Chemistry 4212 Instrumental Analysis Laboratory Spring 2021

COURSE SCHEDULE:

Section 1: Lecture Monday 12:30-1:20 pm (online); Lab Monday 2:30-4:20 pm (Online, or CCSB G.0714)

~~Section 2: Lecture Monday 1:30-2:20 pm (CRBL C204); Lab Tuesday 1:30-4:20 pm (CCSB G.0714)~~

INSTRUCTOR:

Dr. XiuJun (James) Li

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TEACHING ASSISTANT:

Hamed Tavakoli

- Office Location: CCSB 2.0512; email: htavakoli@miners.utep.edu.
- Office hour: 3:00-4:00 pm, Friday

COURSE OBJECTIVES:

- ✓ To practice and improve your skills and knowledge in Instrumental analytical chemistry.
- ✓ To apply the knowledge and gain hands-on experience in subjects covered in the lecture.

COURSE DESCRIPTION:

These experiments are intended to illustrate the major analytical techniques described in the lecture. It should be taken with CHEM 4211 or right after CHEM4211.

A lecture will be given each week to outline the content of the lab, ending with a quiz at the end testing the basic knowledge of the lab content, and hands-on activity will follow. It is important that you invest in good preparation BEFORE coming to lab by reading the lab manuals, doing the pre-lab exercises, and writing your own outlined procedure for each lab.

COURSE EVALUATION:

You will be graded on your overall grasp of the skills, concepts, and participation in the laboratory experiments and written exercises.

1. Quizzes: The quizzes are designed to test your basic understanding of the materials for the specific week. The quiz session only lasts 10~15 minutes at the end of each lecture. No make-ups will be given.
2. Preparation/Participation: You must be present during each lab experiment to be eligible for a grade in this category. DON'T 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 TA will randomly ask you questions regarding the experiment and observe your lab skills for evaluation purposes. A lab notebook is required for every individual for pre-lab notes and data recording during experiments. The TA will evaluate your notebook as a part of participation grades.
3. Lab Reports: Reports are turned in on group basis. Reports should be typed and are due on **the**

day of next lab by 12:30 pm. A daily 10-point deduction will be applied if you fail to turn in your reports on time. Points for the reports will only be counted if you attend the lab. Any missed lab will result in a grade of zero on that lab. Since there will be no makeup labs, you are allowed to drop one grade of the lab reports to accommodate any personal emergencies.

LABORATORY REPORT REQUIREMENTS:

An excellent lab report should contain and will be graded on the following parts.

a) Your name and your lab partners' name and the date of the experiment. ~~Please clearly indicate the effort of each individual in lab and the report. To avoid any miscommunication or misunderstanding, each member has to put the initial next to their assigned percent effort.~~ (2 pts)

b) The title of the experiment. (2 pts)

c) A short but complete statement stating the abstract/objectives of the experiment. (5 pts)

d) Introduction: A description of the basic theory of the experiment and the operation of the instrument used. (15 pts)

e) Materials and Methods: (8 pts)

- ✓ List **Major** chemicals (including solvents) to be used. List formula weights for each substance and other useful information such as the physical properties, MSDS, etc. Find this information in the reference libraries, or on-line.

- ✓ A clear and **concise** procedure statement. You may also use a flow chart to illustrate the procedure. Clearly state if any changes were made.
- ✓ List any safety precaution that should be noted.

f) Results and Discussion: (53 pts)

- ✓ Data, numerical analysis, graphs, tables, etc. Show appropriate calculations and clearly identify important answers. Always use units in your calculations. Be sure to indicate any uncertainties.
- ✓ Describe experimental conditions, observations, and interesting finding. You may find references to support your hypothesis and statements.

g) Conclusion: A conclusion statement summarizing the result and any conclusion. A summary statement about the data found and the determined results must be clearly stated. (10 pts)

h) References (5 pts)

Evaluations:

a) Quizzes: 25 %

b) Participation/Attendance: 5 %

c) Lab Report: 50 %

d) Final Exam: 20 %

A: 89% -100%, B: 79% -89%, C: 69%-79%, D: 59%-69%, F: <59%

TENTATIVE SCHEDULE

Week #	Contents	Note
1.	**Introduction; Safety Training; Check-in**	2/3 Spring Census Day 3/15-19 Spring Break, no class. 4/1 Spring Drop /Withdrawal Deadline. 5/6 Last day of classes 5/7: Dead Day **(The contents & schedules are subject to change due to instrument availability. Any change will be notified ahead of time)**
2.	**Spec 20**	
3.	**UV-VIS**	
4.	**IR Spectroscopy**	
5.	**NMR Spectroscopy**	
6.	**Flame Atomic Absorption Spectroscopy**	
7.	Spring Break -(No Classes)	
8.	**ICP**	
9.	**GC**	
10.	**HPLC**	
11.	**Mass Spectrometry**	
12.	**Fluorescence spectroscopy**	
13.	**Exam Preparation**	
14.	**Exam**	

NOTE: Because of limitations on the number of instruments, it is unavoidable that you will work with instruments in lab before they are discussed in lecture.

LABORATORY SAFETY

The normal rules for lab safety apply. Protective eyewear must be worn at all time, as must closed shoes, socks and full leg coverage. Lab coats are required.

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. Please practice safety.

- ✓ Safety eyewear must be worn during experiments.
- ✓ Open toed shoes are not allowed.
- ✓ Gloves should be worn when appropriate and recommended by the instructor.
- ✓ Long hair must be tied back so it will not accidentally fall into an experiment.
- ✓ No foods or drinks are allowed in the lab.
- ✓ You must wash your hands after dealing with chemicals or dirty glassware, and when you are done with the lab.
- ✓ Cell phones must be turned off or left at home. NO EXCEPTIONS

COURSE POLICIES:

- Goggles are required in the lab. No open toe shoes are allowed.
- The labs are long and you will need to use your time wisely.
- Every group will have an assigned drawer of lab wares. You are 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 you (i.e. you must pay for it). A

drawer check-in sheet will be provided.

- ABSENCE POLICY: The lab work in this class is intended to be performed during the scheduled lab hours. An absence is an automatic zero for any lab work that is missed.
- ACADEMIC HONESTY: Materials (reports, quizzes, exam 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.
- Others:
  - ✓ 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 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.
  - ✓ 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 the whole community. Unpredictable and dangerous (explosive) chemical reactions can occur. Follow the directions given to you on the boards or hoods for properly disposing chemical waste. Make sure to write down the name and the quantity of the waste put into the waste bottle.

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