

CHEMISTRY 661

Analytical Instrumentation

Syllabus Spring 2012

Professor: Dr. Evans

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Office hours: TH 8:30-10 or by appointment

Office: Science 1-084

Lecture/Lab: M 11:00-11:50 and F 12:00-5:00 in S-2-41

Objective: This course provides a survey of the different types of instrumentation that is in the chemist's tool box. We will stress advantages and disadvantages and develop the insight that is necessary to choose the right tool for the right problem. We will use several of these tools in the laboratory portion of the course. The course can be broken down into several components.

1. brief lectures on a given instrument
2. current literature
3. lab demonstrations/hands-on in small groups
4. development of lab modules

Course Structure:

The lectures are going to cover the basics of the instrumental method that is the focus of that week's lab experience. Homework will be based on assignments from an instrumental technique discussed in a recent issue of Analytical Chemistry. Each week you will be required to find a paper from the literature that discusses an application using the instrumentation we will be using in lab. You will turn in a copy of this paper as evidence of doing your homework. On any given week three or four of you will be asked to briefly share the details of the paper you have found with the class. During the first half of the course you will work in teams of 2-3 to develop a lab module for an assigned instrument. This lab module will be used for teams of undergraduates in the second part of the course. You will serve as lab instructors guiding them to complete the lab module you have created. Your grade will consist of a midterm and a final, literature assignments, homework, class participation and development of your lab modules.

Text: Principles of Instrumental Analysis, 6th Edition by Skoog, Holler, and Nieman

Grading:

Lab module, 500 pts, 36 %

5 literature assignments, 50 pts each, 19 %

5 HW assignments, 100 pts, 15 %

Participation (attendance/group and class discussions), 150 pts, 11 %

Mid term Exam, 100 pts, 8 %

Final Exam, 100 pts, 8 %

Grading Scale:

Total points	Grade	Total points	Grade
1110-1200	A (92.5)	850-914	C (70.8)
1050-1109	A- (87.5)	810-849	C- (67.5)
1020-1049	B+ (85.0)	770-809	D+ (64.2)
980-1019	B (81.7)	720-769	D (60.0)
940-979	B- (78.3)	660-719	D- (55.0)
915-939	C+ (76.3)	< 659	F

No late assignments will be accepted!!!!

Attendance: You are expected to attend all lectures and lab periods. Chronic class skipping and tardiness will be reflected in your class participation grade.

Academic dishonesty: For much of the semester you will be working in teams, and team work is encouraged and expected. However, all written lab reports are to be the work of the individual. If I receive lab reports from team members that look identical, both individuals will receive a zero.

Lecture Schedule:

Date	Chapter	Topic
Jan 27	Ch 20	Mass Spec (EI, CI)
Jan 27	Ch 20	Mass (ESI, MALDI)
Jan 30- Feb 3	Ch 26,27	Separations, GC
Feb 6/10	Ch 28	HPLC
Feb 13/17	Ch 30	CE
Feb 24	Ch 6-8,13-14	Spectroscopy overview, UV-vis
Feb 27/Mar 2	Ch 9,10	AA, atomic emission
Mar 5/9	Ch 15	Molecular fluorescence
Mar 12/16	SPRING	BREAK
Mar 19/23	Ch 18	FT, FT-IR
Apr 26/30	Ch 19	Raman Spectroscopy /NMR
Apr 2/6	Ch 19, handouts	NMR
Apr 9/13	Ch 21	X-ray spectroscopy/ X-ray crystallography
Apr 20	Ch 21	Surface techniques: AFM, SEM, aujer, SIMS
Apr 23/27		Wrap up
Apr 30/May 4	Final Exam Period	Final Exam
May 9		
May 14-18		

Lab Schedule:

Date	Topic
Jan 27	
Jan 30- Feb 3	LC-MS
Feb 6/10	GC-MS
Feb 13/17	HPLC
Feb 24	UV-vis, AA
Feb 27/Mar 2	Fluorimeter
Mar 5/9	FT-IR
Mar 12/16	SPRING BREAK
Mar 19/23	ICP-AES
Apr 26/30	Lab 1
Apr 2/6	Lab 2
Apr 9/13	Discuss, Share and Refine, Report 1 due
Apr 20	Lab 3, Report 2 Due
Apr 23/27	Lab 4
Apr 30/May 4	Discuss, Share and Refine, Report 3 due
May 9	Report 4 due, NMR
May 14-18	Final exam period

Timeline for Development of Lab Modules

Jan 27	Assigned and instrument
Feb 3	List of Possible Ideas, one gets approved (50 pts)
Feb 10	Outline of Lab Module and a list of materials needed (50 pts)
Feb 24	Data from trial runs (50 pts)
Mar 2	Final draft of Written Module(100 pts)
Mar 19	Revised Module (50 pts)
April 17 (Tuesday)	Revised Module and report on what was learned from follow-up meeting (100 pts)
May 9	Final Revised Module and report on what was learned from follow-up meeting (100 pts)