

# Chemistry 1C, General Chemistry and Quantitative Analysis

## CHEM 1C - Section 07Z

Lecture MTWR - **Synchronous** - 10:30AM to 11:45AM

Lab MTWR- **Mix Synchronous/Asynchronous – Synchronous hours** - 9:00AM to 10:15AM

**Instructor:** Dr. Chris Deming, email: [demingchristopher@fhda.edu](mailto:demingchristopher@fhda.edu)

**Office Hours:** MTWR 11:45AM – 12:30PM

**Course Description:** This class will cover the principles of solutions, buffers, electrochemistry, transition metals, and nuclear chemistry.

This course is divided into two separate instructional periods; the lecture and laboratory sections. The lecture portion is devoted to discussing concepts and practicing the related calculations, while the laboratory portion gives a chance for students to use their acquired knowledge in a lab setting. Scores for both parts will be combined for one final grade in the class.

## **Course Material:**

**1. Lecture Text:** CHEMISTRY: The Molecular Nature of Matter and Change, Silberberg and Amateis, 9e. Other editions will be essentially the same and will work great to study, but practice problems correspond to the 9<sup>th</sup> edition. Although there are online text options, we will NOT be using CONNECT or ALEKS this quarter. There are multiple options to obtain the text for this course, depending on your specific needs.

a. **Option 1** – Hard copy text. This can be a used copy and any edition. I will give homework and solutions from the 9<sup>th</sup> edition, but you will find these questions in any edition but potentially with different numbering. This is the way to go if you prefer hard copies and is a great choice if you want a quality chemistry textbook to reference in the future.

b. **Option 2** – 90 day access to an electronic text specifically for CHEM 1C. This is a great, cheap option that will give you 90 day access to an electronic text for the chapters in this class (CHEM 1C) only. At the De Anza online book store has this option with ISBN: 9781307600971.

**2. Lab Materials:** This quarter, we will use take-home lab kits from Science Interactive (Formerly Hands On Labs) to perform laboratory experiments at home.

While the cost of the kits is covered, some experiments require materials provided by the student. A lot of these items are things that most will have in the house already, like paper towels or ice. Others will require items that are a little less common and will likely require purchasing these. There is nothing expensive, but making sure these items are available when it is time for the experiment will require ordering early. I have a list of needed material posted to CANVAS. If the cost is an issue, please let me know, and we can find another solution.

**3. 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.

**4. Safety Goggles.** Proper eye protection is required for every lab. Goggles will be provided in the lab kit, but if you have others you would like to use, please let me know and I will help you check if they are chemistry approved.

**5. Camera linked to the internet** – For much of your classwork, you will need to take a picture of your work and submit to CANVAS. Phones are 100% okay. Please let me know if this is an issue as soon as possible.

**Class Registration.** Although we are not limited by the space in the lab, the registration limit is strictly set at 30 per section since we have only purchased the exact number of kits for each class. The class will be filled based on the official roster provided by the De Anza Admissions and Records, including an official waitlist. Students on this waitlist are welcome to come for the lecture and lab portions. Since these will be through Zoom, I will make sure to create a waitlist mailing list to give invites to lecture for the first week.

**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/studentuccess/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 during an exam/quiz or copying/using work other than your own for a lab will result in a 0 for the entire assignment, regardless of what percentage of the work is from cheating.

Worse than a 0 on an exam, I am required to report such incidents to the disciplinary committee, who will make a note of the incident on your transcript, which then becomes visible to 4 year colleges upon reviewing your transfer application.

For this new remote delivery, we will all need to be honest with tests and quizzes. I am trusting all of you to adhere to this code.

**Disability Service Support:** De Anza is committed to providing support for all students. 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/>

**Classroom Conduct:** I want to be very clear that this class is a place where everyone can feel safe to be themselves and to learn at their own pace. It is important to me that you feel comfortable to ask questions, and I hope you all will help me create a supportive atmosphere.

