

San José State University
Department of Chemistry
Quantitative Analysis, Chem 55, Fall, 2019

Instructor:	Prof. Madalyn Radlauer
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Office Hours specifically for Chem 55:	Tues. 3:00 pm – 4:00 pm Fri. 11:00 am – 12:00 pm
Additional office hours:	Mon. 3:00 pm – 4:00 pm Fri. 10:00 am – 11:00 am or by appointment
Class Days/Time:	TTh 8:00 am – 8:50 am
Classroom:	Sci 164
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 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, equipment, 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 (required for course readings)

[*Quantitative Chemical Analysis*](#) by Daniel C. Harris (9th edition, 2016) ISBN: 9781464135385.

The eTextbook is available through the online homework via Sapling and is part of the cost of the online homework, so you do not need to purchase a separate copy of the textbook. That said, if you would like a hard copy, this textbook is available in the SJSU campus bookstore and a copy is on reserve at the King Library.

Online Homework (required)

Required online homework is provided by [Sapling](http://www.saplinglearning.com) at <http://www.saplinglearning.com>. You will register for Sapling through the Canvas site which can be accessed on any computer, tablet, or smartphone. Instructions will be posted to the Canvas site within the first week of school.

Other References (not required)

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

This text is also on reserve at the King Library and will be 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.

iClicker Reef and iClicker Cloud

In this course clicker questions will be employed at least once during each class period when there is no exam. The software, iClicker Reef and iClicker Cloud, will compile your responses in real time, will help me understand how the class is doing, and will give everyone a chance to participate. You must have a device every day in class (available at no cost, see options below) to participate. You must also set up your iClicker Reef account (see directions below).

Device Options:

1. **iClicker Reef App for Smartphone or Tablet:** Allows you to use your smart phone or tablet as a clicker to participate. On your smartphone or tablet go to Mac App Store or Google Play and download iClicker Reef (formerly REEF polling).
2. **iClicker Reef Polling Site for Laptop:** If using a laptop, go to the [iClicker Reef site](https://app.reef-education.com/#/login) at <https://app.reef-education.com/#/login>.
3. **Clicker Remote Handset:** If you do not have a smart phone, tablet, or laptop, you can request to borrow a Clicker remote handset from eCampus (eCampus@sjsu.edu) for free. Send an email to eCampus@sjsu.edu and request to loan a Clicker remote. Further instructions will be provided to you by eCampus on scheduling a pickup. Remotes are to be returned to eCampus at the end of the semester. If you already own a clicker, you can use it to respond to polls. *Note: Please let me know if you will be using a clicker remote handset so that I can check out a receiver from eCampus.*

Setting up an iClicker Reef Account and Adding the Course:

1. Create and activate your iClicker account by following the [iClicker Account Setup Guide](http://www.sjsu.edu/ecampus/docs/iClicker%20Account%20-%20Setup%20Guide%20-%20Student.pdf) at <http://www.sjsu.edu/ecampus/docs/iClicker%20Account%20-%20Setup%20Guide%20-%20Student.pdf>. *Note: Please include your 9-digit SJSU ID. This way it will be integrated into Canvas effectively.*
2. To add the course, look for “FA17 CHEM 145”. For [additional guidance on how to add the course](http://www.sjsu.edu/ecampus/docs/iClicker%20-%20Add%20Your%20Course%20-%20Setup%20Guide%20-%20Student.pdf) see <http://www.sjsu.edu/ecampus/docs/iClicker%20-%20Add%20Your%20Course%20-%20Setup%20Guide%20-%20Student.pdf>.
3. To [sync with the Canvas course](http://www.sjsu.edu/ecampus/docs/iClicker%20Sync%20with%20your%20Course%20in%20Canvas%20-%20Student.pdf), follow the directions at <http://www.sjsu.edu/ecampus/docs/iClicker%20Sync%20with%20your%20Course%20in%20Canvas%20-%20Student.pdf>.

Course Requirements and Assignments

Graded work will include in-class clicker questions, worksheets, online homework, two in-class 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. Reading along in the text is an excellent way to prepare for classes and exams. Exams and assignments in the course will be weighted as follows:

<u>Assignments</u>	<u>Points</u>
In-class Clicker Questions (details below)	100
Worksheets (15 points each, lowest score gets dropped)	150
Online Homework (15 points each, lowest score gets dropped)	150
Midterm Exams (175 points each)	350
Final Exam	250
Total	1000

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, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Final Examination or Evaluation

The Final Exam is comprehensive and will be written in a style similar to the Midterm Exams.

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

In-Class Clicker Questions

Each class when we do not have an exam, I will ask questions and collect responses via iClicker Reef. We will be doing various types of clicker questions in class. These questions will be graded for participation, not correctness. If you answer 80% of the clicker questions over the course of the semester, you will earn the full 100 possible points. The 20% buffer is designed to account for days when you forget your clicker, are sick, run out of batteries, excused absences, etc.

<u>Clicker Questions Answered (%)</u>	<u>Score</u>
80 to 100	100
75 to 79	80
70 to 74	60
60 to 69	40
50 to 59	20
less than 50	0

- Keep in mind, different class periods will have a variable number of clicker questions, so that 80% of class days \neq 80% of the clicker questions.
- You must register your iClicker or accessible device by the second week of class (8/27/19).

