

## Chemistry 1A - Summer 2023 - A Virtual Course

**Welcome to Chem 1A!** Thank you for joining our community of learners dedicated to supporting each other on our quest to understand the world at the molecular level. We aim to offer a meaningful and empowering experience to every student. We will build that rich experience together by devoting our strongest available effort to the class. We are all on our own paths of knowledge and each have our own reasons for being here. But we all have something to teach our classmates and beyond.

We aim to offer a meaningful and empowering experience to every student in this course. We will build that rich experience together by devoting our strongest available effort to the class. **You will be challenged and supported.** I hope you will take an active, critical, patient, and generous role in your own learning and that of your classmates.

In this time of great uncertainty with anxiety-producing news seemingly non-stop, you may be asking yourself, “why am I here learning about atoms?” When you feel this way, please remember your own reasons for attending college and wanting to study science. **Keep that goal and vision front and center and recognize that every day you study, you are getting one step closer to your dreams.** Chemistry does matter (ask us why!), and your personal development will help you become more qualified and ready to become the leader you want to be. **If there are aspects of this course that prevent you from learning or exclude you, please let me know as soon as possible.** And **when you get overwhelmed, please reach out.** We are happy to work with you to meet your needs and to develop strategies to fulfill the requirements of the course. We are happy to provide you with help and support in any way possible.

**We are excited to bring you Chem1A in this remote format because it provides a flexible learning environment that is responsive to your needs.** All our lectures are recorded ahead of time so you can watch/re-watch at times that work for you. This means that our lecture times are all about what YOU need.

In this class, what matters most is that you learn. We take a “growth mindset” approach to learning which means that we know that learning takes time, effort, and strategy. One reason why we love Chemistry is that it builds on itself. So, when you show improvement, we reward that improvement.

We look forward to working with you for the next 5 weeks! We promise to do our best every day and know that you will do the same.

Sincerely,

Dr. John Diniz and the Chem 1A Teaching Team

## How will this class work?

All content will be provided in **video lectures** (made by Prof. Eroy-Reveles) for you to watch at your own convenience. There will be no “lectures” at the scheduled lecture time. Instead, the first 90 mins of the designated lecture time will be used as optional **Problem-Solving Sessions (Mondays and Wednesdays 1:00pm-2:30pm)** that Dr. Diniz will lead via Zoom. These sessions will be recorded and posted to our course Canvas site.

You can participate in optional Discussion Sections with our TA Beatriz via zoom. These sections (limited to 24 students; first come-first served) will be collaborative and you will get to know Beatriz and your fellow students. Discussion Sections will occur on days TBA, with different content each day.

ALEKS will be used for all homework assignments called “Objectives” and will be due every Tuesday and Thursday (Weeks 2-5). There will be three Knowledge Checks (a type of ungraded quiz) so you can make sure you are retaining what you are learning. **Please work on ALEKS each day. Plan to spend at least 15 hours on ALEKS per week during the summer.** Your final ALEKS score will be based on how much of your ALEKS pie is complete by the end of the term. You are welcome to earn “extra credit” for completing ALEKS Objectives on time.

**Please check our canvas page often.** There are weekly Study Guides outlining the lecture videos and Problem-Solving Sessions problems for each week. I have added due dates to most items, so your To-Do list should list upcoming Lecture Videos, Assignments, and Quizzes. A schedule for what we will cover each week as well as the various dates for quizzes and assignments has been included as the last two pages of this document.