**Tentative Dates.** All exam dates, lecture topics/dates, lab topics/dates are listed on page 11 and are subject to change throughout the quarter. The final exam date will not change and is also provided on page 11.

## Grades/Evaluations:

Assignment	Points	Percent
Exam 1	100.0	10.0
Exam 2	100.0	10.0
Exam 3	100.0	10.0
Quiz 1	25.0	2.5
Quiz 2	25.0	2.5
Final Exam	150.0	15.0
<b>Lecture Total</b>	<b>500.0</b>	<b>52.9</b>
Welcome to CHEM 1C Questionnaire	10.0	1.0
Lab Safety Cloud Exercise	5.0	0.5
Making Solutions Simulation/Worksheet	25.0	2.5
Freezing Point Experiment/Worksheet	40.0	4.0
Lab Kit Check	5.0	0.5
Buffer Prelab	15.0	1.5
Buffer Experiment	10.0	1.0
Buffer Calculations	10.0	1.0
Buffer Conclusion	15.0	1.5
Ka Prelab	15.0	1.5
Ka Experiment	10.0	1.0
Ka Calculations	10.0	1.0
Ka Conclusion	15.0	1.5
EChem Prelab	15.0	1.5
EChem Experiment	10.0	1.0
EChem Calculations	10.0	1.0
EChem Conclusion	15.0	1.5
Water Hardness Prelab	15.0	1.5
Water Hardness Calculations	10.0	1.0
Water Hardness Formal Report	75.0	7.5
Osmosis Experiment and Worksheet	10.0	1.0
Lab Final	100.0	10.0
<b>Lab Total</b>	<b>445.0</b>	<b>47.1</b>
Class Total	945.0	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

# Lecture

This class (Chem 1C) will cover chapters 13, 19, 21, 23, and 24 from the assigned textbook. All lectures will be held through Zoom during the indicated time period (**synchronous**). Lecture, lab, and office hours will all be in the same Zoom room and can be found by following the link <https://fhda-edu.zoom.us/j/94456284120?pwd=M2pram9GaW9iazJPVm5hUkRYSG1PdZ09>

This link will also be on CANVAS under “pages”. The PowerPoint lecture slides will be posted before the lecture on CANVAS under “files”, and a link to the recording of the lecture will be posted immediately after under “pages”. Below are four helpful tips that will make learning much easier this quarter.

**1. Preview the material before attending the lecture.** Previewing the material could include reading the section in the textbook, reviewing the lecture slides, or even glancing at the homework. This will help you develop a stronger and more personal connection to the topics and make the presented material much easier to understand.

**2. Complete all homework problems and the in-chapter reviews.** Extensive practice is the best way to ensure concept mastery. The more you practice, the more comfortable you will be, and the better you will perform on exams. Beyond the minimum of the assigned problems, you are encouraged to do the in-chapter problems as well as the end of the chapter problems that were not assigned. I am serious when I say that I sometimes use problems from the book that I didn't assign as exam problems.

**3. Don't fall behind.** In chemistry, each new topic will build on the previous, so it is essential to stay caught up with the class material. Following a lecture when you do not understand the previous material is not an effective learning method 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 to visit office hours.

**Lecture Exams.** This quarter, there will be a total of 3 lecture exams. Each of these exams corresponds to the first 3 chapters in the book. For example, exam 1 will be on chapter 13 only, exam 2 will be on chapter 19 only, etc. The fourth and fifth chapter (23 and 24) will be assessed in the final exam, along with the entire material for the quarter (semi-comprehensive final).

Each exam is worth **100 points**, and the dates are given on page 11. 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 will release a key after the exam, and 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.

If you are having difficulty completing the homework questions for that chapter, I urge you 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.

During remote delivery this quarter, I will email the exams five minutes before the start of the lecture. You will then download the exam and read the questions from the screen while answering on a piece of paper. The test will then be taken while logged onto Zoom with the camera on. All exams must be written on a physical piece of paper. No electronic pads are allowed.

You will have the entire lecture period (10:30AM – 11:45AM) to complete the exam and, once the exam time has finished, there will be 10 minute period where everyone will take pictures of the work and load to CANVAS.

