

COURSE INFORMATION

Class Days / Times: MW 2:00-2:50 pm	Instructor: Dr. Hu
Class Location: GMCS-305	Preferred pronouns: she/her
Mode: face-to-face, including lectures, discussions	Email: please use the Canvas email function to contact Dr. Hu
Platform: Canvas	Office location: CSL408
	Office hours: Appointment Required (Tuesday 12-1 pm)

COURSE OBJECTIVES

This course aims to provide students with a solid understanding of modern chemical instrumentation. It begins with a detailed examination of fundamental instrument components, followed by an exploration of concepts and strategies for integrating these components. By the end of the course, students will gain a deeper appreciation of the strengths and limitations of various analytical techniques, enabling them to make informed decisions when selecting methods for laboratory analysis.

STUDENT LEARNING OUTCOMES

1. Problem Identification and Application

Students will identify situations requiring chemical analyses and understand how instrumental techniques address complex problems.

2. Understanding Instrumentation

Students will gain knowledge of major methods like chromatography, spectroscopy, and mass spectrometry, including their components and outputs.

3. Evaluating Analytical Methods

Students will assess the strengths and limitations of various techniques, determining their suitability for different samples and problems.

4. Data Analysis and Reporting

Students will interpret data from instruments, report findings effectively, and justify method selection for complex analyses.

COURSE MATERIALS

The exam will cover the lecture topics and literature analyses, provided through Canvas. Below are some recommended texts, but these are not required.

1. Principles of Instrumental Analysis, Skoog, Holler and Crouch, 7th ed., Cengage Learning, 2018 (ISBN-13: 978-1305577213).

2. Instrumental Analysis: Granger, Yochum, Granger, Sienerth, 1st ed., Oxford, 2017 (ISBN: 9780190865337)

Textbooks are not required for this course if students attend all lectures and take thorough notes. However, students are encouraged to refer to the corresponding textbook chapters for additional clarification when needed.

CLASS FORMAT

This course will include a combination of short lectures, group discussions, and collaborative group work to enhance learning and engagement.

- **Materials:** There is no required textbook for this course. All digital materials will be provided via Canvas. PPT slides featuring key figures and equations will be available for download on Canvas. These files may include only selected figures and equations from the class and will not represent the complete lecture notes or all content covered during the lecture.
- **Homework Assignments:** Periodic homework assignments will also be required and graded based on accuracy. These assignments will allow you to confirm your understanding of specific topics.

EXAMINATIONS

The course will include three midterm exams (15% each) and a final exam (15%). Each exam will focus on the material covered since the previous exam.

- **Exam Format:** Exams will include a mix of true/false, multiple-choice, short-answer questions, short calculations, and problems similar to homework assignments.
- **Content Coverage:** You are responsible for all topics presented in lecture, including material from PowerPoint slides and content written on the whiteboard. Attendance is crucial, as some topics discussed in class may not appear in the slides.
- **Open-Book Exams:** All exams will be open-book. Students will need to scan and submit their answer sheets via Canvas. Instructions for using the "Clear Scanner" app for scanning will be provided through Canvas.
- **Final Exam Schedule:** Please note that the final exam may be scheduled by the university at an unusual time or on an unusual day. ***There is zero tolerance for academic dishonesty.*** Incidents of plagiarism and/or cheating will be reported, and a zero-grade assigned for all persons involved.

GRADING

Class Participation	10%
Assignments	30%
Exam (1-4)	60%

Grading scale (*may be modified*): A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%

ESSENTIAL STUDENT INFORMATION

For essential information about student academic success, please see the SDSU Student Academic Success Handbook.

- If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact SDSU Student Ability Success Center at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you

should contact SDSU Student Ability Success Center as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from SDSU Student Ability Success Center. Your cooperation is appreciated.

