

**San José State University**  
**Department of Chemistry**  
**Chem 55, Quantitative Analysis, Section 02, Fall, 2020**

**Course and Contact Information**

Instructor:	Prof. Madalyn Radlauer
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Office Hours:	Wed. 10:00 am – 11:00 am Fri. 10:00 am – 11:00 am Or by request
Class Days/Time:	Fri. 1:00 pm – 2:40 pm
Classroom:	None; we will meet via Zoom
Prerequisite:	CHEM 1B (with a grade of "C" or better; "C-" not accepted)

**Course Website**

Course materials such as the syllabus, handouts, notes, assignment instructions, etc. can be found on [Canvas](https://sjsu.instructure.com/) (<https://sjsu.instructure.com/>). You are responsible for regularly checking with the messaging system in Canvas to learn of any updates.

**Course Description** (from the [University Catalog](http://info.sjsu.edu/web-dbgen/splash/catalog.html): <http://info.sjsu.edu/web-dbgen/splash/catalog.html>)

Introduction to theories and techniques of chemical analysis.

**Course Format**

**Technology Intensive, Hybrid, and Online Courses**

This semester, due to the COVID-19 pandemic, this course will be completely online. Both asynchronous and synchronous instruction will take place, so you will be required to attend class via Zoom as well as work through course modules on [Canvas](https://sjsu.instructure.com/) (<https://sjsu.instructure.com/>). Thus you will need a computer with reliable internet access. You will need to use your SJSU account to access class meetings as only authenticated users will have access. Because there will be a considerable amount of group work, it is required that you use a camera and microphone for class meetings. Zoom virtual backgrounds are allowed as long as they are not distracting. If there is any reason you do not feel comfortable sharing video, please discuss with me at your earliest convenience and we will figure something out. If you have unmet technology needs, please see the [SJSU Work Anywhere](https://www.sjsu.edu/workanywhere/) website (<https://www.sjsu.edu/workanywhere/>) for assistance.

## Course Goals and Learning Objectives

The goal of this course is to provide an introduction to analytical chemistry including, but not limited to, statistical methods, dimensional analysis, concentrations, buffers and equilibria, and instrumentation.

### Program Learning Outcome (PLO)

Upon successful completion of this program, students will be able to:

PLO 3: Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in analytical chemistry.

### Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

CLO 1: Analyze numerical problems relevant to chemical reactions, experiments, and tests and apply quantitative reasoning to accurately solve them with correct significant figures and units.

CLO 2: Use basic statistical methods to interpret analytical data.

CLO 3: Recognize and convert between various units in either equation or narrative form.

CLO 4: Describe analytical instrumentation, determine if the measurement from the instrument is an absolute or relative value, and understand what calibration or standardization is required for effective data analysis.

CLO 5: Give examples of analytical techniques that would help solve various scientific questions.

CLO 6: Draw connections between the material covered in this course and its applications in the students' chosen field of study.

## Texts/Readings

**Textbook** (recommended for course readings)

[\*Quantitative Chemical Analysis\*](#) by Daniel C. Harris and Charles A. Lucy (10<sup>th</sup> edition, 2020) Hardcover ISBN: 9781464135385.

*The eTextbook is available with the online homework via SaplingPlus (ISBN: 9781319415709 SaplingPlus for Quantitative Chemical Analysis), so you do not need to purchase a separate copy of the textbook.*

**Online Homework** (required)

Required online homework is provided through [SaplingPlus](#) at <https://www.macmillanlearning.com/college/us/digital/sapling>. You will register for SaplingPlus through the Canvas site which can be accessed on any computer, tablet, or smartphone. Instructions will be posted to the Canvas by the first week of school.

**Other References** (not required)

[\*Introduction to Spectroscopy\*](#) by Donald L. Pavia, Gary M. Lampman, George S. Krutz, James A. Vyvyan

*This text is also used in organic chemistry labs.*

### Library Liaison

You should have a student library account with the King Library that allows you access the library electronic databases. If you plan to access the library services from off-campus, you may need to obtain a password and/or proxy to do so. Check the Library website for information. The reference Librarian for Chemistry is Yen Tran and her email is [yen.tran@sjsu.edu](mailto:yen.tran@sjsu.edu).