Although we will still be able to communicate through the chat feature on Zoom, the goal of this process is to eliminate/minimize any interactions the student might have with the computer during the exam. Please let me know if you think there will be any issues with this way of testing *before* the test, and we can make arrangements.

**Lecture Quizzes.** Quizzes will be given between the exams to make sure everyone is keeping up with the material throughout the quarter. The quizzes are worth **25 points** each, will take about 15-20 minutes, and will be given at the beginning of class, so late attendance may result in missing time for the quiz. The days of the quizzes are given on page 11.

The delivery of these will be similar to the exams. I will post 5 minutes before, you will complete the quiz, then 5 minutes to upload to CANVAS.

**Lecture Final.** The lecture final is worth **150 points** and will cover all chapters but will have about 60% of the questions from chapters 23 and 24 (semi-comprehensive final). The date and time for the final exam are given on page 11 and will not change. Delivery is the same as the other exams.

**Homework.** Homework will not be turned in for credit but will provide the practice needed for concept and calculation mastery. The list of homework problems will be given on CANVAS for the 9<sup>th</sup> edition.

These homework problems will be from the end of each chapter and will cover calculations as well as conceptually based problems. I will also give a solution key so you can check your work.

Doing all of the listed problems is highly recommended and represents the minimum needed to practice the topics, but you are strongly encouraged to go 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.

# Laboratory

This quarter, we will be using specialized lab kits that De Anza has purchased from Science Interactive (SI) to perform chemistry experiments in our own homes. These kits are supported by a cloud platform which provides background information, materials lists, experimental procedures, and sample videos for all of the experiments we will conduct.

Since our lab kits will not ship until the middle of the 2<sup>nd</sup> week, we won't start the lab kit experiments until the beginning of the 3<sup>th</sup> week, and will have a bit of time to fill. We will use this time to go over lab safety, use a simulation program for a lab worksheet, experimentally determine the temperature of our freezer, do practice problems, and get ahead in lecture.

Once the kits have arrived, we will use the lab sessions to discuss the background for the experiment as well as how to safely perform the procedures. **Attending all laboratory introductions is mandatory** and missing them will result in a loss of points and potentially prevent you from performing the lab. If there are any reasons that you cannot attend these sessions, please let me know ahead of time, and we can work something out.

Additionally, there will be designated lab periods for live lab help. If you think you might have questions during the procedure, try to overlap your experiment with this time. All lab dates are given on the calendar on page 11 with the mandatory attendance days in **bold**.

What follows are descriptions of the earlier activities as well as how we will obtain the lab kits, safely perform the experiment, and complete the associated assignments like prelabs, calculations, and conclusions.

## Lab Safety

Safety is an essential focus for laboratories and this becomes a unique challenge when you are doing experiments in your house. We will spend time at the beginning of the quarter discussing how to safely and comfortably perform lab work, and a more specific safety introduction will be given before each lab. Additionally, there is a lab safety module through the SI cloud that is worth **5 points** and will give more safety information for the proper use of the lab kits.

## Worksheet: Making Solutions

To help fill the lab time before the SI kits arrive, we will use a program called Chem Collective (CC) to simulate a lab experiment. This program is free and allows us to simulate experiments for a wide range of reactions.

We will use CC to investigate the formation of solutions, and in doing so, connect all three quarters of chemistry. This program and the associated worksheet will be introduced during the lab session, and the total project is worth **25 points**.

## Temperature of Your Freezer: Experiment with Only Household Items

Before we have our lab kits, we will do an experiment using only items in our house to determine the temperature of your freezer while using what we have learned in chapter 13. The procedure and calculation based questions will help guide us through the process of calculating

the temperature of your freezer and the entire lab project is worth **40 points**. I hope this will serve as a fun way of using ideas from chemistry and some very simple steps to investigate the world around us. I will talk more about this project during the first week of the quarter.