Consider looking over the UCSC Keep Learning site for resources, tips, and suggestions for virtual learning. <https://keeplearning.ucsc.edu/>

Weekly course schedule (All times PST):

Monday	Tuesday	Wednesday	Thursday	Friday
				9:00-11:00 am: <b>Open Tutoring</b> with Beatriz
1:00-2:30 pm: <b>Problem-Solving Session</b> with Dr Diniz	1:00-3:00 pm: <b>Discussion</b> with Beatriz	1:00-2:30 pm: <b>Problem-Solving Session</b> with Dr Diniz	1:00-3:00 pm: <b>Discussion</b> with Beatriz	1:00-2:30 pm during Weeks 2 and 4: <b>Quiz</b> with Dr. Diniz
3:00-4:30 pm: <b>Open Tutoring</b> with Dr. Diniz		3:00-4:30 pm: <b>Open Tutoring</b> with Dr Diniz		
7:00-8:00 pm: <b>LSS Tutoring</b> with Nitya		4:30-5:30 pm: <b>LSS Tutoring</b> with Nitya	5:00-6:00 pm: <b>LSS Tutoring</b> with Nitya	

## Course Description

Chem 1A is one of three courses that make up the old general chemistry sequence at UCSC (Chem 1A-1B-1C). To allow continuing students to finish the series you started, classes in the CHEM 1 series will be offered at least one more time in 2023-24 while the new CHEM 3 & CHEM 4 series launches for the first time. 2023-24 will be the final year that the CHEM 1 series is offered at UCSC. Starting in 2024-25, only the CHEM 3 and CHEM 4 series will be offered. For more information about General Chemistry Courses at UCSC, click [here](#) and [here](#)

In Chem 1A, we start by reviewing fundamental skills involving quantities of reactants and products (also called “stoichiometry”). Then we apply these skills when learning about three types of chemical reactions: ionic precipitation, acid-base, and oxidation-reduction reactions. This is followed by learning about the behavior and properties of gases. The second half of the course is devoted to learning about Equilibrium, when the concentrations of reactants and products are not changing anymore after mixing. We will study equilibrium in depth by applying principles learned to testing what happens in buffer solutions and acid-base titrations.

Note about algebra: Chemistry is a quantitative science where the quantities of substances in reactions determines what happens during a reaction. We use algebra to figure out how many “moles” ( $6.022 \times 10^{23}$ ) are present in a given scenario and stoichiometry (literally in Greek “the measure of elements”) to compare relative amounts of substances to other substances based on a balanced equation.

## Teaching Team

### Instructor

Dr. John Diniz

[jdiniz@ucsc.edu](mailto:jdiniz@ucsc.edu)

### Teaching Assistant (TA)

Beatriz Ehlke

[beehlkes@ucsc.edu](mailto:beehlkes@ucsc.edu)

### Small Group (SGI) tutor

Nitya Jain

[njain14@ucsc.edu](mailto:njain14@ucsc.edu)

## Note on Emails

I will check my email at least 2x a day. You can expect to receive a response within 12 hours during Mon-Fri 9:00-5:00pm.

Nighttime emails might not be answered until morning and weekend emails might not be answered until Monday. With that in mind please, feel free to email me anytime, any day of the week.

## Required Materials

1. **Computer/tablet and internet:** As this course is fully on-line, you will be watching videos, participating in zoom meetings (Problem-Solving Sessions, Discussion Sections, Open Tutoring), and completing online assignments in ALEKS and other platforms. Please look at the Keep Learning website <https://keeplearning.ucsc.edu/> or contact Dr. Diniz if you have issues accessing this class.
2. **ALEKS:** We will use this Web-based, artificially intelligent assessment and learning system for out-of-class work – go to canvas and click on ALEKS in left sidebar menu. **You get 2 weeks of FREE access** (with the Temporary Access code below) so use it to see how the system works and then decide if you want the e-textbook

Class code: **4NEEY-UKQFA**

2-week Temporary ACCESS code:  
**644FC-E21DA-2F7D2-4035D**

There are two options for purchasing ALEKS: with and without an e-textbook. The ALEKS system comes with detailed explanations for every question.

