

Course Syllabus

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CHEM 550 Instrumental Methods of Chemical Analysis

Spring 2021 (Schedule #20801)

Course Information:

Class Days: Mon and Wed

Class Times: 2:00-2:50 PM

Class Location: Online via Zoom, Meeting ID 816 2473 6169, Link

<https://SDSU.zoom.us/j/81624736169> (<https://SDSU.zoom.us/j/81624736169>)

Mode of Delivery: Synchronized Virtual

Office Hours: Tue/Thu 9:30-10:30 via Zoom, Meeting ID 864 4508 0582, Link

<https://SDSU.zoom.us/j/86445080582> (<https://SDSU.zoom.us/j/86445080582>)

Instructor:

Dr. Young Kwang Lee, EIS 17, (619) 594-3167, youngkwang.lee@sdsu.edu,
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(<mailto:youngkwang.lee@sdsu.edu>)

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. define a problem where the determination and/or measurement of some chemical species is required,
2. develop sufficient knowledge about the major instrumentations for chemical analysis including general instrumental components and hardware used in chromatography, spectroscopy, and mass spectrometry,
3. explain the type of information that can be obtained from the measurement with instruments commonly used in chemistry labs, including electrochemistry, gas chromatography, liquid chromatography, mass spectrometry, nuclear magnetic resonance, and optical spectroscopic methods, and
4. understand the advantages and features of different analytical methods to choose appropriate instrumentation for solving various analytical problems.

Textbooks:

The lecture contents will include figures and text from the following textbooks.

Optional: 1. Instrumental Analysis: Granger, Robert M., Yochum, Hank M., Granger, Jill N., Sienerth, Karl D., 1st Ed., Oxford, 2017.; 2. Principles of Instrumental Analysis, Skoog, Holler and Crouch, 7th Ed., Thomson, 2018.

The textbooks are not required for this course if you attend all lectures and and take notes. However, students are encouraged to read the corresponding chapters when they need further understanding.

Lecture Notes:

PPT slides with figures and equations are available for download in Canvas after each lecture. This file may contain only “selected” figures/equations covered in class and it may not contain the complete lecture notes and all the figures covered in the lecture.

Course Design:

Prerequisites. Chemistry 232, 232L, and credit or concurrent registration in Chemistry 410A; credit or concurrent registration in Chemistry 457 for undergraduate students only. Chemistry majors in the teaching credential program (BA in Applied Arts and Sciences) can replace the Chemistry 457 corequisite with credit or concurrent registration in Chemistry 417. Chemical Physics majors can replace the Chemistry 457 corequisite with credit or concurrent registration in Physics 311.

Examinations. There will be two mid-term exams (100 points each) and a non-comprehensive final exam (100 points). Each exam will cover the new material since the previous exam. Exams will contain a mixture of true-false questions, multiple-choice questions, short questions for brief answers, short calculations, and problems similar to those in homework assignments. You are responsible for the topics presented in the PowerPoint slides and written on the whiteboard during the lecture. Lecture attendance is important since there will be material discussed in the lecture that is not in the PPT slides. All exams will be in an open-book format. Students will need to submit their scanned answer sheet via Canvas. Download “Clear Scanner” on your phone for scanning (This will be further instructed via Canvas). Please note that the Final Exam may be scheduled by the university at an unusual time and 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.

Homework. There will be multiple submissions of homework during the semester. The homework will be provided in the lecture.

Grading Policies:

Table 1. Grade scheme for CHEM 550 components. Note that the homework mark may vary depending on the amount of homework and the level of students' understanding.

Component	Midterm I	Midterm II	Final	Homework	Total
Mark	100	100	100	50-200	350-500

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 that particularly high or low class averages may shift the grade distribution.

