

CHEM 4211 INSTRUMENTAL METHODS IN ANALYTICAL CHEMISTRY
SPRING 2021

CRN 28156, 10:30 am - 11:50 am TR

Online: Part synchronous and part asynchronous

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Office hours: by appointment (through zoom)

COURSE PURPOSE

This course is designed to introduce the instrumental methods to solve problems in chemistry. Students will gain knowledge in an array of tools for obtaining qualitative and quantitative information about the chemical composition and structure of matter. Comprehension of the principles of instrumentation will be emphasized so that the students can incorporate them in chemical analysis and therefore will apply them to various fields in chemistry.

TEXTBOOK AND OTHER STUDY MATERIAL

Quantitative Chemical Analysis, by Daniel Harris, 10th Edition, ISBN-13: 978-1319164300
Sapling software for assignments

COURSE CONTENT OUTLINE

- Introduction
- Spectrometry
 - Atomic Absorption Spectrometry
 - Atomic Emission Spectrometry
 - Atomic Mass Spectrometry
 - Ultraviolet Visible Molecular Absorption Spectrometry
 - Infrared Spectrometry
 - Molecular Mass Spectrometry
- Separation Methods
 - Gas Chromatography
 - Liquid Chromatography
 - Capillary Electrophoresis
- Electroanalytical Chemistry
 - Potentiometry and Electroanalytical techniques

EXAMS

- One Midterm examinations and a final exam (***only parts after the first exam***) are scheduled.
- Personal notes are allowed in all exams.

Evaluations:

- Class Presentations : 40%
- Sapling Quizzes : 30%
- Exams : 30%

Grade Breakdown: (Total grade % will be rounded to the whole number.)

100% - 90% - 79% - 68% - 55% - 0%
A B C D F

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 **Center for Accommodations and Support Services (CASS)** located in Union E Room 106. You may call 747-5148 for information about the services.

Course Withdrawal Policy

Classes dropped prior to the official census date **(2/3)** will be deleted from the student's semester record. After this date, the University permits any student to drop with an automatic "W" by the course dropping deadline **(4/1)**. After this date students who withdraw must receive grades of "F".

Others:

- **Make-up exams will not be given** unless arrangement is made with the instructor. Please carefully consider the repercussions of making other commitments that coincide with exam days. Official documents are required for any exam rearrangement.
- Cell phones must be turned off or silenced during the class.
- The syllabus is subject to change. Any changes to this syllabus and the course will be announced in class and posted online. ***You are solely responsible for getting the most updated information regarding to the class.***

Tentative Course Schedule

Week		Contents		Note
1.	1/19; 1/21	Introduction		
2.	1/26; 1/29	Spectrophotometry (Ch 18-22)	Ch-18 Fundamental of spectrophotometry	Additional reading Ch-19 and 21
3.	2/2; 2/4		Ch-20 Spectrophotometer	2/3 Census Day
4.	2/9; 2/11		Ch-22 Mass Spectrometry	
5.	2/16; 2/18		Student Presentations-Ch 19 (3) and 21 (3)	
6.	2/23; 2/25		Present the chapter and then a literature or an application that use the technique	
7.	3/2; 3/4		Separation Methods (Ch 23 - 25)	Introduction to Analytical Separation Ch-23
8.	3/9; 3/11	Gas Chromatography		
9.	3/15-219, Spring Break - (No Classes)			
10.	3/23; 3/25	Separation Methods (Ch 23 - 25)	GC	
11.	3/30; 4/1		HPLC	4/1 Spring Drop/Withdrawal Deadline
12.	4/5; 4/8		HPLC	Exam 1 (3/4) Ch 18-22 (±19,21)
13.	4/13; 4/15		Student Presentations-Literature-based on GC and HPLC	
14.	4/20; 4/22	Electrochemistry (Ch 14-17)	Ch-15 Electrodes and potentiometry	Chapter 14 additional reading
15.	4/26; 4/29			
16.	5/3; 5/6		Student presentation Ch-17	
17.	Final Exam: 5/13 (Thursday) 10:00 am – 1:00 pm			

Projected Presentation Schedule

Table 2: Student Presentations for Ch19 and Ch-23				
S. N.	Ch	Topic	Student	Day
1	19	Analysis of a Mixture; Measuring and Equilibrium Constant	Lauren I Powell	2/16
2	19	Spectrophotometric Reactions; Flow Injection Analysis and Sequential Injection	Md. Saifur Rahman	2/16
3	19	Luminescence in Analytical Chemistry; Sensors Based on Luminescence Quenching; Immunoassays	Kevin E Chacon	2/18
4	21	Overview; Atomization; How Temperature Affects Atomic Spectroscopy	Luis C Nunez	2/23
5	21	Instrumentation, Interference, ICP-MS	Sharif Uddin Ahmed	2/23
6	21	Atomic Spectroscopy of Solid Samples; X-ray Fluorescence; Choosing the Right Atomic Spectrometer	Elizabeth D Montoya	2/25

Table 3: Student Presentations for Ch-24 and Ch-25				
S. N.	Ch 24-25	Literature	Student	Day
1	GC		Kevin E Chacon	4/13
2	GC		Elizabeth D Montoya	4/13
3	GC		Lauren I Powell	4/13
4	HPLC		Sharif Uddin Ahmed	4/15
5	HPLC		Luis C Nunez	4/15
6	HPLC		Md. Saifur Rahman	4/15

Table 3: Student Presentations for Ch-17				
S. N.	Topic	Student	Day	
1	Fundamental of Electrolysis	Elizabeth D Montoya	5/3	
2	Electrogravimetric Analysis	Sharif Uddin Ahmed	5/3	
3	Coulometry	Lauren I Powell	5/3	
4	Amperometry	Luis C Nunez	5/6	
5	Voltammetry	Md. Saifur Rahman	5/6	
6	Karl-Fischer Titration of H ₂ O	Kevin E Chacon	5/6	