

## INSTRUMENTAL ANALYSIS - CHEM 4312

Spring, 2009

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T, Th. 8:00-10:00 am  
F. 11:00am –12:00pm  
Open door policies.

**DESCRIPTION:** A scientist has at her or his disposal a variety of sophisticated instrumentation that better enable him or her to answer questions and solve problems. Solutions to problems require the scientist to understand the question and the nature of the answer sought, be able to determine the type and amount of samples needed to answer the question, and to select an appropriate instrumental technique to help solve the problem. This course is designed to help you learn to solve problems using modern instrumentation by solving challenging, "real" problems. You will explore the principles on which major instrumental techniques are based so that you have a full arsenal of ways to solve problems.

### **STUDENT LEARNING OUTCOMES:**

By the end of the course students will be able to:

1. Assess and address the germane challenges associated with a particular analysis;
2. Select an appropriate method or methods to solve a chemical problem;
3. Demonstrate the understanding of modern chemical instrumentation theory

**TEXTS:** *Principles of Instrumental Analysis*, 6th ed., by Skoog, Holler and Nieman (req.)  
*Handbook of Instrumental Techniques for Analytical Chemists*, F. Settle, ed.  
(rec.)

**EVALUATION:** Your grade in this course is determined by your performance on several exams that assess what you have learned in the lecture as well as your ability to evaluate and solve chemical problems. Each graded assignment is listed below along with its weight.

- Total : 500 points**
1. Four exams worth 100 points each;
  2. A standardized ACS exam worth 100 points;

The total number of points you attained on all graded work determines your final grade.

Grade	%
A	90 - 100
B	80 - 89
C	70 - 79
D	60 - 69
F	below 59

The standardized ACS final exam will encompass ideas that you should have learned in both the lecture and laboratory segments of the course.

**IMPORTANT DATES:**

March 25 – Last day to withdraw from the course with a “W”

March 9-13 – Spring break, no classes

May 6 (Wednesday) – Final exam from 10:15am–12:15 pm

**POLICIES:** My expectation is that you will attend all classes unless directed otherwise. There will be regularly assigned readings and occasional problem sets. None of these assignments are graded; they are for your benefit only. The assigned readings from the text are listed on the syllabus. In addition, I will assign articles for you to read. We will discuss these readings and problem sets during class, and I will expect you to participate. These assignments are the minimum I believe is necessary for an average student to understand the subject material. If you are unable to attend a class, it is your responsibility to determine all material discussed and assignments given.

You will be allowed to make up a missed exam with an excused absence. Normally, these reasons would include medical emergencies, a death in your family or required travel for an UT at Tyler’s event (e.g., athletic team travel). If at all possible, please let me know ahead of time if you are not able to take an exam at its scheduled time so that another time for you to take it can be arranged. If the absence is not excused, you will receive zero points for the exam.

**GRADE REPLACEMENT:**

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grape point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)

**NOTE REGARDING STUDENT ABSENCES DUE TO RELIGIOUS OBSERVANCES:**

Students who anticipate being absent from class due to a religious observance are requested to inform their instructor of such absences two weeks before the religious holiday.

**DISABILITY STATEMENT:** If someone wants to request an accommodation due to disability, including a learning disability, please contact Ida MacDonald in the Disability Support Services offices to arrange the appropriate accommodation.

**SOCIAL SECURITY NUMBER:** It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students now have identification numbers that are not related to their social security numbers.

<u>Topic*</u>	<u>Chapters</u>
Sampling, experimental design	1
Electrical Components and Circuits	2
Operational Amplifiers in Chemical Instruments	3
Digital Electronics and Microcomputers	4
<b>Exam I (100 points)</b>	
Measurements and noise	5
Properties of light, optics	6
Lasers, wavelength selectors	7
Atomic absorption spectrophotometry	8, 9
<b>Exam II (100 points)</b>	
Atomic emission spectrophotometry	10
Molecular absorption spectrophotometry	13, 14
Molecular fluorescence	15
IR	16
<b>Exam III (100 points)</b>	
Mass Spectrometry	11
Mass Spectrometry	20
Electrochemical principles, cyclic voltammetry	22, 25, other
Chromatographic principles	26
<b>Exam IV (100 points)</b>	
GC & LC Instrumentation	27, 28
Electrophoresis	30
<b>Final Exam (100 points)</b>	
* Subject to changes	