Letter	A	A-	B+	B	B-	C+	C	C-	D	F
% Cutoff	92	88	85	82	79	76	73	70	65	<59

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):

Date	Topic	Chapter (A: Instrumental Analysis by Grainger; B: Principles of Instrumental Analysis by Skoog)
Wed 20-Jan	Introduction to Instrumental methods	A: 1
Mon 25-Jan	NMR	A: 14; 21 B: 19A-E,G
Wed 27-Jan		
Mon 1-Feb		
Wed 3-Feb		
Mon 8-Feb	Mass Spectrometry	A: 13 B: 11A-C; 20A-E
Wed 10-Feb		
Mon 15-Feb		
Wed 17-Feb		
Mon 22-Feb	Exam I	

Date	Topic	Chapter (A: Instrumental Analysis by Grainger; B: Principles of Instrumental Analysis by Skoog)
Wed 24-Feb Mon 1-Mar Wed 3-Mar	Chromatography (Theory, GC, and LC)	A: 15; 16 B: 26A-F; 27A-E; 28A-E
Mon 8-Mar	Rest and recovery day, No class.	
Wed 10-Mar	Chromatography	
Mon 15-Mar Wed 17-Mar	Electromagnetic Radiation and Optical Components	A: 3 B: 6A-D; 7A-E,I
Mon 22-Mar	Exam II	
Wed 24-Mar	Electromagnetic Radiation and Optical Components	
Mon 29-Mar	Atomic Spectroscopy	A: 7; 9 B: 8A-C; 9A-E; 10A-C
Wed 31-Mar	Holiday, No Class.	
Mon 5-Apr Wed 7-Apr	Atomic Spectroscopy	
Mon 12-Apr Wed 14-Apr	Molecular Spectroscopy (UV-Vis and Fluorescence)	A: 6; 8 B: 13A-D; 14A-G; 15A-C;

Date	Topic	Chapter (A: Instrumental Analysis by Grainger; B: Principles of Instrumental Analysis by Skoog)
Mon 19-Apr	Exam III	
Wed 21-Apr Mon 26-Apr	Molecular Spectroscopy (IR and Raman)	A:11; 12 B:16A-C; 17A; 18A-D
Wed 28-Apr Mon 3-May Wed 5-May	Electrochemistry	A: 18; 19 B: 22A-F; 25 A-G
Mon 10-May	Final	

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 Honesty: 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 \(http://go.sdsu.edu/student_affairs/srr/cheating-plagiarism.aspx\)](http://go.sdsu.edu/student_affairs/srr/cheating-plagiarism.aspx). Examples of academic dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;
- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;
- using information you find from an online or offline source without giving the author credit;
- replacing words or phrases from another source and inserting your own words or phrases.

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.

Resources for students: A complete list of all academic support services--including the [Writing Center \(http://writingcenter.sdsu.edu/\)](http://writingcenter.sdsu.edu/) and [Math Learning Center \(https://mlc.sdsu.edu/\)](https://mlc.sdsu.edu/)--is available on the Student Affairs' [Academic Success \(http://go.sdsu.edu/student_affairs/academic_success.aspx\)](http://go.sdsu.edu/student_affairs/academic_success.aspx) website. [Counseling and Psychological Services \(http://go.sdsu.edu/student_affairs/cps/Default.aspx\)](http://go.sdsu.edu/student_affairs/cps/Default.aspx) (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx (http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx) between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

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.

Medical-related absences: Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. [Student Health Services \(http://shs.sdsu.edu/index.asp\)](http://shs.sdsu.edu/index.asp) (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the [Student Ability Success Center \(http://go.sdsu.edu/student_affairs/sds/\)](http://go.sdsu.edu/student_affairs/sds/).

SDSU Economic Crisis Response Team: If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit [sdsu.edu/ecrt \(http://go.sdsu.edu/student_affairs/ecrt/Default.aspx\)](http://go.sdsu.edu/student_affairs/ecrt/Default.aspx), email [ecrt@sdsu.edu \(mailto:ecrt@sdsu.edu\)](mailto:ecrt@sdsu.edu), or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.

Course Summary:

Date

Details
