

Instrumental Analysis Syllabus

Course Overview

Theory and application of modern instrumental methods to chemical analysis. To gain a working knowledge of many of the instrumental analysis methods used in a modern chemistry lab. Course material will expose student both to the physical explanation of the phenomena being observed, and to the practical aspect of the various kinds of instruments. Where possible, practical, hands-on lab experiences will be provided to help the students understand the material.

Lab policies

- Attendance is required.
 - Notebooks and safety goggles. *Nitrile gloves will be provided for your use in the lab*
 - Lab preparation: It is expected that each student come to lab prepared to perform the designated experiment. To prepare for the lab, you should: (a) read the lab procedure before coming to lab, and (b) perform any prelab questions or work before laboratory starts. Lab reports will be due at the start of the lab period one week after the experiments are completed.
 - Make-up labs. There are no scheduled times for make-up labs. If you miss a lab, contact me directly through email. To be excused from lab, you must have an excused medical or other absence; if so, it may be possible to take the lab on a day other than your assigned lab day. Students must perform and turn in reports for every experiment to pass the course.
 - Safety practices. It is the responsibility of the student to be aware of the hazards of all chemicals in lab and to exercise due caution and proper procedures at all times. Part of prelab experiments, you are required to find Material Safety Data Sheets (MSDSs) for the chemicals to be used and list to the safety ratings, potential health effects, and first aid measures. There are several web sites that can be used for this purpose.
 - Cheating: Not allowed. Students are encouraged to teach each other, but not to do work for each other. All lab reports are to be done individually. Your report should be written in your own words and follow appropriate citation style for any facts cited.
-

Email: Any questions you may have can be addressed only through your official Indiana University Northwest email. **I will not answer any email pertaining to dates of exams.** That information is posted in this syllabus, reiterated in class as well as posted on oncourse. When emailing please *Do not forget simple rules of etiquette*. Unlike personal emails, professional emails require professional communication. Please use proper English; abbreviating standard English words is not appropriate in a professional email. Abbreviations such as “ur” or “2nite” are not acceptable.

Phone Calls: For documentation and privacy purposes I do not receive phone calls. Various State laws and university policies forbid discussions with any third parties, including other students, your parents or local elected officials. Any and all communication can be made via your university email or directly in person.

Homework: Non-graded

Within the chapters, you will find problems following sections of material that will have been covered in lecture. It is in your best interest to work the problems that follow these sections. The purpose of these problems is to give you, the learner, first-hand experience in solving problems and thinking about chemistry, as well as to help you find trouble spots before exams.

Attendance: Attendance to class **IS** mandatory. I ask that you refrain from using computers, cell phones, or any other means of distraction. You come to learn, not to chat with your friend via text messaging or to read Facebook news.

Academic Integrity: Indiana University Northwest takes very seriously Academic Integrity and has outlined a code of student conduct, see: (Code of Student Rights, Responsibilities, and conduct) Academic integrity requires that “all academic work be wholly the product of an identified individual or individuals.” Academic misconducts include: cheating, fabrication, facilitating academic dishonesty, denying others access to information or material, and plagiarism. Students are expected to conduct complete honesty in the completion of tests, assignments, and any other course work including extra

credit. If any student is found to be cheating or plagiarizing, a grade of "F" will be awarded for the assignment in question and possibly the course.

Cheating is the actual or attempted practice of fraudulent or deceptive acts to gain an unfair advantage in a grade, whether for yourself or for another student. Cheating includes transmitting or receiving by any and all means information about examination questions. During examinations, students will not be allowed to use or have turned on electronic devices (including cell- phones, iPods, calculators, etc). If I believe you have or are using such a device I will immediately confiscate your exam.

Accommodations for Students with Disabilities: Indiana University Northwest is committed to full and equitable access for all enrolled students. If you are a student with a disability and wish to request accommodations, please notify the instructor by the second week of class. Instructors are asked to make reasonable accommodations upon request by the student or the University for such Disabilities. It is the responsibility of the student to contact the University's Disability Service Coordinator so that the case will be dealt with on a timely manner.

