

**CHEM 457 Instrumental Methods of Chemical Analysis  
Fall 2020 (9 AM #20876, 12:00 #20877 and 4 PM #25870)**

**Course Information**

Class Days: Tue and Thu

Class Times: 9:00-11:40 AM, 12:00-2:40 PM or 4:00-6:40 PM

Class Location: CSL 222 or ONLINE as indicated in the schedule table

Zoom Meeting Room (applied to all sections): Meeting ID 975 8131 3168

Link <https://SDSU.zoom.us/j/97581313168>

Mode of Delivery: Hybrid

Instructors:

Dr. Erica Forsberg, CSL 401, (619) 594-5806, [eforsberg@sdsu.edu](mailto:eforsberg@sdsu.edu), <https://forsberglab.sdsu.edu>  
Dr. Young Kwang Lee, EIS 17, (619) 594-3167, [youngkwang.lee@sdsu.edu](mailto:youngkwang.lee@sdsu.edu), <https://leelab.sdsu.edu>  
Dr. Greg Elliott, CSL 229A, (619) 594-5264, [gelliott@sdsu.edu](mailto:gelliott@sdsu.edu)  
Dr. David Onofrei, NMR Lab, [chem-nmr@sdsu.edu](mailto:chem-nmr@sdsu.edu)

**Prerequisites:**

Chemistry 251, 432, 432L and credit or concurrent registration in Chemistry 410B; concurrent registration in Chemistry 550.

**Student Learning Objectives:**

In this laboratory course, students will study instrumental methods of chemical separations and analysis frequently used in all disciplines of chemistry. The student successfully completing the course will be able to:

1. Design and carry out chemical experiments for analyte identification and quantification with instruments commonly used in chemistry labs,
2. Learn sample preparation, calibration curve development, standard dilutions, operation of instrumentation, troubleshooting instrumentation,
3. Measure and analyze data from some of the most commonly used analytical instruments,
4. Use instrument software and Excel spreadsheets for graphing, data analysis, and interpretation,
5. Use electronics and operational amplifiers to collect data and control laboratory devices,
6. Understand the advantages and features of different analytical methods including electrochemistry, fluorescence microscopy, gas chromatography, liquid chromatography, mass spectrometry, nuclear magnetic resonance, and optical spectroscopic methods,
7. Use a combination of instrumental methods to determine chemical structures of organic compounds, and
8. Prepare presentations describing experimental results obtained in the lab.

**Textbooks (same as those for Chem 550):**

Required: Principles of Instrumental Analysis, Skoog, Holler and Crouch, 6th Ed., Thomson, 2007  
Optional: Instrumental Methods of Analysis, Willard, Merritt, Dean and Settle, 7th Ed., Wadsworth, 1988

Copies of these textbooks are available at the Love Library Reading Room (can check out for 2 hours each time).

**Lab Manuals:** Available in Canvas

**Course Design:** The course is consisting of three major components: 1) optical microscopy, 2) chromatography, and 3) molecular spectroscopy. Each module contains lectures and laboratory works, spanning multiple days. Students are expected to complete quizzes, homework, and laboratory reports of each component. Different groups have different lab schedules and due dates. Carefully review the class schedule table. The group assignment will be announced via Canvas.

**Grading Policies:**

No exams are given in this laboratory course. Your letter grade for the course will be based on all the grades from your lab reports and quizzes. In the table below you will find the point values for each course component.

**Table 1.** Grade scheme for CHEM 457 components with allotted marks in brackets

Component	Assignment & Homework	Lab reports	Quiz	Subtotal
Optical Microscopy	Excel (10), Image j (20), Solver (20)	BF (110), DF (110), FM1 (110), FM2 (110)	(100)	590
Chromatography		HPLC1 (50), HPLC2A (65), HPLC2B (65), GC1 (50), GC2A (65), GC2B (65)	HPLC (50), GC (50)	480
Molecular Spectroscopy	MS (50), NMR1 (50), NMR2 (50)	Oral Presentation (200)	IR (10), MS (50)	410
Participation				20
			<b>Total</b>	<b>1500</b>

All deadlines are firm, and extensions will not be provided on an individual basis. In any late submission, a 10% per day late penalty will be applied with the max penalty of 50%. Assignments will receive a grade of zero after five days late. Technology failures (e.g. webpages not loading, dog ate my computer, internet being down...) are likely to occur, do not leave the submission of homework or labs to the last minute. No extensions will be provided for such occurrences.

The final letter grade will be determined based upon the total number of points you have earned throughout the course. A tentative grade distribution (in percentages) is tabulated below. Note particularly high or low class averages may shift the grade distribution.

<b>Letter</b>	A	A-	B+	B	B-	C+	C	C-	D	F
<b>Cutoff</b>	94	90	87	84	81	77	74	70	60	<60

Note: The grading scale above is only an example. You are NOT guaranteed the corresponding letter grade for achieving a given percentage grade. Your final grade will be influenced by the overall class grade distribution to reflect your rank in comparison with your classmates.

**Course Schedule (tentative):**

\*The schedule may be modified depending on the final enrollment.