### **Prices for purchasing through BayTree Bookstore**

- a. **\$48: ALEKS + e-textbook (package called ALEKS 360)**, *Chemistry: The Molecular Nature of Matter and Change* by Silberberg and Amateis, 9e. You can view the book by clicking on the sidebar menu (three parallel lines image located on top left corner of page)
- b. **\$38: ALEKS only**

**ALEKS can also be purchased directly from the ALEKS Website.**

3. **Scientific calculator** Using your phone as a calculator is not recommended as you will not have access to your phone during Quizzes. A calculator that processes *log* and *ln* functions is helpful for chemistry. The TI-30X IIS Scientific Calculator is a good option because it shows entries on the top line and results on the bottom line. You can get one online for about \$15. ALEKS also has a fantastic calculator built-in to the system but getting used to using your own will help you prepare for the Quizzes. A programmable calculator is not necessary

There is also a free general chemistry textbook called [OpenStax Chemistry](#), 2nd edition.

**(Syllabus Continues on Next Page)**

## Grading in Chem 1A

**Grading Philosophy for this class:** We believe that everyone can learn chemistry. We recognize that your performance will be affected by your prior knowledge and many circumstances outside of your control (especially when we are learning chemistry during a pandemic!). We know that **it takes time to learn** and give you many opportunities to show that you are learning.

Your grade is what you earn. **We do not curve grades** because we don't want your grade to change based on how others in the class performed. **You are not competing with anyone.**

### How your total percentage score will be calculated.

35% ALEKS (based on ALEKS Pie completion) - complete by Friday, July 28th at 11:59PM

30% Quizzes (**2 quizzes**)

**25% Final Exam - complete by Saturday, July 29th at 11:59PM**

10% Essays (2 essays)

### Letter Grades

A+: 96 and above%	B+: 85-87%	C+: 73-77%	C-: 60-65%
A: 90-95%	B: 80-84%	<b>C: 65% -72%</b>	D: 50-59%
A-: 88-89%	B-: 78-79%	<b>C grade is minimum grade to take any classes that have 1A as a prerequisite</b>	F: 49 and below

Letter grades will be assigned according to your total percentage score that incorporates all items above.

### ALEKS Objectives (aka Homework) - see Canvas "Info on ALEKS" module

ALEKS is the online learning system we will use in this class. The value of this program is that you get instant feedback on your work, along with support on each question. We use ALEKS because there is an explanation for every question posed. After you get three questions correct in a row, you have proved that you have learned a topic and can move on to the next topic.

See the Canvas Module "**Info on ALEKS**" to figure out what all the ALEKS terms mean: Topic, Objective, Pie, Knowledge Check, etc.

#### How is my ALEKS grade calculated?

Your ALEKS grade will be based on "completing your ALEKS Pie" by the end of the term. There are no extensions on Objectives. The grade is structured this way because the most important part is trying to learn all the ALEKS topics. The deadlines

for Objectives are there to help you move at a reasonable pace through the class.

**How do I catch up?** Starting in Week 2, we don't have any Objectives open from Saturday to Monday every week. During this time, you can work on any topics you are "ready to learn" including those that were previously not learned. You can also review content in prior Objectives or work ahead on topics for future Objectives. This is also possible when you finish an Objective early. There are no "extensions" on ALEKS, but even if someone does not complete a single Objective on time, they can still get 100% on ALEKS.

**ALEKS is not a platform that allows you to "cram" so please make sure you are working on ALEKS every day.** During a normal 10-week quarter, students spend an average of 8-9 hours/week. During the summer, this will be about 15 hours/week. A list of the Topics by Objective is found in the "Chem1A: ALEKS Topics per Objective". After Week 1, ALEKS Objectives will be due every Tuesday and Thursday at 11:59PM. You can start working on ALEKS as early as June 20<sup>th</sup>!

**EXTRA CREDIT:** Finishing ALEKS Objectives on time will earn extra credit. You can earn up to 10% extra credit (1% for each objective) for your ALEKS score.