## Course Requirements and Assignments

Graded work will include pre-class questions, in-class worksheets, post-class quizzes, online homework, two “take-home” exams, and one comprehensive final exam, which all contribute to the course learning outcomes. Dates for the exams are in the Course Schedule below. All relevant dates are also posted to Canvas. Exams and assignments in the course will be weighted as follows:

<b>Assignments</b>	<b>Points</b>
Pre-class Questions	100
In-class Worksheets	200
Post-class Quizzes	100
Online Homework	200
2 Midterm Exams	200
Final Exam	200
<b>Total</b>	<b>1000</b>

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities. Other course structures will have equivalent workload expectations as described in the syllabus.

### Final Examination or Evaluation

The Final Exam is comprehensive and will have a range of question styles that will be similar to the other assignments and exams in the course.

### Grading Information

#### Determination of Grades

Points will be distributed as described in Course Requirements and Assignments above. I will not curve because I believe that everyone can succeed in this course. I may, at the end of the course, linearly shift the scale. I will only shift it to benefit you. The course grade will be determined from the resulting average of the point total as follows:

<u>Percentage of Total Points</u>	<u>Final Course Grade</u>
96 and above	A+
92 to 95.9	A
88 to 91.9	A-
84 to 87.9	B+
80 to 83.9	B
76 to 79.9	B-
72 to 75.9	C+
68 to 71.9	C
64 to 67.9	C-
60 to 63.9	D+
56 to 59.9	D
52 to 55.9	D-
less than 52	F

## Course Modules

The course is organized into modules on Canvas. We will work our way through about 1 module per week. These modules will lay out the required video(s) and recommended reading before each class period and there will be pre-class questions for you to complete prior to class that will help me organize class time to best serve learning. Class will include some lecture, some problem-solving as a class, and some group work. Each class period we will tackle the worksheet that is in the module. There is a brief quiz in each module for you to take after class. There will also be one online homework assignment for each module. The two take-home midterm exams will cover large sections of the course and are not tied to a single module. The final exam is cumulative.

## Pre-class Questions

The pre-class questions will be posted to the appropriate module and full credit will be awarded for on time completion of the assignment. These will be due by 1 pm on Thursday (24 h before class). The reason for this deadline is that each week there will be a question asking for the “muddiest point”, i.e. the part of the topic being covered that is least clear to you. I will read through everyone’s answers and plan my in-class lecture to cover the points that were most difficult for the most people. If your muddiest point is not covered in lecture, I will post it to the module’s discussion feed with some comments to start the discussion of that topic so that you will still have access to more instruction on it.

## In-class Worksheets

Worksheets will be posted to the module before class. You will need to access the worksheet for class. You do not have to print it out, but I will try to format it so that you can do your work directly on the worksheet if you choose to print it. These worksheets will be graded for participation. This will be measured in two ways. First, I will drop into your breakout rooms to check in and offer assistance. I expect you to use this time to engage with the material and work together. Second, you will take a photo and upload your work to Canvas right after class.

## Post-class Quizzes

Starting right after class, you will have access to the post-class quiz in the module. It will be brief and cover things from the pre-class video and reading as well as from the in-class lecture and worksheet. These quizzes will be very short and must be completed before the next module’s pre-class questions will be available to you. These quizzes will be graded for accuracy.

## Online Homework

Online homework via [SaplingPlus](https://www.macmillanlearning.com/college/us/digital/sapling) at <https://www.macmillanlearning.com/college/us/digital/sapling> will be assigned for each module. One great thing about Sapling is that you will get immediate feedback on your work. Note that the questions I have chosen from Sapling may approach problems in a different way than I present in class or may provide answers in a different format than you have seen before. Keep in mind that neither is “wrong” or “right”, they are simply different ways to present the material. The online homework will be graded for accuracy, but you will get multiple attempts on each question with only a slight penalty.

## Extra Practice Problems

In addition to the graded Sapling homework, I will try to post an extra set of practice problems from Sapling for each module. These will not be graded, but I have often gotten requests for more practice problems, so here they are!

## Recommended Reading

In each module, I will post recommended reading from the book. While this is not required, it offers you another way to learn the material.

## Missed Exams or Assignments

This semester is unprecedented. There are pandemics (COVID-19 and racism) causing havoc in our world and forcing us to work and learn under very strange circumstances. This may make it more difficult for you to maintain a steady course schedule and you may need to miss class or an assignment at some point in the semester. If this is the case, please contact me ahead of class time and with as much of a heads up as possible and we can discuss the situation. Generally, I will not accept late work, but I will do my best to be accommodating for unforeseen circumstances.

