

**Instrumental Analysis
Chemistry 4330
Spring 2007**

Lectures: MWF, 9:05 – 10:00

Instructor: John Hansen

Office: Room 2126; Office Hours: MW 10:00 - 1:00, T 10:50 – 2:50

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Text: Principles of Instrumental Analysis, Fifth Edition by Skoog, Holler and Nieman, Saunders Publishing

Course Objectives

CHM 4330 is a semester-long course designed for chemistry majors that covers the use of instrumentation for chemical analysis. In this class, we will discuss the theory behind the analysis (with a strong emphasis on quantum mechanics and spectroscopy), instrumental operation (that covers the electronics and optical components of instruments), and data analysis and interpretation (which includes signal processing, Fourier transformation, and statistical analysis). It is assumed that you have completed a course in analytical chemistry, calculus-based physics and quantum chemistry or quantum mechanics.

Learning Outcomes

In this course, students will demonstrate their understanding of the physical basis and general applications of instrumental techniques applied to the analysis of chemical systems. In particular, they will demonstrate their ability to analyze electronic circuits used in instrumentation (this includes networks, RC circuits, operational amplifiers, digital electronics and logic circuits), and their understanding in the theory and operation of a wide variety of instruments, as well as interpretation of experimental data.

Expectations

It is my desire that each of you will succeed in this course. I will try to help you in anyway I can. It is vitally important you keep up with the material. I have found, without exception, those that received a grade of A or B in this course have consistently done the homework and took it seriously. Please see me, if you should have any difficulties.

Grading

The grade in this course will be based on four regular exams and a final exam.

Each regular exam is worth a 100 points, and the final exam is worth 150 points.

Grades will be calculated based on a maximum of 550 points.

Grade Scale: > 90% = A; 80 - 90% = B; 70 - 80% = C; 60 - 70% = D; < 60% = F

Policies

1. You are responsible for all material covered and all announcements made in

- class. Absence from class does not excuse or relieve you of this responsibility.
2. Cheating will not be tolerated. On the first occurrence it will result in a grade of zero for the exercise in question. A second occurrence will result in a grade of F for the course. All out of class assignments will be done in the absence of any collaboration from others. Any questions, clarifications, or requests for assistance should be directed only to me.
 3. No make-up exams will be given.
 4. I reserve the right to drop any student from my class rolls for excessive absences or tardiness.
 5. NO CELL PHONES!! They need to be placed completely out of my sight and turned off during my class. I do mean put away (not left on your belt). Place them in your packs or leave them in your vehicle. If you violate this rule you will be asked to leave my class, and you will be considered absent for that day. If you violate this rule during an exam it will be considered as an incident of cheating.
 6. If you contact me by email you are expected to use your UWG account.

Tentative Schedule

Date	Topic	Chapters
1/08	DC & AC Circuits	1 and 2
1/10	RC Circuits	2
1/12	RC Filters	2
1/17	Operational Amplifiers	3
1/19	Op Amp Circuits	3
1/22	Op Amp Circuits	3
1/24	Digital Electronics	4
1/26	Digital Electronics	4
1/29	Signals and Noise	5
1/31	Exam I	
2/02	Spectrometric Methods	6
2/05	Optical Instruments	7
2/07	Optical Instruments	7
2/09	Atomic Spectrometry	8
2/12	Atomic Fluorescence	9
2/14	Atomic Absorption	9
2/16	Molecular Absorption	14
2/19	Molecular Absorption	14
2/21	Molecular Luminescence	15
2/23	Exam II	

2/26	Infrared Spectrometry	17
2/28	Infrared Spectrometry	16
3/01	Raman Spectroscopy	18
3/05	Raman Spectroscopy	18
3/07	NMR	19
3/09	NMR	19
3/12	NMR	19
3/14	NMR	19
3/16	NMR	19
3/26	Atomic Mass Spectrometry	11
3/28	Exam III	
3/30	Molecular Mass Spectrometry	20
4/02	Molecular Mass Spectrometry	20
4/04	Chromatography	27
4/06	Chromatography	26
4/09	Chromatography	26
4/11	Chromatography	26
4/13	Potentiometry	22 & 23
4/16	Potentiometry	23
4/18	Voltammetry	25
4/20	Exam IV	
4/23	Voltammetry	25
4/25	Review	
5/02	Final (8:00 to 10:00 am)	

**Some Supplementary Texts
(recommended, not required)**

1. The Art of Electronics, Horowitz and Hill
2. Building Scientific Apparatus, Moore, Davis and Coplan
3. Discrete Systems and Digital Signal Processing, Strum and Kirk
4. Physical Methods in Chemistry, Drago
5. Data Reduction and Error Analysis for the Physical Sciences, Bevington
6. The Fourier Transform and its Applications, Bracewell
7. The Fast Fourier Transform, Brigham