

CHE 350L-011: Instrumental Analysis Laboratory Spring 2009

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Text: Principles of Instrumental Analysis; Skoog, Holler, and Nieman, 5th Edition

Blackboard: Blackboard will be used in this course to post lab activity summaries and updates, necessary protocol downloads, and other information.

Class Times: 2:00-4:30 pm MW, SC 427

Prerequisite: CHE 340-340L

Co requisite: CHE 350

Office Hours: I have an open door policy. Please stop by if you ever have questions, or contact me if you want to set up an appointment. My formal office hours are: M, W:10-11 am

Goals:

- Obtain **hands on** experience on a variety of instrumental methods for chemical analysis.
- Work effectively in groups: All experiments will be conducted in groups. Learning to work as a team is very important in industrial and academic setting.
- Coming to lab well prepared for a given task
- Critical evaluation of results: You will prepare **written reports** documenting your work. These reports will teach you how to organize your data into concise manner and to critically evaluate your results.

Learning Outcomes: This course's student learning outcomes fulfill the following programmatic goals of the Department of Chemistry.

At the end of this course students will be able to:

- *Define components and operation of modern chemical instrumentation*
- *Interpret results acquired from various chemical instrumentation*
- *Assess the benefits and limitations of different instrumentation methods and instrumental components*
- *Identify appropriate instrumental methods for a chemical analysis*
- *Proficiently conduct chemical analyses using modern chemical instrumentation*
- *Effectively communicate results of scientific inquiries orally and in writing*
- *Design and implement an analysis using the scientific literature as a resource for experimental design*

Attendance: NKU policy states that class attendance is mandatory. Attendance is expected and tardiness is not tolerated. You will be working in groups on each lab experiment, and it is important you do NOT let down your partner(s) by showing up late. If you miss a lab period (*unless excused by instructor*) you will automatically receive a **zero** for that experiment. CHE350 and 350L are to be taken simultaneously. Students with more than 2 absences from lab (unless a valid excuse is given) will be dropped from both lecture and lab by the instructor.

Experiments: This semester is divided into different rounds of experiments. This rotation will allow groups to gain exposure to a variety of different instrumentation over the course of the semester.

Quizzes: You will be evaluated on your preparation for different experiments. Quizzes may be written or based on interviews given during the lab period.

Performance: Part of your lab grade will be based on participation and performance. You are working on experiments as a team. Cooperation and contribution from everyone in the group is expected.

Lab Reports: There will be 2 main types of lab reports in this course: (1) **formal reports** and (2) **lab summaries**. Late lab reports will not be accepted (unless excused by instructor) and will result in a grade of **zero**. For guidelines on lab reports refer to attached guide.

Notebook: You are expected to keep an accurate record of your laboratory activities. You should use a small black marble "Composition Tablet" for collection of all data and procedure steps. This notebook should have a table of contents and numbered pages. After each lab period your notebook must be signed and dated by the primary investigator (you) and one witness (lab partner or professor). Your notebook should reflect your ability to document what you do **IN** lab, not reflect on what you did **AFTER** lab. A notebook is not always the "prettiest" document, but one should be able to repeat an experiment by following your notebook. Your notebook will be turned in and graded periodically throughout the semester. Activities such as: writing on scrap pieces of paper, in an alternative notebook, or in pencil will **NOT** be allowed. You will receive a score of **zero** for your lab notebook for each occurrence, and your participation grade will also be affected.

Grading Scheme:

Reports	= 65%
Independent Project	= 15%
Quizzes	= 10%
Lab Performance	= 5%
Notebook	= 5%

Grading Scale: The letter grade for the course will be based on the final percentage scale

<u>Course Grade</u>	<u>Percentage</u>
A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

You are all expected to be prepared for lab each week. Failure to do so may result in not being able to conduct an experiment. This includes reading over the lab and having an understanding of what you will be doing.

Honor Code: The NKU Honor Code is in effect for this course. The Honor Code is a commitment to the highest degree of ethical integrity in academic conduct, a commitment that, individually and collectively, the students of Northern Kentucky University will not lie, cheat, or plagiarize to gain an academic advantage over fellow students or avoid academic requirements. In accordance with the *Code of Student Rights and Responsibilities*, faculty members have the right to determine actions to be taken when a student is caught cheating. Penalties for cheating can range from but are not limited to scores of zero on individual assignments or exams to expulsion from the University and does include failure of the course.
<http://www.nku.edu/~deanstudents/policies.htm>

Note: The syllabus is subject to change. Students are responsible for understanding all items on this syllabus. Any items not understood must be brought to the attention of the instructor within the first two weeks of class.

