, 23, 33, 38, 44, 49, 52, 54, 58, 63, 68, 75, 89, 104

Lab Safety/Preparedness

Maintaining safety in a laboratory is a primary concern. There are many hazards associated with chemistry labs and it is important to understand these hazards and that with proper techniques, the risk drops significantly. There are a few, very simple steps students should take to execute safe lab techniques and gain full points for this section.

First, always wear personal protective equipment (PPE) when performing lab experiments. Such items include, but are not limited to, safety goggles, long pants, sleeved shirt, and closed toe shoes. **All of this safety equipment must remain on until you leave the lab, or until everyone has completed the experiment for the day.** A detailed list containing safe lab procedures and general practices is given on the next page and must be reviewed and signed before starting experiments.

Second, read the lab procedure BEFORE coming to lab and write in your notebook the materials needed and step required so that all hazards are known ahead of time and may be properly addressed. Notes, facts, or some recognition of the hazards is required for the prelab to ensure the section on safety has been read. Reading the procedure ahead of time and knowing what tasks are at hand will also help the experiment go smoothly.

Finally, listen carefully to the directions provided at the beginning of the lab session. Many techniques can be performed safely and easily with the proper technique but become a safety hazard when performed improperly. If the lab lecture is missed, the student will not be allowed to perform that lab.

What follows is a list from the American Chemical Society Safety In Academic Laboratories Guidelines, 7th Ed., the following mandatory minimum safety requirements must be followed by all students and be rigorously enforced by all Chemistry faculty:

From the American Chemical Society Safety In Academic Laboratories Guidelines, 7th Ed., the following mandatory minimum safety requirements must be followed by all students and be rigorously enforced by all Chemistry faculty:

1) Chemistry Department-approved safety goggles purchased from the De Anza College bookstore (NOT safety glasses) must be worn at all times once laboratory work begins, including when obtaining equipment from the stockroom or removing equipment from student drawers, and may not be removed until all laboratory work has ended and all glassware has been returned to student drawers.
2) Shoes that completely enclose the foot are to be worn at all times; NO sandals, open-toed, or open-topped shoes, or slippers, even with socks on, are to be worn in the lab
3) Shorts, cut-offs, skirts or pants exposing skin above the ankle, and sleeveless tops may not be worn in the lab: ankle-length clothing must be worn at all times
4) Hair reaching the top of the shoulders must be tied back securely
5) Loose clothing must be constrained
6) Wearing "...jewelry such as rings, bracelets, and wristwatches in the laboratory..." should be discouraged to prevent "...chemical seepage in between the jewelry and skin...".
7) Eating, drinking, or applying cosmetics in the laboratory is forbidden at ALL times, including during lab lecture
8) Use of electronic devices requiring headphones in the laboratory is prohibited at ALL times, including during lab lecture
9) Students are advised to inform their instructor about any pre-existing medical conditions, such as pregnancy, epilepsy, or diabetes, that they have that might affect their performance.
10) Students are required to know the locations of the eyewash stations, emergency shower, and all exits
11) Students may not be in the lab without an instructor being present
12) Students not enrolled in the laboratory class may not be in the lab at any time after the first lab period of each quarter.
13) Except for soapy or clear rinse water from washing glassware, NO CHEMICALS MAY BE POURED INTO THE SINKS; all remaining chemicals from an experiment must be poured into the waste bottle provided.
14) Students are required to follow the De Anza College Code of Conduct at all times while in lab: “horseplay”, yelling, offensive language, or any behavior that could startle or frighten another student is not allowed during lab;
15) Strongly recommended: Wear Nitrile gloves while performing lab work; wear a chemically resistant lab coat or lab apron; wear shoes made of leather or polymeric leather substitute.

By signing below, I, _____,
First Name Family Name

acknowledge that I fully understand and agree to abide by the laboratory safety rules listed above. Further, I acknowledge that my failure to abide by these rules will result in my being dropped from this chemistry class immediately.

