Green Sheet Chem 55 L – Fall 2021

Please consult the Canvas page for this course (http://sjsu.instructure.com) for all updates due to COVID which may occur at the beginning of the semester.

San José State University

Department of Chemistry Quantitative Analysis, Chem 55, Fall, 2021

Instructor:	Griff Freeman
Office Location:	DH 412B
Telephone:	(408) 924-4952
Email:	Richard.freeman@sjsu.edu
Office Hours	MW: 10:30 – 12:00
Additional office hours:	By appointment
Class Days/Time:	MW 9:30 am – 10:20 am
	This is an in-person lecture. Attendance at the lecture will be part of the course grade.
Classroom:	Washington Square 109
Prerequisite:	CHEM 1B (with a grade of "C" or better; "C-" not accepted)

For the start of the semester (and who knows for how long), SJSU is requiring all students and faculty to wear masks while indoors. This obviously includes this lecture class. Please bring a mask to class and keep it in place during class. Also, please see the announcement on this page regarding what you need to do before the first day of class.

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

Introduction to theories and techniques of chemical analysis.

The purpose of Chem 55 and Chem 55 L is to provide students with an understanding of how quantitative measurements of chemicals are made and hands-on experience carrying out chemical measurements. The hands-on part of this instruction is covered in Chem 55 L. Chem 55 covers the theory of chemical measurements, the use of statistics to describe the results of measurements and several specific examples of chemical measurements.

Course Website

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

Course Goals and Learning Objectives

- Understand the theory behind different types of chemical measurements.
- Make careful chemical measurements using a variety of methods and equipment.
- Understand the errors inherent in these measurements.
- Use statistics to calculate the size of these errors.
- Clearly communicate the results of chemical measurements.

Program Learning Outcome (PLO)

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

PLO 1.1 -   identify, formulate, and solve a range of chemistry problems (fundamental to complex) through application of mathematical, scientific, and chemical principles.

PLO 2.2   - acquire, record, and critically evaluate data through use of instrumentation and software, appropriate record keeping practices, figure preparation, and scrutiny of experimental results.

PLO 2.3 - recognize and assess laboratory hazards, practice risk minimization, and conduct safe laboratory practices.

Texts/Readings

Textbook (required for course readings)

Quantitative Chemical Analysis by Daniel C. Harris (10th edition, 2019).

The eTextbook is available through the online homework via Achieve 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.

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:

Assignments	Points
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 (125 points each)	375
Final Exam	225
Total	**1000**

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, 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. Instructions for iClicker may be found here: https://macmillan.force.com/iclicker/s/article/Checklist-Getting-Started-with-the-iClicker-Student-App (Links to an external site.).

Device Options:

1. **The easiest choice is to download the iClicker app to your phone, laptop, or tablet (something that you will have in lecture). You may also purchase a device from iClicker.**

Online Homework

Required online homework via Achieve.com. This is also the site for your e-text and for iClicker. More explicit instructions for obtaining a license to Achieve will be coming shortly. Homework will be assigned most weeks of the semester (11 total). Each

assignment will have 10 to 40 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 3-5%). 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 Achieve 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.

Worksheets

Worksheets will be passed out during class nearly every week (11total). 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.

Exams

All exams will be held in class.

Final Examination or Evaluation

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

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 acc e p t a b l e excuse is provided, then the grade will be the average of your other grades in that assignment category. In no case will a mak e - 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.

Quantitative Analysis, Chem 55, Fall 2021, Course Schedule

The tentative course calendar here 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.

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.

Information about Grading and Assignments may be found here.

Classroom Protocol

Be on time to class; class starts at 9:00 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)*, 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 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 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.

Grading Plan

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:

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Final Examination or Evaluation

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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: Percentage of Total Points

Final Course Grade

Percentage of Total Points	Final Course Grade
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

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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   Score 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. Clicker Questions Answered (%)

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 ≠ 80 % of the clicker questions .

- You must register your iClicker or accessible device by the second week of class (2/1/21).
- 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).

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Online homework (MacMillan Higher Education) will be assigned most weeks of the semester (11 total). Each assignment will have 10 to 40 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.

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Tentative Lecture Schedule

Tentative Course Schedule Class	Week	Date	Topics, Readings, Assignments, Deadlines
1	1	W 1/26	Read Chapter 0 and Chapter 1 of Harris. *First day of class* Introduction to course.

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2	2	M 1/31	Chapter 1	Units, dimensional analysis, concentration units, preparation of solutions.
3	2	W 2/2	Chapter 3	Error and uncertainty; error propagation, statistics Propagation of Error
4	3	M 2/7	Chapter 4	Normal Distribution
5	3	W 2/9	Chapter 4	Normal Distribution and z-statistic
6	4	M 2/14	Chapter 4	Student's t-test Confidence intervals
7	4	W 2/16	Chapter 4	.Other t-tests
8	5	M 2/21	Chapter 4	outlier tests
			Chapter 6	Review of Equilibrium processes
9	5	W 2/23		Exam #1. Cover everything up to, but not including, equilibrium
10	6	M 2/28	Chapter 6	Solubility Monoprotic acid-base equilibria
11	6	W 3/2	Chapter 7	Principle Species in Solution Titrations Part 1
12	7	M 3/7	Chapter 7, 9	Titrations Part 2 Buffers
13	7	W 3/9	Chapter 7, 8	Buffers and the Systematic Treatment of Equilibrium
14	8	M 3/14	Chapters 9, 10, 11	Acid/Base Titrations 2
15	8	W 3/16	Chapters 9, 10, 11	
16	9	M 3/20	Chapter 11	Graphical methods for endpoint detection
			Chapter 12	Complex titrations
17	9	W 3/23	Chapter 12	Complex titrations - **EDTA**

			Chapter 8	vs concentration
	M 3/26 - F 4/1			**Spring Break**
18	10	M 4/4	Chapter 8	Ionic Strength, Activity, Activity coefficients
19	10	W 4/6		**Midterm Exam 2**
20	11	M 4/11	Chapter 18	Absorption of Light
				Beer's Law
21	11	W 4/13	Chapter 4	Calibration Curves
				Spectrophotometric titrations
22	12	M 4/18	Chapter 18	fluorescence/luminescence
23	12	W 4/20	Chapter 5	Standard Addition
24	13	M 4/25	Chapter 5	Standard Addition and Limits of Detection
25	13	W 4/27	Chapter 21	atomic spectroscopy
				Analytical separations
26	14	M 5/2	Chapter 23	**Gas Chromatography**
27			Chapter 24	Gas Chromatography
	14	W 5/4	Chapter 25	Liquid Chromatography
28	15	M 5/9		TBD
29	15	W 5/11		**Midterm Exam 3**
30	15	M 5/16		Last Day of Class - TBD

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Final Exam	Tuesday 5/24 - 7:15 AM - 9:0 AM