- Class rosters are provided to the instructor with the student's legal name. Please let me know if you would prefer an alternate name and/or gender pronoun.
- **Resources for students:** A complete list of all academic support services-- including the [Writing Center](#) and [Math Learning Center](#) is available on the [Student Academic Success](#) website. [Counseling and Psychological Services](#) (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at <https://sacd.sdsu.edu/cps/get-started> between 4-10 pm or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.
- SDSU Economic Crisis Response Team: If you are experiencing food or housing insecurity, or any unforeseen financial crisis, visit [The SDSU Basic Needs Center](#).

DISHONESTY

There is zero tolerance for academic dishonesty. Incidents of plagiarism and/or cheating will be reported, and a zero-grade assigned for all persons involved. The University adheres to a strict policy prohibiting cheating and plagiarism. Plagiarism can take many forms, including but not limited to:

- Using text from a source verbatim or paraphrasing it without proper citation (this includes phrases, sentences, paragraphs, and entire sections of work).
- Copying and pasting material from an online or offline source and presenting it as your own.
- Using information found online or offline without giving proper credit to the original author.
- Replacing words or phrases from a source with your own without proper attribution.
- Submitting the same work for different classes without permission.

If you have any questions about what constitutes plagiarism, please consult the policy (<https://sacd.sdsu.edu/student-rights/academic-dishonesty/cheating-and-plagiarism>).

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation, suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner.

CLASSROOM CONDUCT STANDARDS

SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Prohibited conduct includes:

- Willful, material, and substantial disruption or obstruction of a university-related activity, or any on-campus activity.

- Participating in an activity that substantially and materially disrupts the normal operations of the University or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
 1. physical abuse, threats, intimidation, or harassment.
 2. sexual misconduct.

Violation of these standards will result in referral to appropriate campus authorities.

RELIGIOUS OBSERVANCES

According to the University Policy File, students should notify the instructors of affected courses of planned absences for religious observances by the end of the second week of classes.

STUDENT PRIVACY AND INTELLECTUAL PROPERTY

The Family Educational Rights and Privacy Act (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. I will use [Canvas / Blackboard] to communicate with you, and I will not post grades or leave graded assignments in public places. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are formally notified otherwise.

DIVERSITY, INCLUSION AND TEACHING PHILOSOPHY

I am dedicated to cultivating an inclusive learning environment where every student feels respected, supported, and empowered to achieve success. We all bring diverse perspectives and experiences that deepen our collective understanding of science. My goal is to create a classroom where everyone feels welcome and encouraged to engage fully in the learning process.

LAND ACKNOWLEDGMENT

For millennia, the Kumeyaay people have been a part of this land. This land has nourished, healed, protected and embraced them for many generations in a relationship of balance and harmony. As members of the San Diego State University community, we acknowledge this legacy. We promote this balance and harmony. We find inspiration from this land, the land of the Kumeyaay.

Tentative List of Topics Covered:

I. Measurement Basics

Electrical Circuits, Resistors, Capacitors
Operational Amplifiers in Chemical Instrumentation
Digital Electronics and Computer Interfacing
Digital-to-Analog and Analog-to-Digital Converters
Signals and Noise

II. Spectroscopic Instruments

Spectroscopy and Instrumentation
*** Exam 1 (Monday, February 16th)**
Fluorescence and Associated Instruments
Infrared Spectrometry and Components of FTIR Instruments
Raman Spectroscopy

III. More Spectroscopic Instrumentation

Nuclear Magnetic Resonance (NMR)
Circuitry for Control and Detection in FT-NMR
*** Exam 2 (Wednesday, Mar 25th)**
Molecular Mass Spectrometry (MS)
Components and Instrumentation in MS
Chromatography
Capillary Electrophoresis
Electrochemistry
*** Exam 3 (Monday, Apr 29th)**

IV. Specialized Techniques (time permitting)

3D Printing in Analytical Chemistry
Automated Methods and Microfluidics
Organ-on-a-Chip Technology
*** Final Exam**

** Dates for Exams are subject to change*