

SUL ROSS STATE UNIVERSITY

ANALITICAL CHEMISTRY I: CHEM 2401 LABORATORY SYLLABUS

(CRN: 21482) Spring 2022

LAB: Analytical Chemistry I

TA: Dr. Hong Young Chang

Room: WSB 307

Email: hxc19tv@sulross.edu

Time: Tuesday 3:30-5:20 pm

Office: WSB 219

Office Hours: M-F(2:00-6:00pm)

Laboratory Manual: Handouts will be provided before each lab meeting. Bring a printed copy with you to the lab each week.

OBJECTIVES

Student Learning Objectives (SLO):

A student graduating with the **chemistry major** is expected to demonstrate that (s)he is able to do the following:

1. Organic Chemistry—Students will be able to draw organic molecular structures and explain organic reactions, stereochemistry, structural analysis and reactions in biological systems.
2. Inorganic Chemistry—The student will be able to demonstrate understanding of coordination chemistry, valence theory, elementary actions and advanced molecular theory.
3. Analytical Chemistry—The student will be able to demonstrate an understanding of theory of analytical chemistry and conduct analytical analysis, including data analysis and calibration,

equilibrium chemistry, gravimetric analysis, titrimetric analysis, spectroscopic analysis, and electrochemical analysis.

4. Physical Chemistry—The student will be able to demonstrate an understanding of the application and theory of physical chemistry, including topics such as atomic structure, electrochemistry, surface chemistry, solid-state chemistry, and thermodynamics.
5. Research—The student will collect and analyze published chemical literature and undertake a chemistry research project.

BSc in Chemistry Marketable Skills

1. Students will become good at punctuality and time management.
2. Students will analyze &/or synthesize molecules and perform spectroscopic characterization and interpret their results scientifically.
3. Students will become proficient at writing scientific papers and to identify appropriate references for their paper.
4. Students will be become proficient at orally presenting scientific topics including the use of visual aids.

Core Objectives (CO):

- Critical Thinking Skills – Students will gain/improve their critical thinking ability by solving real life chemistry problems through inquiry, analysis, and evaluation of available information. Students will be tested on their critical thinking ability in exams and through lab experiments
- Communication Skills – Students will have the opportunity to

improve communication skills through oral discussion and writing reports (i.e. observation, explanation, and conclusion etc.) on the experiments done in the lab sessions.

- Empirical and Quantitative Skills – students will use the mathematical skills needed to manipulate and analyze numerical data obtained through experimentation in order to form conclusions
- Teamwork – students will use team-spirit and consider different points of view to work effectively while conducting experiments as a team working toward a shared purpose or goal

Calculator: A scientific calculator is required for this course.

Microsoft Excel Software: This software is also required for this course.

Cell phones **ARE NOT** permitted and should be turned off during laboratory time.

Expectations:

- Read over the experiment before lab
- Follow all safety procedures:

Shorts and open-toed shoes are NOT allowed in lab. If you come to class without appropriate clothing, you will be asked to leave. NO EXCEPTIONS!

Attendance:

Coming to lab is mandatory. Be on time and SIGN IN at the beginning of the lab period. Plan to spend the entire period in lab. The TA may deduct points for students who arrive late or leave early.

If you miss 3 labs or more, you will receive an automatic F. This means you will fail the entire Analytical Chemistry I course including the lecture component, not just the laboratory section

Assignments:

Pre-Lab Write Up: Due at the beginning of the lab that the experiment is performed.

Lab Report: Due the lab period after the lab is done

Lab Grading:

- Each experiment is worth 30 points
- These points will come from:
- The pre-lab (5)
- Attendance (5)
- The lab report (20)

Assignments must be completed and turned in on time. Assignments must be typed using Microsoft Word or a similar program. Reports will be due the following week unless told otherwise. 10% of the grade will be deducted for assignments not turned in at the beginning of lab. An additional 10% will be deducted for each day that the assignment is late

Outline for Written Pre-lab Reports

- ***Aim:*** Here you will state the goal of the experiment (in your own words).