Athletes: Athletic competitions at times can and do interfere with your attendance to class on exam dates or worksheet due dates. It is your responsibility to provide proper documentation from your athletic advisor and make arrangements with me prior to the scheduled absence. Failure to do this will result in an unexcused absence resulting in a zero on assigned worksheets or exams.

Campus support office:

Student Support Services, HH 29, (219) 980-6798

Student Support Services <http://www.iun.edu/student-support/>

Grading

Exam 100 points

Final Project 200 points

Labs +700 points (100 points each)

Total 1000 points

Grading Scale

A+ 97-100

A 94-96

A- 90-93

B+ 87-89

B 84-86

B- 80-83

C+ 77-79

C 74-76

C- 70-73

D+ 67-69

D 64-66

D- 60-63

F 0-59

Lab Report

GRADING CRITERIA

1. Lab technique: 10%

- The ability to work safely, efficiently, and diligently.

- Keep area clean

- **Balances**

- Work Space

2. Lab Report: 90%

LAB REPORT CONTENTS

1. Abstract: Overview of experiment, sell your chemistry. 5 pts

- 4-5 sentences

2. Introduction: Talk about the experiment and its applications. 10 pts

- Give a brief 1-2 sentence history
 - Why is this experiment important
 - What is this experiment utilized for and why
 - Are there any better methods
 - 2-3 paragraphs
3. Results and Discussion. 60 pts
- Explain your results
 - Show all of your data
 - Graphs
 - Tables
 - Figures
 - Schemes
4. Experimental. 10 pts
- Report any instrument used
 - Type of instrument
 - Name of instrument
 - Report any chemical used (even the DI water) and provide the chemical supplier
 - Scientifically written procedures of the experiment performed
5. Conclusion. 10 pts
- A summary of the experiment
 - Re-express the importance of the experiment
 - 2-3 paragraphs
6. References. 5 pts
- ACS format

Final Project

The final project is designed to encourage literature search along with a pedagogical approach to understanding the applications of analytical instruments. The final project must be approved with a title by September 23rd. The final project is a culmination of experiments, based on a simple hypothesis, using a single instrument, and presented in poster format during the allotted time on December 18th. **This is a formal poster session, you will need to dress-up and be in a presentable manner during your poster session.** There will be other instructors/professors who will be walking around asking questions and grading you on your experiment, knowledge of the instrument, and your overall presentation.

Poster Guidelines

- If there are any chemical structures they should be presented in ChemDraw using ACS 1996 format.
- 36" (height), 48" (width)
- Poster Contents:
 - Title
 - Name
 - School
 - Course
 - Abstract
 - Background
 - Experiment/Methods
 - Instruments Used
 - Results
 - Conclusion

- Future Work
- References

Example

Class Schedule - Flexible

August 26 UV Spectrometry
September 2 UV Spectrometry
September 9 Infrared Spectrometry
September 16 Gas Chromatography
September 23 ^1H Nuclear Magnetic Resonance
September 30 ^1H Nuclear Magnetic Resonance
October 7 ^{13}C Nuclear Magnetic Resonance
October 14 ^{13}C Nuclear Magnetic Resonance
October 21 Mass Spectrometry
October 28 Mass Spectrometry
November 4 Review for Exam
November 11 **Exam**
November 18 **Final Project**
November 25 Thanksgiving Break
December 2 **Final Project**
December 9 **Final Project**
December 16 **Final Project**
December 18 **Final Poster Session**

Lab Schedule - Flexible

August 26 UV Spectrometry - Sunscreen
September 2 UV Spectrometry - Anti-Doping
September 9 Infrared Spectrometry/Combustion/HDI
September 16 Gas Chromatography - Money
September 23 **Project Title/Abstract Due**
September 30 ^1H Nuclear Magnetic Resonance
October 7 ^{13}C Nuclear Magnetic Resonance
October 14 Mass Spectrometry - Unknowns
October 21 **Project Outline Due/Order Chemicals**
October 28 **Start Final Project**
November 4 **Final Project**
November 11 **Final Project**
November 18 **Final Project**
November 25 Thanksgiving Break
December 2 **Final Project**
December 9 **Finish Final Project**
Print Poster
December 16 Lab Clean-Up
December 18 Poster Session/Check out