\*The course is provided in a hybrid mode. All labs in CSL222 are face-to-face and the rest will be virtual via Zoom. See the zoom link above.

## CHEM 457 Schedule Fall 2020

Professor	Date	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Lee	Tue 25-Aug	Check In					
	Thu 27-Aug	Microscopy Lecture & Excel					
	Tue 1-Sep	Microscopy Lecture & ImageJ					
	Thu 3-Sep	Bright Field Microscopy, BF (CSL222)					
	Tue 8-Sep	Data Analysis Practice Fluorescence 1: Single Particle Diffusion					
	Thu 10-Sep	Fluorescence 1 (CSL222)	Fluorescence 1 (CSL222)	Fluorescence 2	Fluorescence 2	Dark Field 1 (CSL222)	Dark Field 1 (CSL222)
	Tue 15-Sep	Data Analysis Fluorescence 1	Data Analysis Fluorescence 1	Data Analysis Fluorescence 2	Data Analysis Fluorescence 2	Data Analysis Dark Field	Data Analysis Dark Field
	Thu 17-Sep	Fluorescence 2	Fluorescence 2	Dark Field 1 (CSL222)	Dark Field 1 (CSL222)	Fluorescence 1 (CSL222)	Fluorescence 1 (CSL222)
	Tue 22-Sep	Data Analysis Fluorescence 2	Data Analysis Fluorescence 2	Data Analysis Dark Field	Data Analysis Dark Field	Data Analysis Fluorescence 1	Data Analysis Fluorescence 1
	Thu 24-Sep	Dark Field 1 (CSL222)	Dark Field 1 (CSL222)	Fluorescence 1 (CSL222)	Fluorescence 1 (CSL222)	Fluorescence 2	Fluorescence 2
	Tue 29-Sep	Data Analysis Dark Field	Data Analysis Dark Field	Data Analysis Fluorescence 1	Data Analysis Fluorescence 1	Data Analysis Fluorescence 2	Data Analysis Fluorescence 2
	Thu 1-Oct	Buffer class for finishing optical microscopy module (online & CLS222)					
	Tue 6-Oct	IR lecture & practice					
	Thu 8-Oct	IR lecture & practice / experiments and microscopy quiz					
Forsberg	Tue 13-Oct	Chromatography and MNova lecture					
	Thu 15-Oct	GC 1 (virtual)	GC 1 (virtual)	GC 1 (virtual)	HPLC 1 (virtual)	HPLC 1 (virtual)	HPLC 1 (virtual)
	Tue 20-Oct	GC 2A (CSL 222)	GC 2A (CSL 222)	GC 2A (CSL 222)	HPLC 2A (CSL 222)	HPLC 2A (CSL 222)	HPLC 2A (CSL 222)
	Thu 22-Oct	GC 2B (CSL 222)	GC 2B (CSL 222)	GC 2B (CSL 222)	HPLC 2B (CSL 222)	HPLC 2B (CSL 222)	HPLC 2B (CSL 222)
	Tue 27-Oct	HPLC 1 (virtual)	HPLC 1 (virtual)	HPLC 1 (virtual)	GC 1 (virtual)	GC 1 (virtual)	GC 1 (virtual)
	Thu 29-Oct	HPLC 2A (CSL 222)	HPLC 2A (CSL 222)	HPLC 2A (CSL 222)	GC 2A (CSL 222)	GC 2A (CSL 222)	GC 2A (CSL 222)
	Tue 3-Nov	HPLC 2B (CSL 222)	HPLC 2B (CSL 222)	HPLC 2B (CSL 222)	GC 2B (CSL 222)	GC 2B (CSL 222)	GC 2B (CSL 222)
Onofrei	Thu 5-Nov	NMR lecture / practice					
	Tue 10-Nov	NMR lecture / assignment					
Forsberg	Thu 12-Nov	Buffer NMR class / assignment work / structure characterization work					
	Tue 17-Nov	MS lecture / practice					
	Thu 19-Nov	MS lecture / assignment					
	Tue 24-Nov	Buffer MS class / assignment work					
	Tue 1-Dec	Structure Characterization Presentations					
	Thu 3-Dec	Structure Characterization Presentations					

HPLC = high pressure liquid chromatography, GC = gas chromatography, IR = infrared, NMR = nuclear magnetic resonance, MS = mass spectrometry

**Safety Policies and PPE requirements:**

Prior to each lab entry, students must fill out a [COVID-19 Symptom Tracker Form](#). Students must have their temperature taken by TA prior to entering the lab. All students are required to wear a face mask, lab coat, gloves, and safety glasses. Students without appropriate PPE will not have access to the lab. A face mask must cover the mouth and nose at all times. Anyone who doesn't follow this policy will be asked to leave the lab immediately. When entering the lab student's temperatures will be checked and everyone will need to use hand sanitizer before entering the lab and leaving the lab (this should be provided in the lab). There will be a set pathway that all students will adhere (e.g. one entrance and one exit).

**Required PPE:**

Face mask

Lab coat

Safety glasses

Closed-toed closed heeled shoes

Pants

T-shirt

**Statement for Students with Disabilities:**

- 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.

**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.

**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.

**Academic 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.