- If you have any technical issues, you must notify me by 6 pm of that class day.
- If you are using a smart device, you can click in even if you are out of class. This is cheating and will result in the loss of all participation points (i.e. 0 of 100 total points).

Worksheets

Worksheets will be passed out during class nearly every week (11 total). Each worksheet will have 3 to 5 questions and be worth 15 points. We will discuss how to approach these questions in a qualitative way in class. Then you will take the worksheet home and tackle solving the problems quantitatively. You may work with a group, but each student must submit their own individual work. Working in groups does not mean copying down each other's answers. Please do your own work as that will greatly enhance your ability to do similar questions on the exams. You will input your answers with the correct significant figures and units to Canvas for grading. Your lowest worksheet score will be dropped.

Online Homework

Required online homework via [Sapling](http://www.saplinglearning.com) at <http://www.saplinglearning.com> will be assigned most weeks of the semester (11 total). Each assignment will have 10 to 30 questions and will be worth 15 points. While you will have an unlimited number of attempts, each attempt will slightly reduce your score for that question (by 5%). Please use the resources at hand if you need them: the hints and feedback. Your lowest homework score will be dropped.

I have decided to use online homework so that you will get immediate feedback on your work. That said, the questions I have chosen from Sapling may approach problems in a different way than I present in lecture 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.

Recommended Reading

In addition to the worksheets and online homework, carefully study the book and lecture notes and ask questions on any material you do not understand. I have 2 scheduled office hours specifically for Chem 55 students, 2 additional office hours (which are intended to be for Chem 145 students), and I am willing to schedule office hours by appointment if none of these times accommodate your schedule. See the Canvas site for recommended reading. I will also post recommended reading and practice problems from the book on the board at the start of each class.

Missed Exams or Assignments

If an exam or assignment is missed without a legitimate excuse, a score of 0 will be entered for that assignment. If an acceptable excuse is provided, then the grade will be the average of your other grades in that assignment category. In no case will a make-up exam or assignment be given. Contact me *in advance* if you will miss an exam date for a legitimate activity. There will be no final exam rescheduling unless you have 3 exams on the same date.

Exam Regrades

To qualify for an exam regrade, you must take the exam in ink and not use white-out. Do not write on your exams that are submitted for a regrade. Submitting a modified exam for regrading is a serious breach of academic integrity. Regrades must be submitted within one week of the exam being handed back to you. Regrade requests must include a written description of what you feel was graded incorrectly. One exception to all of the above: if I made an arithmetic error in your point tally, simply write “tally error” and I will check the point tally.

Classroom Protocol

Be on time to class; class starts at 8:00 am sharp. Device use in class should be limited to taking notes and responding to clicker questions. Students are strongly encouraged to participate during the class period.

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).

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 2019, Course Schedule

The tentative course calendar below includes weekly course content, exam dates, worksheet due dates (labels as WS#), 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, 9th edition, will be listed on the Canvas site.

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.

Tentative Course Schedule

Class	Week	Date	Topics, Readings, Assignments, Deadlines
1	1	Th 8/22	First day of classes In-class survey, introduction to course
2	2	Tu 8/27	Units, dimensional analysis, and applications to research
3	2	Th 8/29	Error and error propagation, statistics
4	3	T 9/3	Statistics WS1 due
5	3	Th 9/5	Statistics and quality assurance
6	4	T 9/10	Gravimetric methods and calculations WS2 due
7	4	Th 9/12	Chemical equilibria and titration basics
8	5	T 9/17	Monoprotic acid-base equilibria WS3 due
9	5	Th 9/19	Polyprotic acid-base equilibria
10	6	T 9/24	Polyprotic acid-base equilibria, activities vs concentration WS4 due
11	6	Th 9/26	Buffers and the Henderson-Hasselbalch equation
12	7	T 10/1	Midterm Exam 1
13	7	Th 10/3	Buffers
14	8	T 10/8	Acid-base titrations WS5 due
15	8	Th 10/10	Acid-base titrations
16	9	T 10/15	Complex titrations WS6 due
17	9	Th 10/17	Complex titrations
18	10	T 10/22	Relative vs absolute measurements WS7 due
19	10	Th 10/24	Calibration curves and standardization
20	11	T 10/29	Spectroscopy WS8 due
21	11	Th 10/31	Spectroscopy

Class	Week	Date	Topics, Readings, Assignments, Deadlines
22	12	T 11/5	Midterm Exam 2
23	12	Th 11/7	Atomic spectroscopy
24	13	T 11/12	Atomic spectroscopy WS9 due
25	13	Th 11/14	Analytical separations
26	14	T 11/19	Gas Chromatography WS10 due
27	14	Th 11/21	Liquid Chromatography
28	15	T 11/26	Mass spectrometry WS11 due
	15	Th 11/28	<i>Thanksgiving Break – No class</i>
29	16	T 12/3	Connecting analytical methods to scientific questions
30	16	Th 12/5	<i>Last day of classes</i> Review and class wrap up
	Final Exam	Th 12/12	Coverage is cumulative 7:15 am – 9:30 am in SCI 164 (usual classroom)
		F 12/20	<i>Grades available</i>