_____ _____
Signature Date

Maintaining a Neat and Effective Lab Notebook

Laboratory notebooks are essential for any scientist. Our primary goal as chemists is to understand the complexities of the world around us by performing specifically designed highly controlled experimentation. Thus an easily accessible and highly organized means of recording observations or data is necessary for obtaining the most accurate and detailed account of the experiment.

The following instructions should serve to indicate the minimum requirement for the upkeep of the lab notebook for this course. The items with purple titles are what need to be completed before the experiment for the prelab.

General Lab Notebook

Name and starting date on the cover. In the case of original research, you may be working with many others in the same space and need to distinguish your notebook from another's. Additionally, when you go back and look through old notes, dates on the cover allow easy recognition of the correct notebook. Your name and starting date must be on the cover before starting the first experiment.

Table of Content. Keeping a detailed table of content is another easy and effective way to organize your observations and data entries. This table must include the title of the experiment, the date of the entry, and the page number. Update each lab session.

Table of Chemicals. At the end of the notebook will be a table that lists every chemical you use and the corresponding hazards. This will be updated throughout the quarter and will serve to promote safe chemical practices as well as provide an easily accessible means of finding hazards of common chemicals. Information for this table can be found on the MSDS sheets.

Each Experiment

Title and Date. The title of the experiment and the date of lab session must be at the top of the page.

Abstract. A *brief* summary of the experiment should follow the title. This should include the main purpose of the experiment, the laboratory procedures you will use, and the relevant mathematical relationships between measurable quantities.

Hazards. In addition to reading the experiment, you will also need to read the hazards for the chemicals required for each lab. Write the chemical, the associated hazards, and any special steps needed. Typically the "special steps" will be something like, "Gloves are recommended".

Experimental Procedure. The experimental procedure is a detailed description of the method utilized to obtain experimental data. The written procedure should be in your own words, not copied directly from the lab manual and should be detailed enough that you do not need to look at the laboratory manual. This must all be completed before the laboratory session or you will not be allowed to perform the experiment for safety reasons.

Data Tables. Recording data should be done in a well-organized table next to the corresponding experimental procedure or after the procedure. This will ensure you know exactly what measurements you record. Good examples of effective data table organization can be found in the laboratory manual for each experiment. Be sure to pay attention to units and significant figures for all data collection.

Observations. The phenomena you observe can yield as much information as the most detailed measurements. Observations like temperature change, bubbling, color change, or solid formation should be recorded next to the related experimental procedure. Additionally, record any instrument problems or issues with the experiment. If your data is extremely far from expected, your experimental observations may give insight as to the source of such discrepancies.

Calculations. Calculations should be written neatly and final answers should include units. For each type of calculation, you must demonstrate one example using your data. If graphing is required, both computer generated and hand-drawn representations are acceptable as long as axes are appropriately labeled and scaled. These must be completed before leaving lab that day to receive full credit.

Conclusion. This section is the most important and often the most difficult because it requires deep consideration of the experiment as a whole. The conclusion will be turned in the following lab period and should contain at least these three sections.

The first is a brief summary of the experiment including the main goal and the methods used to collect/analyze data. This should not be more than two sentences and should be specific to each experiment.

For the next section, present the key values. Many of the experiments require numerous tables and measurements and including all of these values is not the point of this section. Only include the values that directly relate to the experimental goal. For example, in the lab titled "Molar Volume of a Gas", the conclusion should contain the calculated value for the molar volume of a gas but does not need all the pressure measurements. Additionally, compare one trial to the next and/or compare the average value to literature values if possible.

Finally, provide a source of error that may have resulted in discrepancies between trials or accepted values. This should go beyond simple factors like human error and should connect an experimental design or procedural step to an error in your value. That is, explain how such an error could have affected your result by following this error through the calculation process. The conclusion is due at the beginning of the next lab period after completion of the lab.

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.