

Bulletin Description:

**CHEM 2223 - Quantitative Analysis Laboratory**

(1.0 cr; Prereq-2222; A-F or Aud, fall, spring, summer, every year)

Lab companion to 2222 involving the quantitative analysis of organic and inorganic samples using classical and instrumental techniques. Students are instructed in the use of classical and modern computer-controlled instrumentation and techniques, as applied to the acquisition and analysis of experimental data.

Concurrent registration in Chem 2222 is required.

Textbook and Materials:

1. Laboratory Manual for Chemistry 2223, UMD Chemistry Department, Spring 2008
2. Laboratory Notebook (National Comp Book 43-46x or AMPAD Comp Book 26-25x)
3. Your textbook from Chem 2222. (Skoog, West, Holler and Crouch, Analytical Chemistry, An Introduction, Seventh Edition, Saunders, 2000, or equivalent)

Lab Fees: Certain consumables and breakage for lab items may be charged to your U-card.

Computing: Computers are available in the laboratory for some experiments. However, you must have access outside the laboratory to a computer with Microsoft Excel. You may use your own computer or purchase access to the campus computer labs.

Grading: Documentation and accuracy of laboratory determinations, laboratory notebook and laboratory practice.

Instructor: Donald Poe, Professor, 333 Chem, 726-7217, [dpoe@d.umn.edu](mailto:dpoe@d.umn.edu), [www.d.umn.edu/~dpoe](http://www.d.umn.edu/~dpoe)  
Course website: <http://www.d.umn.edu/~dpoe/chem2223/>  
Office hours: Posted on website  
Teaching Assistants: TBA.

Format: One 3-hour lab per week, as registered, in Chem 232/238.

DESCRIPTION AND GOALS

This course provides a basic introduction to laboratory operations in chemical analysis, including titrimetric and instrumental methods. The student will learn the basic laboratory techniques and operations required to obtain precise and accurate results for representative chemical analytical methods.

Other Information

Individuals who have any disability or physical condition (including pregnancy or allergy), which might affect their ability to participate in this class are encouraged to inform their instructor at the start of the semester. Adaptation of the methods, materials or testing may be made as required for equitable participation.

This material is available in alternative formats to individuals with disabilities upon request. Please contact Penny Cragun, Access Center, 726-8727.

### Checking In

Check equipment in locker assigned against list. If any items are broken or missing, see the instructor about replacing them. Inspect the following items very carefully.

- 1) Burets and pipets: If tips are chipped, replace. Check buret for leakage.
- 2) Inspect all glassware for cracks and chips. Replace if defective. Obtain your instructor's signature on the equipment list after you have completed the inspection of your equipment.

### Laboratory Schedule

Lab work begins during the first period. Bring goggles and a lab notebook. The projected start date for each experiment is shown. Lab reports are due at the indicated period.

Experiment	Start Period	No. of Periods	Report Due	Group Size	Goggles Required	Accuracy (Analyzed Unknown)	
	Check in and balance instruction	1	1		No*		
1	Calibration of Volumetric Glassware (pipet only)	1	0.5	2	1	No*	-
2	a) Dilution and Titration Exercise	2	0.5		1	Yes	-
	b) Determination of Replaceable Hydrogen.	2	3	5	1	Yes	100
3	Calibration Curves and Linear Regression Analysis	5	1	5	1	No*	-
4	Introduction to pH Measurement and Buffer Behavior.	6	1	8	1	Yes	-
5	Determination of Sodium Carbonate by Potentiometric Titration.	7	1	8	1	Yes	100
	Instruction and preparations for remaining experiments	8	1				
6	Spectrophotometric Determination of Iron with 1,10-Phenanthroline (rotations)	9-12	1	**	1	Yes	100
7	Determination of Water Hardness by Titration with EDTA (rotations)	9-12	2	**	1	Yes	100
8	Gas Chromatography (rotations)	9-12	1	**	2	Yes	100
	Repeat any experiment as needed.	13	1		Yes		
	Check out	14			No*		

\*If any hazardous chemicals or solutions or used by any student during these periods, all students must wear goggles unless the chemical are entirely contained within a fume hood. In the latter case, the student(s) working in the fume hood must wear goggles.

\*\*Report due next lab period following scheduled period.

The final lab period for each section will be reserved for cleanup and check out. No laboratory work will be permitted during that period. ALL notebooks must be submitted for final grading on or before your last scheduled laboratory period.

### Grading

Notebook and lab practice (40%) and accuracy of analyses (60%). Minimum requirements to pass course include successful completion of all laboratory work and associated reports, including satisfactory results on at least 4 of the 5 analyzed unknowns. Students must follow laboratory safety and chemical hygiene procedures.