

**QUANTITATIVE ANALYSIS LABORATORY**  
**SYLLABUS (CHEM 3110)**  
**FALL 2021, CCSB G.0714**

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**Co-requisite:** Lecture CHEM 3310

Pre-requisite: General Chemistry and others listed in the course description.

**Welcome!** This course provides practical laboratory experience in fundamental quantitative chemical analysis and improve your experimental skills in analytical chemistry such as acid-base titration, gravimetric analysis, quantitation of unknown, and so on.

We hope that you will treat this class as an opportunity to practice and improve your skills and knowledge in analytical chemistry. You will be graded on your overall grasp of the skills and concepts in the laboratory experiments and written exercises.

JUST getting the right answer will not get you an “A” in this class. In addition to attending and actually performing all of the labs correctly, you will need to produce complete lab reports, as explained below, for a grade.

**Invest in good preparation BEFORE** coming to class by reading the labs, doing the prelab exercises, and writing your own outlined procedure for each lab. Anticipate problems and timing issues.

DO NOT SCHEDULE OTHER APPOINTMENTS/commitments during this lab time, as your grade will suffer, if you are not in the lab at the scheduled times. The labs are long and you will need to use your time wisely. If you feel that your experiment was too much out of control, please see me or the TA. Try to resolve any problems within the allotted lab time.

~~**Everyone will have assigned labwares.** You will be responsible for your drawer and its contents. Any items in the drawer found to be missing (or damaged beyond simple repair) at the end of the semester will have to be replaced by the corresponding students.~~

Being able to **successfully work next to and with fellow scientists** is a skill worth pursuing. Practice safety when moving in the lab. Look behind you before walking. We will mainly work in groups of three to four for all of the labs. You will have to negotiate the sharing of labor, materials, and responsibilities with your partners. You are encouraged to communicate with your lab mates during class and to share your experiences and solve problems.

### **COVID-19 PRECAUTION STATEMENT**

We need to follow CDC, El Paso, and UTEP's regulations to ensure high safety such as **the indoor face mask mandate**.

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to [covidaction@utep.edu](mailto:covidaction@utep.edu), so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit [epstrong.org](http://epstrong.org).

## SAFETY

Only limited hood space is available, so we'll have to share, and we may also need to use the hoods in other rooms. If you feel pushed into doing something unsafe because of lack of space or proper tools, please see me or the TA for help before proceeding. Please practice safety at all times.

### ACCIDENTS

- **Always look behind you** before beginning to move in a lab.
- Speak loud and clear to warn others of an accident and or potential danger.
- Know your safety options before you begin (sinks, shower, eyewash, gloves).
- Know your path out of the lab, if it becomes necessary.
- Know where the fire extinguishers are.
- If an instructor/TA is present during a fire, allow them to operate the fire extinguisher.
- Know what can go wrong and be prepared with a solution (a cure, an antidote).
- Research any chemical that is unfamiliar to you. Know its properties.  
Do the prelabs!
- Familiarize yourself with the first-aid supplies and their location.

### WASTE:

The sink drain is a one way hole. It's best to **be very sure** that it is OK to pour anything into a drain. Improper waste disposal is not only dangerous to you, but hazardous to a whole community. For example, how do you know what was poured into the sink just before you arrived? Unpredictable and dangerous (explosive) chemical reactions can occur. **Follow the directions given to you by the TA or** on the boards or hoods for properly disposing chemical waste. Listen carefully to any instructions given by the teachers directing the lab. Come to lab on time to know the precautions.

**Wear proper safety gear and clothing. The following are required.**

1. **Safety eyewear must be worn during experiments!**
2. **You must wear your lab coat in the lab!**
2. **Cell phones must be turned off** or left at home. NO EXCEPTIONS
3. **Open-toed shoes are not allowed.** Shoes must cover toes, heels and ankles.(maybe keep a pair of lab shoes around)
4. **Gloves should be worn** when appropriate and recommended by the instructor.
5. **Long hair must be tied back** so it will not accidentally fall into an experiment.
6. **No foods or drinks** are allowed in the lab.
7. You must wash your hands after dealing with chemicals or dirty glassware, and when you are done with the lab.

## PRE-LABS, LAB NOTEBOOKS AND LAB REPORT GUIDE

Your lab notebook will be for recording data during experiments. Lab reports will be generated in a neat format using the data in your notebooks. Lab reports will be **typed** (including graphs and tables) by each group. Each group will generate their own group report to submit for grading. **If you did not attend lab you cannot turn in a report.**

### PRE-LABS

**Before you arrive** to Lab, your notebook must have the following **PRELAB information** written down inside. **A copy** of these pages from your notebook needs to be turned in at the beginning of the lab period. **To get full credit for the prelab, you must have all of these 7 items.**

1. Experiment name and statement of purpose.
2. Write out all the chemical reactions that are expected in the experiment.
3. List all chemicals (including solvents) to be used.
4. List formula weights for each substance and other useful information such as the density, (is it) hygroscopic?, water sensitive?, light sensitive?, a carcinogen?, other properties or dangers?, etc. Find this information in the reference libraries, or on-line (internet).
5. List of things to do right at first, such as preparations that take a long time (from one hour to overnight, like boiling water), cleaning of a buret or other glassware, dissolving hard to dissolve solids, or drying chemicals in the oven.
6. **Your own**, neatly hand-written, clear, **step by step experimental procedure**. This will be your quick guide to the lab. Have a good plan to follow. **Use the provided lab procedure as a guide. Be smart. Think about what steps should be done first in order to be more efficient and time-saving.**

**Taking Data:** Write things down as they happen, if possible. It is best to write everything directly into your notebook. Transcribe any scratch paper scribbles into your notebook immediately. Your partner will be a big help if you need to keep an eye on a reading while they write down the numbers. Charts and table formats save a lot of space. **You may use pens (No pencils for data recording!)**. Avoid excessive smudges.  
After each experiment, **you need to show your data to TA to sign before you leave.** Otherwise, you might receive up to 50% penalty deduction from your final grade of that experiment.