### How to Get the Lab Kits

Since summer quarter is so much shorter, ordering will be a little trickier, but I am still confident this process will work and allow us to maintain our lab schedule. Kits are available to order on 7/1 so please order your kit as soon as possible. Once the census on 7/6 has passed, I will send the official class roster, and the kits will be shipped. This early order plan is in hopes of obtaining the kits as soon as possible.

Shipping last quarter (spring) was very quick for locations within the US, but international shipping was not as dependable, so please let me know if you are living outside the US and we can make a plan.

While the cost of the kits is covered, some experiments require you to provide some materials. A lot of these items are things that you will likely already have in the house, such as paper towels or ice. Others are a little less common and will likely require purchasing them. There is nothing expensive, but making sure these items are available when it is time for the experiment will require ordering early, so I will post a list of the needed material to CANVAS. If the cost is an issue, please let me know, and we can find another solution.

### Lab Assignments (with SI kits)

There will be a total of 5 labs that we will perform using the SI lab kits. For each experiment, you are required to attend the introductory lecture, read the procedure, complete a prelab, perform the procedure, answer the follow-up questions/calculations, and write a conclusion.

For each experiment, I will give an introduction that will typically include a discussion of the theory behind the experiment as well as a walkthrough of the harder aspects of the procedure. Missing these will result in a loss of points and may prevent timely experiment completion.

The first thing to do to prepare for the lab is to *read the entire experiment*, including the background, procedure, and materials list. It is essential to become familiar with the experimental design and procedures before starting with the lab work, and it starts with a thorough read-through of the methods. The background information and related procedures are provided on the SI cloud, and you will be given access to the class shell in the first week of class.

Since you are **not required to do any work on the SI cloud this quarter**, this information will also be provided on CANVAS. I want to reiterate here, that the SI cloud contains lots of questions that will help with background information and follow-up calculations, but none of these will count towards points. The SI cloud system will only be used for reference and the safety module.

Once you have familiarized yourself with the lab, the next step is to write a **prelab, worth 15 points**. There are three parts to the prelab that are equally important. The first is to write an **abstract**, where you will describe the goals of the experiment, introduce the scientific principles that form the basis of the study, and summarize the process by which you obtain the

experimental data. This should not be a list of procedural steps, but rather 1-3 paragraphs of writing, in your own words.

The second part is a recognition of the **hazards** associated with each chemical in the procedure. This does not need to be everything on the SDS but should convey the hazards working with that chemical and the proper precautions for safe usage.

The third part of the prelab is to write **tables** to hold the collected data. Great examples for tables can be found on the SI cloud. All parts of the prelab must be handwritten and completed before beginning the experimental procedure. Scan/take pictures of the work and upload them to the appropriate CANVAS assignment.

Then, **complete the procedure to obtain the desired data**. All data must be collected in the premade tables (see the previous paragraph). Additionally, there will be picture you are required to take throughout the experiment that are specific for each experiment and will be discussed during the lab introduction. Upload all of this to the appropriate CANVAS assignment for **10 points**.

I don't really like the questions on the SI cloud, so I wrote some and a pdf of these questions will be available at the beginning of each experiment. You will use your experimental data to **perform the calculations and answer the questions** on this worksheet, worth **10 points**.

The last task is to write a **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 should contain at least these three sections.

The first is a summary of the experiment, including the main goal and the methods used to collect/analyze data. This part should not be more than a paragraph and will be very similar to some of the content in the abstract.

For the next section, **present the key values**. Many of the experiments require collecting a large amount of raw data, but including all of these values is not the point of this section. Only include the values or conclusions that directly relate to the experimental goal. Additionally, compare one trial to the next and/or compare the average value to literature values.

Finally, provide a source of error that may have resulted in discrepancies between trials or between experimental averages and accepted values. This description should go beyond simple factors like human error and should connect an aspect of the experimental design or procedural step to any discrepancies between the experimental and expected values. That is, explain how an error could have affected your result by following this error through the calculation process.

The conclusion will be submitted through CANVAS and will be worth **15 points**. Handwritten or typed is accepted.

