

CHEM 1250
Instrumental Analysis
Fall Term, 2025-2026

Instructor: Dr. Alexander Star
Professor of Chemistry and Bioengineering
Office: Room 112, Eberly Hall
E-mail: astar@pitt.edu (subject: CHEM 1250)

Lectures: Tue, Thu – 6:00 - 7:10 pm – 135 Chevron Science Center
Recitations: Thu – 7:15 - 8:10 pm – 228 Eberly Hall
Office Hours: by appointment (send e-mail)

Required Text: Principles of Instrumental Analysis, 6th or 7th Edition
By Skoog, Holler and Crouch
(See reading assignments in course schedule, below)

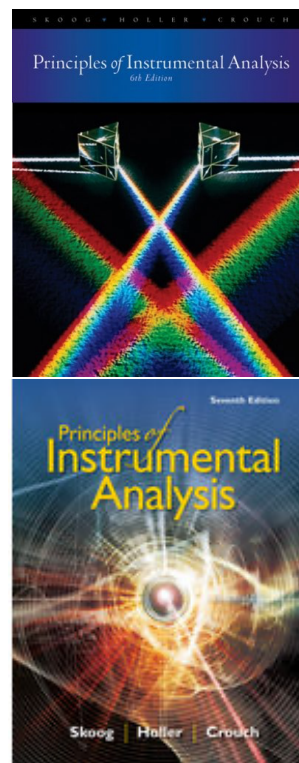
Course Objectives:

What makes this water smell bad? “How much gold is this rock? What is this white powder? Is my glucose level normal today? All these questions are answered by chemical analyses.

Most analyses today are carried out with specially designed electronic instruments controlled by computers. These instruments make use of the interaction of electromagnetic radiation and matter, or of some other physical property of matter, to characterize the sample analyzed. To understand how the instrumentation operates and what information it can provide requires basic knowledge of chemistry, physics, mathematics, and engineering. The fundamentals of common analytical instruments and how measurements are performed with these instruments are the subjects of the course lectures on specific instrumental techniques. The main objective of the course is to understand the fundamentals of common analytical instrumental techniques, their capabilities, and their shortcomings.

The instrumental analysis lab (CHEM 1255) is totally separate from this course (CHEM 1250). Your grades in the lab do not affect your grade in this course. All questions concerning the lab schedule, policies, etc., should be directed to the lab coordinator or the teaching assistants.

Recitation will be dedicated mostly to practice problem solving. The recitations are informal and will mainly be an opportunity for students to ask questions, pre-exam review, etc.



Class Schedule – Fall 2025

Date	Topic	Reading Assignment	
Week 1	Tue, Aug 26 Thu, Aug 28	--Introduction-- Introduction to Spectroscopy	Chap 1 Chap 6
Week 2	Tue, Sep 2 Thu, Sep 4	Introduction to Spectroscopy	Chap 7
Week 3	Tue, Sep 9 Thu, Sep 11		
Week 4	Tue, Sep 16 Thu, Sep 18	Introduction to Spectroscopy UV-Vis Molecular Spectroscopy	Chap 13 Chap 14
Week 5	Tue, Sep 23 Thu, Sep 25	Fluorescence Molecular Spectroscopy	Chap 15
Week 6	Tue, Sep 30 Thu, Oct 2	Midterm Exam 1 Intro to Optical Atomic Spectroscopy	Chap 8
Week 7	Tue, Oct 7 Thu, Oct 9	Atomic Absorption Spectroscopy Atomic Emission Spectroscopy	Chap 9 Chap 10
Week 8	Tue, Oct 14 Thu, Oct 16	Atomic X-ray Spectroscopy	Chap 12
Week 9	Tue, Oct 21 Thu, Oct 23	Infrared Spectroscopy	Chap 16,17
Week 10	Tue, Oct 28 Thu, Oct 30	Raman Spectroscopy NMR	Chap 18 Chap 19
Week 11	Tue, Nov 4 Thu, Nov 6	Midterm Exam 2	
Week 12	Tue, Nov 11 Thu, Nov 13	Mass Spectrometry	Chap 11,20
Week 13	Tue, Nov 18 Thu, Nov 20	Surface Analysis	Chap 21
Week 14	Tue, Nov 25 Thu, Nov 27	Thanksgiving Recess – no class Thanksgiving Recess – no class	
Week 15	Tue, Dec 2 Thu, Dec 4	Introduction to Electrochemistry	Chap 22 Paper due
Week 16	Tue, Dec 9 Thu, Dec 11	Electroanalytical Methods Final exam	Chap 23,25

Grading Policies:

Two midterm exams:	200 points (2*100 points)
Two assignments:	100 points (2*50 points)
Quizzes	50 points
Homework	50 points
Participation	50 points
The final exam:	100 points
Total points:	550 points

Final letter grades will be assigned on the basis of the following scale:

A	> 500 points	B	440 – 459	C	380 – 399
A–	480 – 499	B–	420 – 439	C–	360 – 379
B+	460 – 479	C+	400 – 419	D	300 – 359

Exams will be held during class time on the dates shown in the course schedule, above. No make-up exams will be given unless arranged *in advance* for appropriate reasons.

Assignments: details to be provided in class.

Assignment will involve reading current research articles related to new developments or applications of the instrumentation discussed in this course. The articles will be announced in class. For assignment, you will write a 3-4 page critique of a scientific paper from the recent literature – this critique will be worth 50 points. Details will be discussed nearer to the time.

Papers must be turned in on or before the assigned date – no exceptions will be made to this policy.

COVID-19 specific points:

During this pandemic, it is extremely important that you abide by the [public health regulations](#), the University of Pittsburgh's [health standards and guidelines](#), and [Pitt's Health Rules](#). These rules have been developed to protect the health and safety of all of us. Universal [face covering](#) is required in all classrooms and in every building on campus, without exceptions, regardless of vaccination status. This means you must wear a face covering that properly covers your nose and mouth when you are in the classroom. If you do not comply, you will be asked to leave class. It is your responsibility have the required face covering when entering a university building or classroom. For the most up-to-date information and guidance, please visit coronavirus.pitt.edu and check your Pitt email for updates before each class.

If you are required to isolate or quarantine, become sick, or are unable to come to class, contact me as soon as possible to discuss arrangements.

Academic Integrity

Students in this course will be expected to comply with the [University of Pittsburgh's Policy on Academic Integrity](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. For hands-on practice, complete the [Understanding and Avoiding Plagiarism tutorial](#).

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and [Disability Resources and Services](#) (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Equity, Diversity, and Inclusion

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, visit the [Civil Rights & Title IX Compliance web page](#).

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing titleixcoordinator@pitt.edu. Reports can also be [filed online](#). You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).