## Knowledge Checks

Knowledge checks are **ungraded** quizzes that help to see if you are retaining what you learned. If you answer a question incorrectly, you may be required to go back and review that topic. **There will be two Knowledge Checks in ALEKS that will occur after you complete Objective 3 and after you complete Objective 7.** When a Knowledge Check comes up, you can't do anything in ALEKS until you complete the Knowledge Check. DO NOT mark "I don't know" for all the questions just to get through the Knowledge Check fast. This will result in you having to go back and learn a

lot of topics again. If this happens, e-mail Dr. Diniz and they will reset the Knowledge Check so you can show that you mastered those topics. You can always ask Dr. John Diniz to assign you a knowledge check, which many pro-active students do before Quizzes.

## Quizzes and Final Exam

We will have 2 Quizzes – see schedule at the end of the syllabus for dates. The Final Exam will be about 2 hours. Some questions will be taken from ALEKS and some will be more conceptual. **Each quiz/exam is cumulative**, with more emphasis on new material. The Final Exam will be approximately two-thirds new material since Quiz 2 and one-third old material.

### What if I miss a Quiz?

There are no make-up quizzes. Put the dates of quizzes on your calendar now. If you know that you are unable to make a quiz ahead of time, you need to email Dr. Diniz to make arrangements to take the quiz at an earlier time or date. If you miss a quiz because of circumstances beyond your control, then email Dr. Diniz immediately to discuss how your grade for the quiz will be made up. **A portion of your final exam score will be used as the score on the missed quiz.**

## Chemistry and Life Essays

Short essays will help you apply what you are learning to the world around you. You will write two short essays for this course. Assignment details and a grading rubric will be provided through Canvas. The due dates are provided in the weekly schedule at the end of the syllabus.

## How much time should I spend each week on Chem1A?

During a normal 10-week quarter, a 5-credit course assumes a median workload of 15 hours per week, depending on your prior knowledge of chemistry. During the summer, this will be about 30 hours/week. For this course, estimates of the weekly workload are:

- 7 hours: Lecture Videos (required)
- 15-20 hours: Completing ALEKS Assignments (required)
- 2 hours: Attending Discussion Section (optional)
- 2-6 hours: reviewing material for Quizzes

## Learning Outcomes:

By the end of this course students should be able to

1. Understand topics including atomic structure of matter; molecules; chemical reactions; acids and bases; gases; and equilibria in the gas and liquid phase.
2. Use critical and practical thinking to analyze and evaluate chemistry problems. Students should be able to answer questions about chemistry by analyzing the problem, identifying the relevant topics and applying their understanding of those topics to arrive at a solution. Students will be able to test this answer for correctness and be able to interpret and communicate their results.
3. Recognize how each topic builds upon cumulatively such that the final topic, equilibria in the gas and liquid phase, requires students to exercise their full

set of knowledge and techniques to arrive at solutions.

4. Collaborate effectively with their peers to solve problems and interact productively with a diverse group of classmates.
5. Connect course chemistry topics with the real world to understand how chemistry is relevant to our lives.

## Commitment to Equity

This course is meant to be a safe learning space for EVERYONE, regardless of race, ethnicity, background, prior science experience, sexual orientation, gender, pronoun choices, etc. Any violations should be reported to the Teaching Team and will be dealt with appropriately. The design of the lectures and assessments are meant to give everyone the opportunity for success.

## Resources for Success in Chem 1A

### **Open Tutoring (Office Hours)**

Attending Open Tutoring is a great way to get individualized help and learn about where this class is going. Links to access Open Tutoring with both Dr. Diniz and Beatriz will be provided under Zoom and on the class calendar in Canvas. If these times don't work for you, please email one of us and we can find a time to meet virtually.

**Open Tutoring is a great time to work on ALEKS questions with us!**

### **Discussion Sections**

During Discussion sections, the TA will review material and design activities to help you test your knowledge. They will also

discuss study strategies that will help in all your chemistry courses. You will also work on questions that will be remarkably similar to homework and tests. This is a great time to ask questions, test out study groups, and work with your peers.

