



**Prerequisites: General Chemistry, Organic Chemistry,
Instrumental Analysis, Forensic Chemistry**

SYLLABUS

COURSE OBJECTIVES

1. Students will study and discuss the theories, principles, and applications of modern analytical optical and atomic spectroscopy.
2. Students will study and discuss the theories, principles, and applications of advanced mass spectrometric methods.
3. Students will study and discuss the theories, principles, and applications of advanced molecular spectroscopy methods.
4. Students will improve their understanding of data evaluation of spectroscopic methods through the application to forensic chemistry.

COURSE OUTCOMES

1. Students will be able to design a protocol, for the identification of an unknown organic or inorganic substance using a spectroscopic method.
2. Students will be able to understand protocols and data from advanced spectroscopic methods of analysis of substances commonly found in forensic evidence.
3. Students will be able to troubleshoot and identify the difficulties encountered in the spectroscopic methods used to analyze common analytes in forensic evidence.
4. Students will become familiar with the most recent developments in the field of spectroscopy reported in the analytical chemistry literature.

REQUIRED MATERIALS FOR THE COURSE

Available in the Campus Bookstore:

Text: Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, and Timothy A. Nieman, Sixth Edition, Saunders College Publishing, 2006.

Scientific hand calculator.

Instructor Information

Lecture: Thurs: 1:00 – 3:00 PM; SCI 136

Instructor's office: Oberkotter 6; Phone: x3495

Office Hours: Tues., Thurs. & Fri. 11 AM – 12 Noon

Email: Tabrette@cedarcrest.edu

GRADING SYSTEM

The grade for this course is based on three take-home exams (75%) and a written research paper (20%). The remaining 5% of the grade constitutes class participation and is determined by the instructor.

The final letter grade will be awarded according to the following scale:

93 – 100%	A	80 – 82.9%	B ⁻
90 – 92.9%	A ⁻	76 – 79.9%	C ⁺
87 – 89.9%	B ⁺	70 – 75.9%	C
83 – 86.9%	B	Below 70%	F

POLICIES

Classroom Attendance

Classroom attendance is **mandatory** in order to perform well in this class. If class is missed due to illness, sports event, or family emergency, the student is still responsible for any missed assignments and obtaining the lecture notes.

Written Research Paper

The student will be required to write a critical review of a topic (assigned by the instructor) in analytical spectroscopy related to forensic science. The paper will be a critical review of the recent literature (last 5 years) on the topic chosen. The paper will not be less than 5 typewritten double-spaced pages or more than 10 typewritten double-spaced pages. All references will be listed properly (according to JOFS guidelines) at the end of the paper. This research paper will account for 15% of the student's grade for the course.

Obtaining Assistance

Do not hesitate to seek assistance concerning class lectures, homework assignments, or grading. If the student can not make it to the instructor's scheduled office hours, she should make arrangements to meet with the instructor at an alternative time at both the student's and the instructor's convenience.

Honor Philosophy

“The Cedar Crest College Honor Philosophy states that students should uphold community standards for academic and social behavior in order to preserve a learning environment dedicated to personal and academic excellence. Upholding community standards is a matter of personal integrity and honor. Individuals who accept the honor of membership in the Cedar Crest College community of scholars pledge to accept responsibility for their actions in all academic and social situations and for the effect their actions may have on other members of the College community.”

The instructor expects each student to abide by the college’s honor code. This honor code applies to all activities associated with this course. The student should realize that the honor code is an important aspect of the educational process at Cedar Crest College.

Cedar Crest College Faculty and Administration support the following statement concerning Classroom Protocol:

“Appropriate classroom behavior is implicit in the Cedar Crest College Honor Code. Such behavior is defined and guided by complete protection for the rights of all students and faculty to a courteous, respectful classroom environment. That environment is free from distractions such as late arrivals, early departures, inappropriate conversations, and any other behaviors that might disrupt instruction and/or compromise students’ access to their Cedar Crest College education.”

Please be sure to turn off all cell phones and pagers during class times.

Community Standards for Academic Conduct:

“Academic integrity and ethics remain steadfast, withstanding technological change. Cedar Crest College academic standards therefore apply to all academic work, including but not limited to, handwritten or computer-generated documents, video or audio recordings, and telecommunications.

