



SAN DIEGO STATE
UNIVERSITY

Analytical Spectroscopy CHEM753

Spring 2019
Schedule# 33651

Course Information

- Class Days: Monday & Wednesday
- Class Time: 7:00-8:15 pm
- Class Location: GMCS 306
- Instructor: Dr. Youngkwang Lee
- Email: youngkwang.lee@sdsu.edu
- Office Hours Times: Monday & Wednesday 3:00-4:00 pm
- Office Hours Location: EIS 17 (lower level)

Course Overview

Chemistry 753 is a lecture course of optical spectrochemical analysis. The course is intended for graduate students and well-prepared undergraduates in chemistry, biochemistry, biophysics and biology. The purpose of this course is to provide students with fundamental knowledge of spectroscopic instrumentation and methodologies, and with a survey of practical applications – from traditional atomic and molecular spectroscopy to state of the art single-molecule and superresolution microscopy. The course will be conducted with the following three stages: the first introduces basic concepts of spectroscopic analysis and in-depth knowledge of optical components; the second covers traditional atomic and molecular spectroscopy techniques; the third will review cutting edge spectroscopic and imaging techniques in practical applications. Ultimately, students will be able to apply the class knowledge to come up with the most appropriate spectroscopic methodology to solve their problems.

Student Learning Objectives

- List the major spectroscopic methods used in chemistry and biochemistry
- Describe the scientific principles underlying optical measurements
- Describe the characteristics of signal and noise in spectroscopic measurements
- Describe the interactions between electromagnetic radiation and matters
- Describe the operation of optical components in spectroscopic setups
- Configure appropriate optical components to build spectroscopic systems
- Associate the most appropriate spectroscopic and imaging methodology to solve their problems
- Present and critique ideas and data of the research papers that use spectroscopic techniques

Enrollment Information

- Prerequisites: none
- Adding/Dropping Deadline: Feb 5, 2019

Course Materials

- The course does not require textbooks and lecture will be posted on Blackboard.
- Research articles: SDSU library journal databases

- Optional textbooks:
 - Principles of Instrumental Analysis, 7th edition by Skoog
 - Spectrochemical Analysis, by Ingle
 - Principles of Fluorescence Spectroscopy, 3rd edition by Lakowicz

Course Structure and Conduct

- The course consists of three learning modules that span 15 weeks.
- The course involves frequent lecture-discussion to reflect the learning state of students into the class teaching.
- There will be quizzes and/or assignments that will be posted at least a week ahead.
- Students will be presenting a research paper, and they will critique research ideas and data at the end of semester.
- The course may be video recorded except student presentations.
- Students are expected to attend all lectures.

Course Assessment and Grading

- Multiple choice quizzes (10%)
- Assignments (15%)
- 2 Midterms (40%)
- 1 Final (30%)
- Participation in class discussion (5%)
- Late submission will be penalized--10% each day until submitted. A doctor's note is required for any late submission to be considered for full grading.
- Make-up policy will be negotiated between Dr. Lee and the student on an individual basis.

Course Schedule (tentative)

Week of	Monday	Wednesday
1/21/2019		Introduction to spectrochemical analysis
1/28/2019	Spectrochemical information	Electromagnetic radiation
2/4/2019	Optical components of spectrometers (interference, diffraction, polarization)	Optical components of spectrometers (interference, diffraction, polarization)
2/11/2019	Optical components of spectrometers (modulators, imaging and beam directing optics)	Optical components of spectrometers (filters, prisms, gratings, monochromators, polychromators and spectrographs)
2/18/2019	Optical components of spectrometers (Nondispersive system--Interferometers)	Light sources (conventional radiation sources, lasers)
2/25/2019	Light sources (lasers)	Detectors (thermal detector, photon detector, multichannel detector)
3/4/2019	Detector (photodetector arrays and scientific cameras)	Midterm 1

3/11/2019	Signal and noise	Signal and noise
3/18/2019	Atomic/molecular spectroscopy	Molecular spectroscopy (FT-IR)
3/25/2019	Molecular spectroscopy (Raman)	No class
4/1/2019	Spring Recess	Spring Recess
4/8/2019	UV-Vis luminescence spectroscopy (Fluorescence)	UV-Vis luminescence spectroscopy (FRET, quenching, and anisotropy)
4/15/2019	Midterm 2	Microscopy introduction
4/22/2019	Fluorescence microscopy	Special topics in microscopy
4/29/2019	Special topics in microscopy	Paper discussion
5/6/2019	Paper discussion	Paper discussion
5/13/2019	Final	

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 Student Disability Services at (619) 594-6473.

To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services 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 Student Disability Services. Your cooperation is appreciated.

Academic Honesty

The University adheres to a strict [policy regarding cheating and plagiarism](http://www.sa.sdsu.edu/srr/conduct1.html). These activities will not be tolerated in this class. Become familiar with the policy (<http://www.sa.sdsu.edu/srr/conduct1.html>). Any cheating or plagiarism will result in failing this class and a disciplinary review by Student Affairs.

Examples of Plagiarism include but are not limited to:

- 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
- Submitting a piece of work you did for one class to another class

If you have questions on what is plagiarism, please consult the [policy](http://www.sa.sdsu.edu/srr/conduct1.html) (<http://www.sa.sdsu.edu/srr/conduct1.html>) and this [helpful guide from the Library](http://infodome.sdsu.edu/infolit/exploratorium/Standard_5/plagiarism.pdf): (http://infodome.sdsu.edu/infolit/exploratorium/Standard_5/plagiarism.pdf).

Turnitin

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source

documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. You may submit your papers in such a way that no identifying information about you is included. Another option is that you may request, in writing, that your papers not be submitted to Turnitin.com. However, if you choose this option you will be required to provide documentation to substantiate that the papers are your original work and do not include any plagiarized material.