## Disability Resource Center (DRC)

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please affiliate with the DRC. I encourage all students to benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at [drc@ucsc.edu](mailto:drc@ucsc.edu). For students already affiliated, make sure that you have requested Academic Access Letters, where you intend to use accommodations. You can also request to meet privately with me during my office hours or by appointment, as soon as possible. I would like us to discuss how we can implement your accommodations in this course to ensure your access and full engagement in this course.

## Tutoring Learning Supporting Services (LSS)

There is tutoring available for this class provided by [Learning Support Services \(LSS\)](#)!

Learning Support Services Tutors are an important part of the teaching team and are here to help you be successful. [Small Group Tutoring](#) is for everyone and open to all students in class to get extra practice on the things you already know or the things you want to know better.

Your tutor(s) is an undergraduate student who took the class, did well, and received extensive training on how to help you learn!

Sessions are one-hour long and available several days a week and attendance is voluntary; *however, students who attend sessions weekly tend to earn a higher final grade than students who do not participate.*

Ask your tutor for more information about session times, visit our [website](#), or visit us [in person at the ARCenter](#) or remotely at our [Virtual Front Desk](#), M-F 9am-6pm. You can also view your Tutor's schedule on [The Tutor Hub](#).

[Learning Support Services](#), catch-up, keep-up, excel!

## Campus Advocacy, Resources, and Education (CARE) Office

The UCSC [Campus Advocacy, Resources & Education \(CARE\) Office](#) believes that all people deserve to live and engage in an environment free from violence. The CARE program provides support, advocacy, resources and violence prevention education to the UC Santa Cruz community. We respond to the needs of students, staff, faculty and non-affiliates impacted by stalking, dating/domestic violence and sexual assault by providing free and confidential services.

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the Campus Advocacy Resources & Education (CARE) Office by calling (831) 502-2273. In addition, Counseling & Psychological Services (CAPS) can provide confidential, counseling support, (831) 459-2628. You can also report gender discrimination directly to the University's Title IX Office, (831) 459-2462. Reports to law enforcement can be made to UCPD,



(831) 459-2231 ext. 1. For emergencies call 911.

Faculty and Teaching Assistants are required under the [UC Policy on Sexual Violence and Sexual Harassment](#) to inform the Title IX Office should they become aware that you or any other student has experienced sexual violence or sexual harassment.

## Slug Support Program

College can be a challenging time for students and during times of stress it is not always easy to find the help you need. Slug Support can give help with everything from basic needs (housing, food, or financial insecurity) to getting the technology you need during remote instruction.

To get started with SLUG Support, please contact the Dean of Students Office at 831-459-4446 or you may send us an email at [deanofstudents@ucsc.edu](mailto:deanofstudents@ucsc.edu).

## Slug Support/Tech Services

The ITS Support Center is your single point of contact for all issues, problems or questions related to technology services and computing at UC Santa Cruz. To get technological help, simply email [help@ucsc.edu](mailto:help@ucsc.edu).

## Academic Integrity

All members of the UCSC community benefit from an environment of trust, honesty, fairness, respect, and responsibility. You are expected to present your own work and acknowledge the work of others in order to preserve the integrity of scholarship.

Academic integrity includes:

- Following exam rules
- Using only permitted materials during an exam

- Viewing exam materials only when permitted by your instructor
- Keeping what you know about an exam to yourself
- Submitting your own original work

Academic misconduct includes, but is not limited to, the following:

- Disclosing or sharing exam content during or after you have taken an exam
- Accessing exam materials without permission
- Copying/purchasing any material from another student, or from another source, that is submitted for grading as your own
- Violations of the Academic Integrity policy can result in dismissal from the university and a permanent notation on a student's transcript. For the full policy and disciplinary procedures on academic dishonesty, students and instructors should refer to the [Academic Misconduct page](#) at the [Division of Undergraduate Education](#).

**In Chem1A, you are not allowed to consult with any person or website for help on Quizzes or Exams.** We are happy to help you with ALEKS anytime.

