

Office of Academic Affairs  
Tarleton State University  
January, 2003

Master Course Syllabus Outline

Department: Chemistry and Geosciences Course Prefix/Number: **CHEM 4084**

Official Course Title: **Instrumental Analysis**

Master Syllabus Approved by Department on: \_\_\_\_/\_\_\_\_/\_\_\_\_  
month date year

I. Catalog Description (50 words; brief synopsis of course content, emphases)

A study of the theory and use of instruments for chemical analysis. Techniques include absorption spectroscopy, nuclear magnetic resonance, atomic absorption, flame emission, mass spectroscopy, chromatography, potentiometry, and polarography.

II. Prerequisites?

CHEM 3074 and 1 semester of organic chemistry or approval of department head

III. Expanded Course Description (150 words; primary course content, intended student level and role(s) course is to play in the curriculum)

A study of the theory and use of instruments for chemical analysis. Techniques include absorption spectroscopy, nuclear magnetic resonance, atomic absorption, flame emission, mass spectroscopy, chromatography, potentiometry, and polarography.

The course consists of 2 lecture hours and one six (6) hour lab period for 4 hours of college credit and is offered each spring semester.

This is the second of a two-semester analytical chemistry sequence, is required for all chemistry majors, and is usually taken in the junior or senior year.

IV. Intended Student Learning Outcomes? Required; **knowledge outcomes** (what students who successfully complete the course will be expected to know). Optional; **skill outcomes** (what students who successfully complete the course will be able to do). Optional; **value outcomes** (what students who successfully complete the course will value or appreciate).

**Knowledge outcomes:**

Upon completion of this course, the student will understand:

1. basic theory of electromagnetic radiation.
2. components of optical instruments.

3. basic principles of optical atomic spectroscopy.
4. theory, instrumentation, and applications of:
  - a. atomic absorption and atomic fluorescence spectroscopy.
  - b. atomic emission spectroscopy.
  - c. atomic mass spectroscopy.
  - d. ultraviolet / visible molecular absorption spectroscopy.
  - e. molecular luminescence spectroscopy.
  - f. infrared spectroscopy.
  - g. Raman spectroscopy.
  - h. nuclear magnetic resonance spectroscopy.
  - i. molecular mass spectroscopy.
5. basic theory of electroanalytical chemistry.
6. theory and instrumentation of potentiometry, coulometry, and voltammetry.
7. basic chromatographic theory.
8. principles and instrumentation of gas chromatography and high performance liquid chromatography.

**Skill outcomes:**

Upon completion of this course, the student will be able to

1. demonstrate safe laboratory practices.
2. collect, record, analyze, and report analytical data.
3. perform chemical analyses using the instruments listed above.

**Value outcomes:**

Upon completion of this course the student will have an understanding of the principles and practices of modern Analytical Chemistry.

V. Unless otherwise stipulated in this master syllabus by the department, the following items are subject to faculty discretion as described in each faculty member's individual course outline/syllabus:

- a) Course Requirements? (grading/evaluation procedures; class attendance policy; term papers, projects, field assignments; examinations; class participation, etc.)

For this course, your grade will be determined in the following manner:

Lecture Grade:		50%
3 exams	60%	
Homework	10%	
Final Exam	30%	
Laboratory Grade		50%
Unknown Results	50%	
Lab Reports	30%	
Final Exam	20%	

Make-up exams will be by permission of the instructor. Please contact the instructor immediately after the missed exam to make arrangements.

b) Required Text(s)?

"INSTRUMENTAL ANALYSIS" by Skoog, Holler, and Nieman, 5<sup>th</sup> ed.

b) Bibliography?

Department Head Signature/Date:

\_\_\_\_\_  
Signature

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
Date