Policies of the Department of Chemistry at Northern Kentucky University

- All items on syllabi are subject to change by the instructor.
- Students are responsible for reading and understanding all items on the syllabi. Any items not understood must be brought to the attention of the instructor within the first two weeks of class.
- The work you will do in any course is subject to the Student Honor Code. The Honor Code is a commitment to the highest degree of ethical integrity in academic conduct, a commitment that, individually and collectively, the students of Northern Kentucky University will not lie, cheat, or plagiarize to gain an academic advantage over fellow students or avoid academic requirements.
- Cheating will not be tolerated. In accordance with the Code of Student Rights and Responsibilities, faculty members have the right to determine actions to be taken when a student is caught cheating.
- Faculty members reserve the right to dismiss or to have removed a disruptive student from their classrooms

Students with disabilities who require accommodations (academic adjustments, auxiliary aids or services) for this course must register with the Disability Services Office. Please contact the Disability Service Office immediately in the University Center, Suite 320 or call 859-572-6373 for more information. Verification of your disability is required in the Disability Services Office for you to receive reasonable academic accommodations. Visit the Disability Services website at www.nku.edu/~disability/.

LAB REPORT GUIDELINES

I. Formal Reports

Contain:

- 1) Title Page: The title page should include [experiment title, name, lab partners, dates of experimental work, course title, unknown sample name/number, and date submitted]
- 2) Abstract: This is not an introduction, but a brief (short paragraph) outline of what was accomplished and the results.
- 3) Introduction: Here you should provide the overall objective and background of the experiment. The theory of a particular instrumental technique and experiment should be described. You **must** write this description in your own words, and use appropriate references/figures when necessary.
- 4) Experimental: This is a description of the particular instrument and procedure used for an experiment. Explain how data was collected.
- 5) Results and Discussion: These two sections are often found in chemistry journals combined together. In this section a narration presenting the results obtained (ie. graphs, charts, tables) during the experiment and discussing what the data means (data interpretation) should be presented. You also would include comments on the performance of the instrument or analysis and the limitations and advantages of the technique.
- 6) Conclusion: Paragraph summarizing results and presenting a final conclusion.
- 7) Literature References: You must correctly list all references used throughout the report. The literature references should be presented in standard ACS format.

II. Lab Summaries

Contain:

- 1) Title Page
- 2) **Brief** statement of Principles of Experiment
- 3) Experimental: (**Only** include any changes to original experiment)
- 4) Results and Discussion
- 5) Conclusion
- 6) Literature References

Formal Reports and Lab Summaries Should:

- Be typed
- Contain clearly labeled sections
- Contain calculations in the results section
- Include: tables, graphs, charts integrated within the report. (**Graphs and data table should be clearly labeled with numbers and titles.**)
- Contain proper grammar: (i.e. write in 3rd person, have agreement in tense, agreement between subject and verb etc.)

Note: One Lab Summary will be in the form of a presentation. The capillary electrophoresis lab will require a technical report. Guidelines will be provided with lab.

Independent Project: The independent project will culminate in students presenting their work in a poster form.

TENTATIVE LAB SCHEDULE

Date	Experiment
Weeks 1-2 (1/12-1/21)	Electronics S/N Experiment
Weeks 3-6 (1/26-2/18)	1 Week Rotation on the following Experiments: Gas Chromatography (GC), High Performance Liquid Chromatography (HPLC), Atomic Adsorption/Atomic Emission (AA/AE), FTIR
Week 7 and 8 (2/23-3/4)	Capillary Electrophoresis X-ray Diffraction
Spring Break	
Weeks 10-12 (3/16-4/1)	Rotation on the following Experiments: GC/MS, UV-Vis/Fluorescence, Scanning Probe Microscopy (SPM)/Electrochemistry
Weeks 13-16 (4/6-4/29)	Independent Project

Lab Reports Due on **Friday by noon**, unless otherwise noted by the instructor. Tentatively the poster presentation for the independent project will be presented during finals (May 4: 1-3pm)