

Tentative Syllabus
Chemistry 455/655 – Instrumental Analysis: Spring Semester 2008

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Office hours: MW – 9 to 10:30 am, or by appointment
Lecture times: MW – 11:30 to 12:45 am

Course Description--Analytical chemistry is a sub-discipline within chemistry, which deals with the identification and assay of a material or its components. The pre-requisite for this course is quantitative analysis. Quantitative analysis is concerned with how much of a given substance is in a material to be analyzed. Chemical analysis is vital to such diverse fields as health services, agriculture and food production, environmental protection, criminology, etc. Whereas, quantitative analysis stressed classical analytical techniques, instrumental analysis examines the use of modern analytical methods. Typically this refers to the use of modern instrumentation. These instruments are used to measure physical properties not typically examined with classical analytical techniques to distinguish the constituents and the concentrations of constituents in a given sample. The advantages of these methods include increased efficiency and automation. The growth of instrumental analysis will continue as new methods and new instruments are developed. It is important to point out that in some cases classical analytical techniques are still the most accurate way to measure an unknown. However, in many cases the advantages obtained from instrumental methods far outweigh the advantages for the classical technique.

Upon completion of the course students should have an understanding of modern analytical instrumentation. In addition an understanding of instrument design and construction will be obtained. Finally this course is designed to help chemists learn how to operate a variety of analytical instrumentation. Because of the fast pace at which material will be presented, lecture attendance is strongly recommended.

Assessment of these learning objectives will be based on the following:

Grading—The course grade will be based on performance in three regular exams, quizzes, problem sets, directed readings, and the final exam as follows:

Exams (100 points each)	300 pts.
Quizzes or directed reading (6 total)	150 pts.
Problem sets	50 pts.
<u>Final exam</u>	<u>200 pts.</u>
Total	700 pts.

The final grade in CHE 455/655 will be based on the total points obtained from the 4 categories above at the completion of the semester. For the overall course grades the following cut-offs will be used:

A = 100 – 88 %, B = 87 – 75%, C = 74 – 62%, D = 61 – 49%.

Exams—The use of electronic calculators is permitted unless otherwise stated, but no credit is allowed for calculator failure during an exam. **Up to** half the credit is possible if **all** set-up prior to the final calculation is completed. A scientific calculator is suggested, but not required, for this course.

Failure to take an exam at the scheduled time will result in a grade of zero. Make-up exams will be allowed only in the most extraordinary of circumstances. However, the student must supply adequate proof that an emergency has befallen her/him and **contact the instructor prior to the exam**. Even then, it must be realized that a make-up exam will be more difficult than the regularly scheduled exam in order to be fair to the rest of the class. The instructor has final discretion in all matters concerning exams.

Quizzes and problem sets—Short quizzes will be administered throughout the semester after the completion of chapters or topics (**these will all be take home assignments**). If you miss the lecture and fail to obtain a quiz it is your responsibility to obtain a copy of the quiz from the instructor and complete the assignment prior to the due date. You will not be given extra time to complete the quizzes because of missed lectures.

Problem sets will also be provided for each chapter to assist the student in mastering the material. These sets **will** be graded. Students will turn in problem sets **on the assigned date** and select problems will be graded. Students are strongly urged to visit the instructor during office hours or make an appointment to see the instructor if help is needed in performing the more difficult calculations.

Late quizzes or problem sets will not be accepted after the end of class. If you want credit turn in at the lecture counter prior to the end of class on the assigned date. If you will not be attending class on the date an assignment is due it is your responsibility to turn it in prior to the due date.

Directed readings—During the course you will be provided with 2-3 research articles from analytical journals, which examine a technique relative to this course. You will be required to read the article, summarize the work, and discuss in detail the technique evaluated in the manuscript. This work will be performed individually and the only discussion that you may have regarding this assignment is with the instructor. **Plagiarism of the work or any other work in your summary will result in a grade of 0.**

The following is noted:

Academic dishonesty of any type will not be tolerated and will be dealt with in the most severe manner allowed by UNLV policy. Some examples include plagiarism, sharing work, turning in multiple copies of the same work by more than one individual, copying, etc...

Students have a responsibility to conduct themselves in class and in the libraries in ways, which do not interfere with the right of other students to learn or of instructors to teach.

If you have a documented disability that may require assistance, you will need to contact the Disability Resource Center for coordination in your academic accommodations. The DRC is located in the Reynolds Student Services Complex in Room 137. The DRC can be reached through the following: phone number 895-0866, TDD-895-0652 or [www drcssc@ccmail.nevada.edu](mailto:drcssc@ccmail.nevada.edu).

It shall be the responsibility of the student to notify the instructor no later than the last day of late registration of his or her intention to participate in religious holidays, which do not fall on State holidays or periods of class recess. This policy shall not apply in the event that administering the test or examination at an alternative time would impose an undue hardship on the instructor or the University, which could not reasonably have been avoided

Students are responsible for all information contained in the undergraduate catalog.

TENTATIVE COURSE OUTLINE: *Spring Semester 2008*

Text: Principles of Instrumental Analysis; Skoog, Holler, and Crouch, 6th Edition, Harcourt Brace & Company, Philadelphia (2007).