## Classroom Protocol

Be on time to class; class starts on Zoom at 1:00 pm sharp. Please find a place where you will be able to use your microphone and webcam. Unless an alternative plan is determined with me before the second class period, I expect everyone to be able to do “face-to-face” discussions so that you can participate during the class period, especially in the breakout rooms. Virtual backgrounds are acceptable as long as they are not distracting and as long as they do not violate the guidelines for a safe and respectful community listed below.

## Email policy

I receive a lot of emails, so to be sure that I see your email, all Chem 55 emails should have Chem 55 in the subject line. I will do my best to respond to class-related emails within 1 business day of receiving them, however, keep in mind that this may not always be possible, especially during high volume times (around exams). You can also message me via Canvas and I will target a similar turnaround time.

## University Policies

Per [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant information to all courses, such as academic integrity, accommodations, dropping and adding, consent for recording of class, etc. is available on Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>.

## Safe and Respectful Community

I hope that the classroom will serve as an environment that will promote learning and the development of new ideas, as well as be a safe and respectful community. Behavior that interferes with the normal academic function in a classroom is unacceptable. Students exhibiting this behavior will be asked to leave the class. The university has a [brochure on student conduct](http://www.sjsu.edu/studentconduct/docs/ENGLISH%20Brochure.pdf) at <http://www.sjsu.edu/studentconduct/docs/ENGLISH%20Brochure.pdf>.

Examples of such behavior include

1. Persistent interruptions or using disrespectful adjectives in response to the comments of others.
2. The use of obscene or profane language.
3. Yelling at classmates and/or faculty.
4. Persistent and disruptive late arrival to or early departure from class without permission.
5. Physical threats, harassing/bullying behavior, or personal insults (even when stated in a joking manner).
6. Use of personal electronic devices such as pagers, cell phones, PDAs in class, unless it is part of the instructional activity.

## Quantitative Analysis, Chem 55, Fall 2020, Course Schedule

The tentative course calendar below includes weekly course content, midterm exam dates, and the date for the final exam. Dates may be subject to change, but prior to this, fair notice will be given during class and through Canvas. The recommended reading from our primary textbook, Quantitative Chemical Analysis, 10<sup>th</sup> edition, will be listed on the Canvas site along with each module.

Note: In your general chemistry courses (Chem 1A and 1B), you covered a range of topics that are essential to this course including, but not limited to, significant figures, SI units, stoichiometry, calculating concentrations, acid-base equilibria, buffers, and titrations. We will review some aspects of these topics and we will use them as a foundation for describing more complicated (and exciting) topics. Please review your general chemistry notes and do not hesitate to ask questions as they come up during lecture, office hours, workshop, or at CoSAC. Please also refer to the Preparatory Videos module for additional review.

### Tentative Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/21/2020	<b><i>First day of classes</i></b> Introduction to course and course resources, brief tutorial on how to use our Canvas site, breakout room session on applications of Chem 55 concepts
2	8/28/2020	Dimensional analysis and error analysis (Module 1)
3	9/4/2020	Statistics (Module 2)
4	9/11/2020	Statistics (Module 2)
5	9/18/2020	Monoprotic acid-base equilibria and ionic compounds in solution (Module 3)
6	9/25/2020	Polyprotic acid-base equilibria and systematic treatment of equilibria (Module 4)
7	10/2/2020	Polyprotic acid-base equilibria and systematic treatment of equilibria (Module 4)
7		<b><i>Take-home midterm exam 1 available, see Canvas for further instructions</i></b>
8	10/9/2020	Buffers and determining the major species in solution (Module 5)
9	10/16/2020	Acid-base titrations (monoprotic and polyprotic) (Module 6)
10	10/23/2020	Complex titrations (Module 7)
11	10/30/2020	Relative vs absolute measurements and calibration curves and standardization (Module 8)
12	11/6/2020	Spectroscopy with an emphasis on absorption spectroscopy (Module 9)
12		<b><i>Take-home midterm exam 2 available, see Canvas for further instructions</i></b>
13	11/13/2020	Analytical separations and chromatography (Module 10)
14	11/20/2020	Chromatography calculations and resolution of peaks (Module 11)
15	11/27/2020	<b><i>Thanksgiving weekend, no class meeting</i></b>
16	12/4/2020	Connecting analytical methods to scientific questions (Module 12)
	12/11/2020	<b><i>Assigned final exam time is 12:15 – 2:30 pm</i></b>