

# INSTRUMENT ANALYSIS

## CHEM 3525

### *Syllabus*

**Spring 2005**  
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#### **I. Course Objectives**

This course will discuss the principles and operational aspects of chemical analysis using a variety of instrumentation. By understanding the fundamental principles of operation for measuring devices, a chemist can make reasonable choices among the alternatives to solve a particular analytical problem. The application of various instrumental methods will be explored in detail. The goal of this course is to give the student an understanding of the most commonly used analytical instruments in many laboratories today.

#### **II. Course Outline**

##### **A. Introduction to Instrumentation**

1. Review of concepts in chemical analysis
2. Operational Amplifiers
3. Basic Electrical Circuits
4. Fundamentals of Solid-state Electronics
5. Signal and Noise
6. Electromagnetic Radiation: A Closer Look

##### **B. Introduction to Optical Spectroscopy**

1. Instrumentation of optical spectrometry
2. UV-Vis spectrometry
3. Applications in UV-Vis spectrometry
4. Fluorescence and Phosphorescence
5. Atomic Absorption Spectroscopy
6. Atomic Emission Spectroscopy
7. Infrared Spectrometry

##### **C. Chromatography**

1. Principles of chromatography
2. Instrumentation and application in gas chromatography
3. Instrumentation and application in high-performance liquid chromatography.
4. Other chromatographic techniques

##### **D. Other Techniques**

1. Mass spectrometry
2. Nuclear magnetic resonance

3. Electroanalytical methods
4. X-ray Spectroscopy

### III. TEXT

Lecture: *Principles of Instrumental Analysis*, 5th edition, by Skoog, Holler, and Nieman; Saunders College Publishing, Philadelphia, 1998. (ISBN: 0-03-002078-6)

Laboratory: Laboratory assignments will be given on a weekly basis. A laboratory fee of \$10 is charged to cover laboratory handout photocopying and miscellaneous charges.

Notes will be presented in PowerPoint format in most cases. These notes should be only considered as a supplement to the text and not a replacement.

### IV. GRADING SYSTEM

#### A. Evaluation Procedures

1. Homework assignments
  - a. Problems assigned in class will **not** be taken up for grade.
  - b. Special assignments will be given randomly to be graded, i.e., library assignments.
2. Quizzes
  - a. Quizzes are **typically given weekly** (usually Fridays) and may be unannounced.
  - b. Quizzes will represent 12.5% of your total grade.
3. Exams
  - a. The section exams will represent 37.5% of your total grade. These exams are typically a combination of matching or multiple choice, problem solving, and essay questions. Four section exams will likely be given periodically over the course of the semester. If you have conflicting commitments, arrange an alternative time **prior** to the exam. Only the three highest exam grades will be used for your grade.

#### **TENTATIVE EXAM DATES**

Exam 1	Tues., Feb. 8
Exam 2	Tues., March 8
Exam 3	Tues., April 12
Exam 4	Thurs., May 5

These section exams will be given in the evenings. Alternative arrangements can be made if you are unable to attend during the scheduled period.

- b. The final exam will be given during "finals weeks" and will represent 25% of your total grade. The final exam will be comprehensive.
4. Laboratories
  - a. Laboratory reports are **due in one week** following experiment. All reports should be prepared using a word processor and spell-checked. Late reports are penalized 2 points for each day late. After 2 weeks, you have lost all possible points.

- b. The laboratory notebook will be used only to collect data and record experimental observations (data). Laboratory notebooks will be taken up randomly and graded for completeness, format, and neatness.
- c. All laboratory experiments **must be completed** in order to receive a grade for the laboratory portion of this class.

## B. Grading Standards

1. The lecture portion of this course will contribute 75% of the overall grade.
  - a. The ten best quiz grades and special assignments will count as 12.5%.
  - b. The section exams are worth 12.5% each (drop the lowest) for a total of 37.5%.
  - c. The final exam is worth 25%.
2. The laboratory portion of the course will contribute 25% to your overall grade.
3. Letter grade assignments: A≥85.0%, B≥75.0%, C≥65.0%, D≥55.0%, and F<55.0% of the  
over all possible points.

## V. AMERICAN WITH DISABILITIES ACT

Any student needing special accommodations due to a physical, mental or learning disability should contact Mrs. Susan Dodson, the Coordinator for Student Disability Services, Hallie McKinney, Room 111B or call (580) 745-2394 (TDD# 745-2704). It is the responsibility of each student to make an official request to the Coordinator for academic accommodations.

## VI. CLASS POLICIES

- (A) Attendance
  1. Regular lecture attendance is expected, however you are not penalized for not attending lectures. Late assignments will not be accepted.
  2. Laboratory and exam attendance is mandatory unless **prior** arrangements are made.
- (B) Laboratory / Safety Rules
  1. Safety glasses **must** be worn at all times by every person who steps into the laboratory. **NO EXCEPTIONS**. Failure to observe this precaution or other safety practices will result in reduction of grade and/or dismissal from the course.
  2. A laboratory coat is recommended during the experiments.
  3. **Only** closed toed shoes will be permitted in the laboratory. No flip-flops, sandals, or other open-toed shoes are allowed.
  4. Smoking, eating, and drinking in the laboratory are prohibited at all times.
  5. No unauthorized preparation or experiments are to be attempted at any time.