**GRADING:** To accommodate any personal emergencies, you may drop one lab report grade. Your lab report grades and class grade will depend on:

1. The completeness of your lab reports. (see below)  
(Late lab reports get 10% off grade per day. Late means 5 days or less.)
2. The quality of your lab reports
3. The quality of your lab work and behavior while you were in lab.

4. The accuracy of the results of the experiment.
5. Your attendance and being on time for lab.
6. Pre-Labs.
7. A written **final exam** at the end of the semester.
7. **No make-up will be considered.** Please make effort to attend all labs. If you did not attend a particular lab, you will NOT get any grade for that lab.

<b>Prelab + participation + performance:</b>	<b>20%</b>
<b>Lab Reports:</b>	<b>60%</b>
<b>Final Exam:</b>	<b>20%</b>

### **Grades:**

A: 89% - 100%, B: 79% - 89%, C: 70%-79%, D: 60%-69%, F: <60%

### **LABORATORY REPORT REQUIREMENTS:**

Reports on the labs performed will be due one week after they are performed. Late reports will not receive full credit. **Reports more than 5 days late (from due date) will not be accepted.**

Excellent lab reports should contain and will be graded on the following parts:

1. The title of the report, descriptive of the experiment.
2. Your name and your lab partners' name clearly defined and the date performed, and clear statement of each person's contribution in the report.
3. A clearly referenced procedure statement (i.e. which procedure did you follow?) with a copy of the procedure attached, and clearly state any changes made vs original.
4. A short but complete statement(s) stating the objective of the experiment.
5. A drawing and description of the basic theory of operation of the instrument used.
6. A section on the chemicals used, their structure and intrinsic qualities.
- 7a. Data, numerical analysis, graphs, tables, etc. Show all calculations (or example of one if there are many) and **clearly identify important answers.** Always use units in your calculations. **Be sure to indicate any uncertainties (error analysis).**
- 7b. **Discussion of the results:** Describe experimental conditions, etc. not included in the data section above: what actually happened? Explain, like in a story, clearly what you did, your excuses, and your conclusions, etc. **What was the answer, the amount, the error? A summary statement about all the data found and the **determined results must be clearly stated.****
8. A conclusion statement *restating the result* and summarizing any conclusion about the experiment and its utility for doing the chosen analysis.

### **ATTENDANCE POLICY:**

You must be present during each lab experiment to be eligible for a grade on that experiment. **You group are expected to submit collaborative lab reports. If someone did not contribute the report, his/her name should not appear in the Lab Reports**

**(Please also report this to your TA)! And he/she will not get grades for that lab! The contribution to each lab reports should be also clearly stated!** Any missed labs will result in a grade of zero on that lab (but if you did pre-labs, you can get credits for pre-lab work.). **Make-up labs will not be given.** To accommodate any personal emergencies, you may drop one lab report. **Attendance at the lecture portion of the lab is also mandatory. If you are absent from the lecture portion, you are not allowed to attend the lab section!** The lecture will start at 1:30 PM on Monday of each week.

#### **Academic honesty:**

Materials (written or otherwise) submitted to fulfill academic requirements must represent a student's own efforts. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Violations will be taken seriously and will be referred to the Dean of Students Office for possible disciplinary action. Students may be suspended or expelled from UTEP for such actions.

#### **Students with Disabilities**

If you have or believe you have a disability, you may wish to self-identify. You can do so by providing documentation to the Office of disabled Student Services located in Union E Room 203. Students who have been designated as disabled must reactivate their standing with the Office of Disabled Student Services on a yearly basis. Failure to report to this office will place a student on the inactive list and nullify benefits received. If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or the director of Disabled Student Services. You may call 747-5148 for general information about the Americans with Disabilities Act (ADA).

All grades of Incomplete must be accompanied by an Incomplete Contract that has been signed by the instructor of record, student, departmental chair, and the dean. Although UTEP will allow a maximum of one year to complete this contract, the College of Science requests it be limited to one month based upon completion data. A grade of Incomplete is only used in extraordinary circumstances confined to a limited event such as a missed exam, project, or lab. If the student has missed a significant amount of work (e.g. multiple assignments or tasks), a grade of Incomplete is not appropriate or warranted.

*Syllabus is subject to change. Any change will be announced in class, or posted on the Blackboard site during the semester. You are solely responsible for getting the most updated information.*

**LABORATORY EXPERIMENTS (SUBJECT TO CHANGE):**

1. Laboratory Safety
2. Excel in statistics for analytical chemistry
3. Penny Statistics (Unit 4)
4. Preparing Standard Acid and Base (Unit 6)
5. Analysis of a Mixture of Carbonate and Bicarbonate (Unit 8)
6. Using a pH Electrode for an Acid-Base Titration (Unit 7)
7. Gravimetric Determination of Calcium as  $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$  (Unit 2)
8. EDTA Titration of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  in Natural Waters (Unit 12)
9. Spectrophotometric Determination of Iron in Vitamin Tablets (Unit 20)
10. Microscale Spectrophotometric Measurement of Iron in Foods by Standard Addition (Unit 21)
11. Basics of electrochemical analysis: Cyclic Voltammetry (extra materials)
12. Review and Preparation for final exam
13. Final exam