

Instrumental Analysis CHM434
Chemistry & Biochemistry SIUC
Fall 2015

Instructor	Dr. Mohtashim Shamsi		
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Office	Neckers 293	Office hours	M & W 12-1
Class	Neckers 218	Lab Location	Neckers 409
Class Schedule	Mon, Wed @ 11-11:50 am	Lab Schedule	Tue, Thu @ 2-4:50 pm
Text	Skoog, Holler, Nieman, <i>Principles of Instrumental Analysis</i> , 6th Edition and assorted supplementary reading assignments		
Prerequisites	Previous or concurrent enrollment in CHEM 360 and CHEM 330 or instructor consent.		
Lectures	PowerPoint slides, handouts and notes may be provided in some cases.		

Introduction: Analytical chemistry is one of the major branches of chemistry and strongly connected with other branches and sub-branches such as biochemistry, clinical chemistry, environmental science, food and nutrition, forensic science, and pharmaceutical chemistry. Analytical chemistry is an essential part of human life from blood work tests to drinking water and food quality tests, from determining the composition of mined ores to identifying disease markers.

This course is based on a selection of advanced instrumental techniques significant to the chemical industry and chemical research with specific reference to what is currently state-of-the-art. Topics may include advances in electrochemical, chromatography, spectroscopy, mass spectroscopy, surface science techniques and microprobe analysis.

Overall objective: By the end of this course you are expected to know the purpose, basic working principles, sensitivity, instrumental design and sample preparation of various advanced analytical techniques. There will be an emphasis on the applications of these techniques. Specific learning objectives will be provided later along with the topics.

Key dates and deadlines:

Classes begin	Mon, Aug. 24
Labor Day holiday	Mon, Sep. 7
Fall Break	Mon, Oct. 13
Midterm exam	Mon, Oct. 19
Travelling	Mon, Oct. 26 – Wed, Oct. 28
Veterans Day holiday	Wed, Nov. 11
Thanksgiving break	Wed, Nov. 25
Final exam	Wed, Dec. 16

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Assessments & Grading:

Must pass both lab and theory components to pass the overall course.

A: 85% - 100%, B: 75% - 85%, C: 60% - 75%, D: 50% - 60%, F: <50%

Weekly quiz	10%	10 min. every Monday. Only based on concept but no problem sets. Purpose is to make sure you do read the stuff at home that was covered in class. Best 50% quizzes will count towards the final.
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Problem sets	10%	Only problems, which may or may not involve calculations. Must be submitted before the next problem set is given. Purpose is to make sure students are hands on problems associated with the material covered. Best 3 out of 4 problem sets will count towards final.
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Midterm exam	20%	Two hours exam covering material <u>from beginning of the course till the midterm</u> . 100% count towards the final. Questions types: Mix
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Final exam	20%	Two hours exam covering material covered <u>after the midterm</u> . 100% count towards the final. Questions types: Mix
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Lab Notebook	10%	Read carefully lab manual for further details.
Lab Experiments	30%	

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Week	Chapters	Topics
Aug 24, 26 & 31	Ch.1&5	1. Course Orientation 2. Instrumental methods and data analysis 3. Signal to Noise ratio
Sep 2 -30	Ch. 6-10 Ch. 13-17	Molecular Spectroscopy <ul style="list-style-type: none"> ▪ UV/visible spectrophotometry & Beer's Law ▪ UV/visible instrumentation ▪ Fluorescence and phosphorescence spectroscopy Molecular Spectroscopy <ul style="list-style-type: none"> ▪ IR & FTIR instrumentation Atomic spectroscopy <ul style="list-style-type: none"> ▪ Atomic emission and absorption ▪ Flame emission and absorption
Oct 5,7&14	Ch 20&21	Surface Science and Molecular Mass Spectroscopy <ul style="list-style-type: none"> ▪ XPS and Auger spectroscopy (surface spectroscopy) ▪ AFM, SEM and STM (surface microscopy)
Oct 21-Nov 11	Ch. 22, 23, 24 & 25	Electroanalysis <ul style="list-style-type: none"> ▪ Potentiometry ▪ Voltammetry ▪ Hydrodynamic voltammetry ▪ Cyclic voltammetry ▪ Differential pulse voltammetry ▪ Amperometry
Nov 16-Dec 9	Ch. 26, 28 & 29	Separation Science <ul style="list-style-type: none"> ▪ Chromatography ▪ Liquid chromatography ▪ Gas Chromatography
Total Classes 26	Note:	<i><u>The schedule is tentative. Topics to be covered in classes subject to change depending on the flow of the class.</u></i>

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Assignments: Assignments must be submitted in print, specific instructions will be provided on each assignment. Usually assignments are due in one week.

Academic Integrity:

- Students are responsible to be aware of Faculty guidelines on academic integrity and Chemistry department policy on plagiarism.
- Students are encouraged to study in groups in order to discuss procedures and data of lab experiments, however all calculations, answers of prelab quiz, lab reports or assignment questions “*MUST*” be students’ own work.
- Plagiarism will not be tolerated in any case.

Penalties:

1. Late submissions of assignments, 10% marks will be deducted per day for the number of days delayed.
2. The penalty for late submissions may be waived under justifying circumstances (such as sudden illness, accident in family etc.).
3. In case of missed test and exam, students may be offered to accommodate the missed term test depending on circumstances while there is certainly no make-up for final exam.

Accessibility Needs: If you want special needs in terms of accessibility, please contact me as soon as possible or Ryerson accessibility services.

Emergency Procedures: Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at www.bert.siu.edu, Department of Safety's website www.dps.siu.edu (disaster drop down) and in Emergency Response Guideline pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.