- **Reagents:** You will make a list of all of the chemicals used in the experiment along with relevant data (grams, volume, molarity etc. that is indicated in your experiment).
- **Apparatus:** You will list all of the equipment that you will use.
- **Method:** This is where you will outline the steps in the experiment. The steps will be put in your own words.

Outline for Written Lab Reports (Use Microsoft Word or related program)

- **Aim:** Here you will state the goal of the experiment (in your own words).
- **Reagents:** You will make a list of all of the chemicals used in the experiment along with relevant data (grams, volume, molarity etc.). This is how much **YOU** used, not how much the manual asks for.
- **Apparatus:** You will list all of the equipment that you used.
- **Method:** This is where you will outline the steps in the experiment. Be sure to note any difference between what you did and what the manual said to do.
- **Data & Results:** Note the observations that you made during the experiment. What are your findings? (percent yield, melting

point, etc.)

- **Discussion:** Discuss your results and answer the questions that were asked in the **Data and Results** section of the experiment. Talk about the significance of your results. Were your results expected or unexpected? Why or why not?
- **Conclusion(s):** Summarize the key points and findings of the experiment. Was the experiment successful or unsuccessful?

ChemDraw (or ACD/ChemSketch) is a computer program that you can use to draw molecular structures, chemical reactions, etc. You can download ChemDraw (or ACD/ChemSketch) onto your own personal computer (PC or Mac):

<http://sitelicense.cambridgesoft.com/sitelicense.cfm?sid=3000>

[ChemSketch Download for Academic and Personal Use | ACD/Labs \(acdlabs.com\)](http://acdlabs.com)

Make sure you follow the requirements for the password and use your SRSU email address to register.

Alternatively you can access ChemDraw in the GIS lab (computer room next to the chem TA room) by searching for “ChemDraw” whenever there is no class (open lab when no classes are being taught).

Students with Special Needs: *Sul Ross State University is committed to equal access in compliance with the Americans With Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student’s responsibility to initiate a request for accessibility services. Students seeking accessibility*

services must contact Ms. Rebecca Greathouse Wren, M.Ed., LPC-S, Director/Counselor, Accessibility Services Coordinator, Counseling and Accessibility Services, Ferguson Hall, Room 112. The mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas 79832. Telephone: 432-837-8203. E-mail: rebecca.wren@sulross.edu . Students should then contact the instructor as soon as possible to initiate the recommended accommodations.

If anyone is pregnant or gets pregnant during the semester, please inform your TA and Dr. Chang.

Scholastic Dishonesty: *Students who violate the University rules on scholastic dishonesty are subject to penalties, including the possibility of an **F** in the course and/or dismissal from the University. All laboratory reports need to be individually completed and not copied from another student's work.*

Analytical Chemistry I (CHEM2401) Lab Schedule

Date	Experiment
January 11	No Laboratory Experiment (attributed to Omicron)
January 18	Safety Video, Lab Tour, Equipment Checkout
January 25	Performing Serial Dilution, Chemical Titration Techniques, Analytical balance
February 1	Calibration of glassware and pipet volume
February 8	Introduction of Excel for plotting of experimental data
February 15	Micro-pipet Calibration using Excel for Statistics
February 22	Introduction to Analytical Spectrophotometry: Iron in water (Uv-vis)
March 1	Determination of Manganese in environmental waters (Uv-vis)
March 8	No laboratory Experiment (Spring Break)
March 15	Introduction to Fourier-transform infrared spectroscopy (FT-IR / Amino acids)
March 22	Precipitate Titration (AgNO_3 titrate NaCl)
March 29	Acid-Base Titration (Using NaOH titrate Acetic Acid)
April 5	Redox Titration of Hypochlorite in Bleach
April 12	Lab Cleanup
April 19	Final Test