The following dates should be noted: January 21st MLK day, Feb 18th M Presidents Day Recess, and Mar 15th –23rd Spring Break Recess. ***The final exam for this course is Wednesday, May 14th at 10:10 a.m. in CHE 101.***

The following rough outline is provided to assist your preparation for lectures. Due to the volume of material it is impossible to lecture on every topic. Therefore, it is imperative that you read the text thoroughly to obtain an understanding of material not covered.

<u>Date</u>	<u>Topic</u>	<u>Assignment</u>
<i>Section I: Measurement basics</i>		
1/23	Chpt 1: Sections A to E, Introduction	Read Chpt 5 A to C
1/28	Chpt 5: Sections A to C, Signal To Noise	Read Chpt 6 (A to D)
1/30	Chpt 6: Sections A to D, Introduction to Spectroscopy	Read Chpt 7 (A to F) Read Chpt 8 (B to C1) Read Chpt 9 (A to E)
<i>Section II: Atomic Spectroscopy</i>		
2/4	Chpt 6: Sections A to F, Introduction to Spectroscopy	Read Chpt 11 (A to B-4)
2/11	Chpt 7: Sections A-F, Components of Optical Instruments	
2/13	Chpt 7: Sections A-F, Components of Optical Instruments	Read Chpts 20 (A to C) 13 (A to D)
2/20	Chpt 8: Section B – C1, Introduction to Atomic Spectrometry	
2/25	Chpt 9: A to E, Atomic Absorption Spectrometry	
2/27	Midterm I (Chpts 1,5,6,7)	
3/3	Chpt 9: A to E, Atomic Absorption Spectrometry Chpt 11: Atomic Absorption Spectrometry Sections A to B-4	

3/5 Chpt 11: Atomic Absorption Spectrometry Sections A to B-4
Chpt 20: Sections A to C (20)
Read Chpts 14 (A to D)
15 (A to C)

Section III: Molecular Spectroscopy

3/10 Chpt 13: Introduction to UV/Vis Molecular Spectrometry, Sections A-D
3/12 Chpt 13: Introduction to UV/Vis Molecular Spectrometry, Sections A-D
Read Chpt 16 (A to C)
3/24 Chpt 14: UV/Vis Applications, Sections A-D
3/26 Chpt 14: UV/Vis Applications, Sections A-D
Chpt 15: Molecular Luminescence Spectrometry, Sections A- C
Read Chpt 17 (A to B)

4/2 **Midterm II (Chpts 8,9,11,20,13,14)**

4/7 Chpt 15: Molecular Luminescence Spectrometry, Sections A- C
Read Chpt 22 (A to F)
Chpt 23 (A to C-5)
4/9 Chpt 16: Introduction to IR Spectrometry, Sections A - C
Chpt 17: Applications of IR Spectrometry, Sections A - B
Read Chpt 25 (A to D)
4/14 Chpt 17: Applications of IR Spectrometry, Sections A – B
Chpt 22: An Introduction of Electroanalytical Chemistry, Sections A-F

Section IV: Electroanalytical Chemistry

4/16 Chpt 22: An Introduction of Electroanalytical Chemistry, Sections A-F
Chpt 23: Potentiometry Sections A to C-5
Read Chpt 26 (A to F)
27 (A to D)
4/21 Chpt 23: Potentiometry, Sections A to C-5
4/23 Chpt 25: Voltammetry, Sections A-D
Read Chpt 28 (A-C,F)

Section V: Separation Methods

4/28 Chpt 26: Introduction to Chromatographic Separations, Sections A-F
4/30 **Midterm III (Chpts 15,16,17,22,23)**
5/5 Chpt 26: Introduction to Chromatographic Separations, Sections A-F
Chpt 27: Gas Chromatography, Sections A-D
5/7 Chpt 27: Gas Chromatography, Sections A-D
5/2 Chpt 28: Liquid Chromatography, Sections A, B, and D.
5/14 **Final Exam (10:10 a.m.)**

Homework problems by Chapter

Chapter 1: 1,6-8,9-11

Chapter 5: 1-3,5-8,10-12

Chapter 6: 1,2,5,7,11,12,14,15,18,19

Chapter 7: 1,2,6,8,11,12,16,19,21

Chapter 8: 7

Chapter 9: 1-4,6,8,9,11-13,16,17,19

Chapter 11: Problems covered in Chpt 20.

Chapter 20: 1,2,5,7,9,11,15,16

Chapter 13: 5-7,10,13,16,17,19,23,24,26

Chapter 14: 1,2,6,8,17

Chapter 15: 1-5,7a-b,7d-f,9,11

Chapter 16: 1,3,5,6,7,8

Chapter 17: 1,2,6-9

Chapter 22: 1,4(1),5,6,8,10,13

Chapter 23: 2,4,5,7,8,11

Chapter 25: 1, 2,3,4,5,12,13,14

Chapter 26: 1-3,6,8,9,11-14,20,21

Chapter 27: 1,4,5,6,8,10,15,16,21,22,25

Chapter 28: 2,4,11,12,15