**Please be patient with your learning.**

There is no reason for anyone to be so desperate to cheat in this class. This is just the beginning of your college career. Learning and mastering the material should be the focus, not the actual letter grade for the course.

**(Syllabus continues on the next page)**

## Weekly Schedule (You are invited to print this out)

There is a canvas module for each week that includes a study guide with details on what we are learning and how it fits into the class, suggested sections of the book to preview, tips on solving ALEKS questions, and more.

Week	Topics to be covered
Week 1	<p><u>Using the Periodic Table</u></p> <ul style="list-style-type: none"> <li>Convert between mass, moles, and number of atoms or molecules</li> <li>Name and write the formula of ionic compounds formed from common ions and polyatomic ions</li> <li>Calculate average atomic mass from isotopic mass and abundance</li> </ul> <p><u>Stoichiometry of Reactions</u></p> <ul style="list-style-type: none"> <li>Perform stoichiometric calculations to convert between masses of reactants and products</li> <li>Determine the amount of product or reactant remaining in a <b>limiting reactant situation</b></li> <li>Calculate the concentration of a solution</li> </ul> <p><u>Three Types of Reactions</u></p> <ul style="list-style-type: none"> <li>Describe and predict the outcome of Ionic Precipitation Reactions</li> <li>Write molecular, complete ionic, and net ionic equations</li> <li>Calculate the concentration of species at the end of a reaction</li> </ul>
Week 2	<p><b>Friday (7/7): Quiz 1: limiting reactants, precipitation reactions, reduction/oxidation.</b></p> <ul style="list-style-type: none"> <li>Calculate percent yield; Use percent yield to calculate reactant amount</li> <li>Identify and predict the outcome of acid-base reactions</li> <li>Perform stoichiometric calculations for acid-base reactions</li> <li>Identify oxidation-reduction reactions from changes in oxidation numbers</li> <li>Separate oxidation-reduction reactions into half-reactions</li> </ul>
Week 3	<p><b>Friday (7/14): Essay 1: "Chemistry and You" is due</b></p> <p><u>Gases</u></p> <ul style="list-style-type: none"> <li>Understand how the kinetic molecular theory of gases is consistent with the ideal gas law and perform calculations using ideal gas law <math>PV=nRT</math></li> <li>Understand and use in calculations the relationship between mole fraction and partial pressure</li> <li>Use relative effusion rates to find an unknown molar mass</li> </ul> <p><u>Equilibrium</u></p> <ul style="list-style-type: none"> <li>Understand the dynamic nature of equilibrium and predict how a system at equilibrium would react to a change in conditions.</li> <li>Write expressions for the equilibrium constant and use it to calculate equilibrium amounts from initial amounts.</li> <li>Understand when to use the small-x approximation when solving equilibrium questions.</li> </ul>

<b>Week 4</b>	<b>Friday (7/21): Quiz 2: Gases, Equilibrium, pH of Acids/bases</b> <u>Acid-Base Equilibria</u> <ul style="list-style-type: none"><li>• Understand the difference between strong and weak acids (and bases) and calculate the pH of those solutions.</li><li>• Identify conjugate acid-base pairs and predict relative acid/base strength from pKa values.</li><li>• Predict the acidity/basicity of salt solutions and calculate the pH of those solutions.</li></ul>
<b>Week 5</b>	<b>Wednesday (7/26): Essay 2: "Chemistry and Life" is due.</b> <u>Buffer Solutions</u> <ul style="list-style-type: none"><li>• Understand how an acid/base buffer system works to maintain pH. Calculate the pH of buffer solutions.</li></ul> <u>Acid-Base Titrations</u> <ul style="list-style-type: none"><li>• Distinguish between strong acid/base and weak acid/base titrations.</li><li>• Calculate the pH at any point in a titration.</li></ul> <b>Saturday (7/29): Final Exam (covers everything learned in the class)</b>