

CHEMISTRY 361

Analytical Instrumentation

Syllabus Spring 2005

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Office hours: MWF 10:30-11:30 or by appointment

Office: Science 1-084

Lecture: Tu Th 10-11:15 Chemistry Conference Room

Lab: Th 2-5

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. four, 4-week lab projects

Course Structure:

Tuesday will be reserved for lectures. The lectures are going to cover the basics of the instrumental method that is the focus of that week's literature assignment.

Thursdays:

Each Thursday you will receive an article from the current literature and an assignment that will consist of a list of questions pertaining to the article. The assignment will be due the following Thursday, and we will discuss the article in class after the assignment has been turned in. **Late assignments will not be accepted!**

Each of you will choose an article from the literature on a new and improved instrumental technique. You will be required to delve into the references in this article for background information, and present a summary of the technique (power point presentation) to the class. These presentations will be held on Thursdays. During the first week of class each of you will sign up for a particular slot during the semester.

Lab:

As mentioned above the lab will be project-based and will require you to work efficiently as part of a team. The team will consist of 3-4 members. You will be given a project. The goals of the project will be explicitly stated. You will also be given some pertinent articles from the literature. You will be given this information one week in advance of the first lab period for the given project. During the lab period on week one you will have to work together to hash out a "plan of attack", basically an outline of how you plan to carry out the project. I will serve to guide you as a team. This outline is to be formally written up and handed in on the following Tuesday (*one per group*). Any lab work that needs to be performed in preparation for the following week also be tackled during the first week of lab. You will also use this lab period to evaluate the data collected the prior week for the previous project, and to determine if any further experimentation is needed.

Week 2 and 3 will be used to perform the necessary experiments to complete the project.

You will use the lab period of week 4 to evaluate the data collected the prior week for the previous project, and to determine if any further experimentation is needed. You will also be given your next project, and will have to design the experiments that need to be performed for this next project (the “plan of attack” that is due the following Tuesday).

Reports are due Tuesday after week 4. They will be graded and returned by that Thursday. Lab reports are to be written up in the style of a research article (abstract, introduction, *theory and experimental*, results, conclusions, references). Lab reports for the first and third project must be revised. The revisions are due the following Thursday. The final grade for the first and third lab report will consist of an average grade between the original and revision.

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

Grading:

- 4 lab reports, 100 pts each
- 4 experimental outlines, 50 pts each
- 10 literature assignments, 20 pts each
- 1 literature presentations, 200 pts
- participation (group and class discussions), 200 pts
- There will be no exams.

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 tartiness will be reflected in your class participation grade will reflect

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 25/27	Ch 20	Mass (ESI, MALDI)
Feb 1/3	Ch 11	Mass Spec (EI, CI)
Feb 8/10	Ch 28	HPLC
Feb 15/17	Ch 6, 13, 14	Intro to spec. , UV-vis
Feb 22/24	Ch 15	Molecular fluorescence

Mar 1/3	Ch 9, 10	AA, atomic fluorescence, atomic emission
Mar 8/10	Ch 16, 17	FTIR
Mar 22/24	Ch 18	Raman
Mar 29/31	Ch 19	NMR
Apr 5/7	Ch 19	NMR
Apr 12/14	Ch 12, 21	X-ray, Surface techniques
Apr 19/21	Ch 21	AFM, SEM, aujer, SIMS
Apr 26/28	Ch 25	Cyclic Voltammetry
May 3/5	Ch 24	Coulometry
May 10	Ch 27, 30	GC, CE

Lab Schedule and assignment due dates:

Date	Group A	Group B
Jan 27 (week 1, first module)	Receive project 1	Receive Project 2
Feb 1	Outlines are due! Perform experiment	Outlines are due! Perform experiment
Feb 3 and 10	Perform experiment Lit. Assign. Due	Perform experiment Lit. Assign due
Feb 17	Evaluation of data Additional experiments Receive Project 2 Lit. Assign. due	Evaluation of data Additional experiments Receive Project 1 Lit. Assign. due
Feb 22	Outlines are due! Reports are due Perform experiment	Outlines are due! Reports are due Perform experiment
Feb 24 and Mar 3 (start second module)	Perform experiment Lit. Assign. Due Revisions are due (Mar 4)	Perform experiment Lit. Assign. Due Revisions are due (Mar 4)
Mar 10	Evaluation of data Additional experiments Receive project 3 Lit. Assign. due	Evaluation of data Additional experiments Receive Project 4 Lit. Assign. Due
Mar 22	Perform experiment Reports are due	Perform experiment Reports are due

	Oulines are due!	Oulines are due!
Mar 24 and Mar 31	Perform experiment Lit. Assign. Due	Perform experiment Lit. Assign. Due
Apr 7	Evaluation of data Additional experiments Receive project 4 Lit. Assign. due	Evaluation of data Additional experiments Receive Project 3 Lit. Assign. Due
Apr 12	Perform experiment Reports are due Oulines are due!	Perform experiment Reports are due Oulines are due!
Apr 14 and April 21 (start forth module)	Perform experiment Lit. Assign. Due Revisions are due (Apr 24)	Perform experiment Lit. Assign. Due Revisions are due (Apr 24)
April 28	Evaluation of data Additional experiments	Evaluation of data Additional experiments
May 5	Reports are due	Reports are due