

# Chemistry 1C, General Chemistry and Quantitative Analysis

## Chem 1C - Section 03Z

Lecture TR - **Synchronous** - 1:00PM to 2:15PM

Lab TR- **Mix Synchronous/Asynchronous – Synchronous hours** 9:00AM to 10:20AM

## Chem 1C - Section 04Z

Lecture TR - **Synchronous** - 1:00PM to 2:15PM

Lab TR- **Mix Synchronous/Asynchronous – Synchronous hours** 4:00PM to 5:20PM

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

**Office Hours:** Tuesday 10:20AM to 11:30AM, Thursday 10:20AM to 11:30AM, 2:15PM to 4:00PM

**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 must seal to the face with an elastic strap and be specifically for chemistry. Let me know if you are unsure about your goggles and I will help you check.

**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. Since these will be through Zoom, I will make sure to create a waitlist mailing list to give invites to lecture for the first two weeks.

**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 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.

**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 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. The final exam schedule can also be found on the De Anza finals schedule page.

## 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
Quiz 3	25.0	2.5
Final Exam	150.0	15.0
<b>Lecture Total</b>	<b>525.0</b>	<b>52.5</b>
Lab Safety Cloud Exercise	5.0	0.5
Lab Kit Check	5.0	0.5
Making Solutions Simulation/Worksheet	30.0	3.0
Buffer Prelab	15.0	1.5
Buffer Experiment	10.0	1.0
Buffer Calculations	15.0	1.5
Buffer Conclusion	20.0	2.0
Ka Prelab	15.0	1.5
Ka Experiment	10.0	1.0
Ka Calculations	15.0	1.5
Ka Conclusion	20.0	2.0
EChem Prelab	15.0	1.5
EChem Experiment	10.0	1.0
EChem Calculations	15.0	1.5
EChem Conclusion	20.0	2.0
Water Hardness Prelab	15.0	1.5
Water Hardness Experiment	10.0	1.0
Water Hardness Formal Report	70.0	7.0
Colligative Properties Prelab	15.0	1.5
Colligative Properties Experiment	10.0	1.0
Colligative Properties Calculations	15.0	1.5
Colligative Properties Conclusion	20.0	2.0
Lab Final	100.0	10.0
<b>Lab Total</b>	<b>475.0</b>	<b>47.5</b>
Class Total	1000.0	100.0

# 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/93651711105?pwd=MXNNQjN6aE9DMkpLeVIYME9DbUJtZz09>

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 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 coming to 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. 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 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 (1:00PM – 2:15PM) 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 day of the quizzes are given on page 11 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.

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

Lab hours will be used for a few different purposes throughout the quarter such as lab introductions, practice problems, live lab help hours, and exam review.

Since we will not order our lab kits until the beginning of the 3<sup>rd</sup> week, and start labs at the beginning of the 4<sup>th</sup> week, we have quite a bit of time before we will be doing any experiments. We will use the lab time in the first 3 weeks to go over lab safety, use a simulation program for a lab worksheet, 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. We will also spend some time at the beginning of the quarter discussing general lab safety and using the safety module on the SI cloud (worth **5 points**).

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**.

## Introduction to Science Interactive (SI) Formerly HOL

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. What follows is how we will obtain these kits, safely perform the experiment, and complete the associated assignments like prelabs, calculations, and conclusions.

## How to Get the Lab Kits

Once census day has passed, and there can be no more adds or drops, you will order these special SI kits. The cost for the lab kit and shipping will be covered by De Anza and will be available to order on 4/20/21. On the first week of lab, we will discuss how to order these kits. Please do this on 4/20 to be sure you receive your kit before it is time to start experiments. Shipping last quarter (winter) was very quick for locations within the US, but international shipping was not as dependable though still much better than fall quarter. In fact, last quarter, every single student receive their kit. If you don't think you will have a space to do this in your current house, please let me know as soon as possible, and we can figure out a solution.

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 kits. For each experiment, you are required to attend the introductory lecture, read the procedure, complete a prelab, perform the procedure, manipulate the data with the correct equations, 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 your account within the first two weeks 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**, which is a paragraph (maybe two) that describes the experimental goals, how those goals will be achieved experimentally, and what equations will be used to manipulate the raw data. The second part is a recognition of the **hazards** associated with the procedure. The third thing 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**.

You will then need to use the collected data with the correct equations to obtain the final result. You must show one handwritten example for each type of calculation to receive the **15 points** for the lab calculations. I understand that for multiple trials, you may enter the data straight into your calculator or even use a computer program, so I do not need to see every single calculation, but please include the result of all trials when reporting a final average.

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 three sentences and should be specific to each experiment.

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 **20 points**. Handwritten or typed is accepted.

### 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 **30 points**.

**Formal Laboratory Report.** For the Water Hardness Titration lab, you are required to do a formal, typed report worth **70 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.

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 6/18 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 6/17 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 #	Tuesday	Tuesday
4/4/21	1	Chapter 13 (Solutions)	Chapter 13 (Solutions)
4/11/21	2	Quiz 1 Chapter 13 (Solutions)	Chapter 13 (Solutions)
4/18/21	3	Chapter 19 (Buffers)	EXAM 1 – Chapter 13
4/25/21	4	Chapter 19 (Buffers)	Chapter 19 (Buffers)
5/2/21	5	Quiz 2 Chapter 19 (Buffers)	Chapter 19 (Buffers)
5/9/21	6	Chapter 19 (Buffers)	Chapter 21 (EChem)
5/16/21	7	EXAM 2 – Chapter 19	Chapter 21 (EChem)
5/23/21	8	Chapter 21 (EChem)	Chapter 21 (EChem)
5/30/21	9	Chapter 23	EXAM 3 – Chapter 21
6/6/21	10	Chapter 23	Chapter 23
6/13/21	11	Quiz 3 Chapter 24	Chapter 24

## LECTURE FINAL EXAM

**TUESDAY June 22, 1:45 PM-3:45 PM**

## Tentative lab schedule

Lab dates that require attendance are in **bold**.

Week Of	Week #	Tuesday	Thursday
4/4/21	1	<b>Syllabus, Lab Introduction</b>	<b>Intro to Solution Formation and CC Part 1</b>
4/11/21	2	<b>Intro to Solution Formation and CC Part 2</b>	<b>Chapter 13 Practice Problems</b>
4/18/21	3	<b>Order Kit Day/Chapter 13 Review</b>	Study Day
4/25/21	4	<b>Buffer Lab Intro</b>	Live Lab Help
5/2/21	5	<b>Chapter 19 Practice Problems</b>	<b>Weak/Strong Titration Lab Intro</b>
5/9/21	6	Live Lab Help	Chapter 19 Review
5/16/21	7	Study Day	<b>EChem Lab Intro</b>
5/23/21	8	Live Lab Help	<b>EChem Practice Problems</b>
5/30/21	9	<b>Water Hardness Titration Intro/Chapter 21 review</b>	Study Day
6/6/21	10	Live Lab Help	<b>Colligative Properties Intro</b>
6/13/21	11	Live Lab Help	<b>Lab Final Exam</b>

# 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.