**Formal Laboratory Report.** For the Water Hardness Titration lab, you are required to do a formal, typed report worth **75 points**, rather than a conclusion like the other labs. 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.

It 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. I will talk about the specifics during the introduction for this lab, and I will provide an instructions sheet to help with the structure of this report.

The due date is 8/5 by 11:59 PM, so there is plenty of time to get help. Please make sure to start the calculations earlier and try to not leave too much work 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 will be on the last week of class and is worth **100 points**. You will be allowed to use any notes during this test, so it is beneficial to organize your work. The lab final date is 8/4 during the synchronous lab hours. No early or late exams will be allowed. The testing format will be the same as the lecture exams. No working with chemicals required.

## Lecture Schedule

All dates, including exams and quizzes, are subject to change throughout the quarter. The final exam date will not change. Quizzes are in orange and exams are in red.

Week Of	Week #	Monday	Tuesday	Wednesday	Thursday
6/27/21	1	CH 13 (Solutions)	CH 13 (Solutions)	Quiz 1 CH 13 (Solutions)	CH 13 (Solutions)
7/4/21	2	Independence Day No Lecture	Exam 1	CH 19 (Buffers)	CH 19 (Buffers)
7/11/21	3	CH 19 (Buffers)	CH 19 (Buffers)	Quiz 2 CH 19 (Buffers)	CH 21 (Echem)
7/18/21	4	Exam 2	CH 21 (Echem)	CH 21 (Echem)	CH 21 (Echem)
7/25/21	5	CH 23 (T-Metals)	CH 23 (T-Metals)	Exam 3	CH 23 (T-Metals)
8/1/21	6	CH 23 (T-Metals)	CH 24 Nuclear Chemistry	Review/Overflow	Final Exam

## LECTURE FINAL EXAM

Thursday August 5, 10:30 AM-11:45 AM

**Tentative lab schedule** - Lab dates that *require attendance* are in bold.

Week Of	Week #	Monday	Tuesday	Wednesday	Thursday
6/27/21	1	-Syllabus -Lab Introduction	-Lab Safety Intro -Intro to Solution Formation and CC Part 1	-Intro to Solution Formation and CC Part 2 -At Home Freezing Point Experiment Intro	-Chapter 13 Practice Problems
7/4/21	2	-Independence Day No Lab	-Study Day	-Chapter 19 Practice Problems	-Buffer Lab Intro
7/11/21	3	-Live Lab Help Day Buffers Experiment	-Ka Determination Lab Intro	-Chapter 19 Practice Problems	-Live Lab Help Day Ka Determination Experiment
7/18/21	4	-Study Day	-Echem Lab Intro	-Chapter 21 Practice Problems	-Live Lab Help Day EChem Experiment
7/25/21	5	-Chapter 21 Practice Problems	-Water Harness Titration Intro	-Study Day	--Live Lab Help Day Water Hardness Experiment
8/1/21	6	-Osmosis Intro -Lab Final Info	-Chapter 23 Practice Problems	Lab Final	-Study Day

# Lab Safety/Preparedness

Maintaining safety when performing experiments is a primary concern. There are many hazards associated with chemistry labs, especially now that you will be experimenting in your house. It is essential to recognize these hazards and understand that with proper techniques, the risk drops significantly. There are a few very simple steps students should take to execute safe lab techniques.

First, always wear personal protective equipment (PPE) when performing lab experiments. Such items include, but are not limited to, safety goggles, long pants, sleeved shirts, and closed-toe shoes. **All of this safety equipment must remain on until you complete the experiment, including cleanup.** 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 executing the lab procedure. 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 by the instructor. Many techniques can be performed safely and easily with the proper technique but become a safety hazard when performed improperly.

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

**Student Learning Outcome(s):**

\*Apply the principles of equilibrium and thermodynamics to electrochemical systems.

\*Apply the principles of transition metal chemistry to predict outcomes of chemical reactions and physical properties.

\*Evaluate isotopic decay pathways.

\*Demonstrate a knowledge of intermolecular forces.