

**CHE 340-01  
ANALYTICAL CHEMISTRY**

Instructor: Dr. Vinay Kumar  
SC 446  
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Office Hours: 9-9:50 a.m. MW  
and 10:50-11:45 a.m. TR

Fall 2003

OTHER HOURS BY APPOINTMENT ONLY

**COURSE**

- OBJECTIVES:**
1. To provide a fundamental knowledge of the principles underlying the various chemical, electroanalytical, and spectrophotometric methods of quantitative analysis.
  2. To show how principles of analytical chemistry are applied in chemistry and related disciplines—especially in life and environmental sciences.

**TEXT:** *Quantitative Chemical Analysis*; Daniel Harris, sixth ed. (2003); W.H. Freeman and Co.

**Note:** The purchase of the Solutions Manual to this textbook is highly recommended.

**TENTATIVE COURSE OUTLINE:** The following chapters will be covered in the order shown below: Pages/sections to be Covered or skipped will be announced in the class.

**Note:** All items on this syllabus are subject to change by the instructor. Students are responsible for reading and understanding all items on this syllabus. Any items not understood must be brought to the attention of the instructor within the first two weeks of class.

<u>Chapter</u>	<u>Chapter title</u>
0	The Analytical Process
1	Measurements
3	Experimental Error
4	Statistics
6	Chemical Equilibrium
7	Let the Titration Begin
8	Activity
10	Monoprotic Acid-Base Equilibria
11	Polyprotic Acid-Base Equilibria
12	Acid-Base Titrations
13	EDTA Titrations
14	Electrochemistry
15	Electrodes and Potentiometry
17	Electroanalytical Techniques
18	Spectrophotometry
23	intro to Chromatography
25	HPLC

**TENTATIVE EXAM SCHEDULE:** 1st Test : Fri. Sept 26\*  
2nd Test: Fri. Oct. 24\*  
3rd Test : Fri. Nov. 21\*  
Final : Wed. Dec. 17

- \* Test dates will be confirmed at least a week before the exam.

Important Dates:

Fall break: Oct. 20-21

LAST DAY TO WITHDRAW WITH A "W" GRADE: Oct. 31

LAST CLASS: Fri. Dec. 13

GRADE: The grade for the course will be based as follows:  
Each of the three one-hour tests and the comprehensive final will count 25% toward the grade.

MAKE-UP TEST POLICY: No make-up tests will be allowed for any reason. A student missing a test must make an appointment to see the instructor. On latter's discretion, the student may get a make-up or the final exam may count an additional 25%. This policy will not apply for more than one missed test.

## MISCELLANEOUS

### What's an analytical chemist?

The analytical chemist has an extensive knowledge and understanding of the fundamental principles underlying the methods of chemical and instrumental analyses. By applying these principles, he can 1) modify the existing methods of analysis, 2) devise new methods and instruments, 3) adapt developed instrumentation to analytical purposes. An analytical chemist is fully aware of the limitations imposed by these principles (and methods) and is prepared to take such limitations into consideration when evaluating the reliability of the analytical data obtained by the methods under application. To appreciate the role of an analytical chemist, see examples below:

### TYPICAL EXAMPLES OF WHAT AN ANALYTICAL CHEMIST DOES (ILLUSTRATIVE ONLY)

- \* Determines the type of chemical analysis or test to be performed on chemicals and materials to establish their properties, characteristics, and chemical compositions.
- \* Conducts quantitative and qualitative chemical analyses by using the principles and practices of general analytical chemistry methods such as gravimetric, titrimetric, optical, electrical, and/or chromatographical; analyzes complex mixtures of substances for drugs, toxic organics, metals, aerollergens, radioactive levels, asbestos and analyzes construction materials to determine compliance with standards; monitors pollutants in air or water; may recommend courses of action for consideration by superiors.

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- \* Participates with a higher level chemist or engineer in investigating industrial water or air pollution problems; participates with engineering and/or inspectional personnel or personally samples hazardous or toxic materials on local or remote sites; investigates customer complaints concerning water quality.
- \* Performs assigned research tasks that are used to determine effectiveness of water or wastewater treatment methods, to improve analytical methodology or to determine the source of evidence; evaluates laboratory tests results in the area of concern.
- \* Prepares technical reports and department policy or policy papers resulting from analysis or research findings; performs comprehensive literature search; discusses data and issues with colleagues; compiles information and submits verbal and written reports to supervisors.
- \* Operates computer consoles to analyze results of tests or to perform mathematical calculations involved in the analyses of substances.
- \* Appears in court to testify on individual findings of chemical and physical tests.
- \* Performs related work as required.