As a student at Cedar Crest College, each student shall:

- Only submit work which is his/her own.
- Adhere to the rules of acknowledging outside sources, as defined by the instructor, never plagiarizing or misrepresenting intellectual property.
- Neither seek nor receive aid from another student, converse with one another when inappropriate, nor use materials not authorized by the instructor.
- Follow the instructions of the professor in any academic situation or environment, including taking of examinations, laboratory procedures, the preparation of papers, properly and respectfully using College facilities and resources, including library and computing resources to ensure that

these resources may be effectively shared by all members of the College community.

- Abide by the Cedar Crest Computer Use Policy.
- If a student perceives a violation of the Academic Standards, he/she will go to their instructor.
- If you are unable to resolve the problem with the instructor, you should go to the chair of the department. If you need further assistance after the consultation with the instructor and the chair, you should see the Provost.”

It is the instructor’s policy to deal with violations of these Standards for Academic Conduct by awarding a grade of 0 for the assignment or examination in question.

Students with Learning Disabilities

The instructor supports the Cedar Crest College policy regarding learning disabilities as follows:

“Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.”

CHRONOLOGICAL PLAN FOR THE COURSE

The schedule on the following page lists the topics, which constitute the lectures pertaining to this course. A summary of the testing schedule and content is provided. The schedule **may be** modified throughout the course, as needed.

Testing Schedule Summary

<u>2007 Date</u>	<u>Test</u>	<u>Material Included</u>
Thurs. 9/17	Exam 1	Lectures 1 through 4 plus reading materials
Thurs. 10/22	Exam 2	Lectures 5 through 9 plus reading materials
Thurs. 12/3	Exam 3	Lectures 10 through 13 plus reading materials

Lecture Topics Outline

<u>Date</u>	<u>Lecture</u>	<u>Topic</u>	<u>Reading Assignment:</u>
8/27	1	Introduction to Analytical Spectroscopy	Skoog, Ch 6
9/3	2	Ultraviolet-Visible Molecular Spectrometry	Skoog Ch 13
9/10	3	Optical Spectroscopic Techniques	Skoog Ch 14
9/17	4	Chiroptical Spectroscopic Techniques Exam I	(Handout)
9/24	5	Infrared Spectrometric Methods of Analysis	Skoog, Ch 16 & 17
10/1	6	Raman Spectroscopy	Skoog, Ch 18
10/8	7	Advanced Topics in NMR	Skoog, Ch 19
10/15	8	Mass Spectrometry	Skoog, Ch 20
10/22	9	Advanced Mass Spectrometric Methods Exam II	(Handout)
10/29	10	Atomic X-Ray Spectrometry	Skoog, Ch 12
11/5		NEAFS Meeting	
11/12	11	Surface Characterization by Spectroscopy	Skoog, Ch 21
11/19	12	Atomic Mass Spectrometry - ICP/MS	Skoog, Ch 11
11/26		Happy Thanksgiving!	
12/3	13	X-Ray Crystallography Exam III	(Handout)

BIBLIOGRAPHY:

Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, and Timothy A. Nieman, Sixth Edition, Saunders College Publishing, 2006.

Wilson & Wilson's Comprehensive Analytical Chemistry, D. Barcelo, Ed., *Vol. 47, Modern Instrumental Analysis*, S. Ahuja and N. Jeseperon, Eds., (Elsevier, Oxford, UK, 2006).

Forensic Chemistry. Suzanne Bell. New Jersey: Pearson Prentice Hall, 2005.

Modern Spectroscopy, Fourth Ed., J. Michael Hollas, (John Wiley & Sons, Hoboken, NJ, 2004).

Organic Structure Analysis, Philip Crews, Jaime Rodriguez, and Marcel Jaspars, (Oxford University Press, New York, NY, 1998).

Fundamentals of Analytical Chemistry, Seventh Edition. Douglas A. Skoog, F. James Holler, and Donald M. West. Philadelphia, PA: Saunders College Publishing, 1996.

Spectrochemical Analysis, James D. Ingle, Jr. and Stanely R. Crouch, (Prentice Hall, Upper Saddle River, NJ, 1988).

Instrumental Methods of Analysis, Seventh Edition. Hobart H. Willard, Lynne L. Merritt, Jr., John A. Dean, and Frank A. Settle, Jr. New Jersey: John Wiley & Sons, Inc., 1988.

Quantitative Analytical Chemistry, Fourth Ed. , James S. Fritz and George H. Schenk, (Allyn and Bacon, 1979).

I. M Koltoff, E. B. Sandell, E. J. Meehan, and Stanley Bruckenstein, Quantitative Chemical Analysis, Fourth Ed. (The Macmillan Company, 1971).