

**Spring 2005**

**Chemistry 225: QUANTITATIVE ANALYSIS**

Instructor: Dr. Igor Lednev

Office hour: Fridays, 9:30-10:30 a.m.

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Text: Skoog, West, Holler and Crouch, "Analytical Chemistry. An Introduction", 7<sup>th</sup> edition

Course Outline:

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Approximate Date	Chapter	Subject
W Jan 19 M Jan 24	1, 3 and 4	Introduction, Concepts, Chemical Equilibrium
W Jan 26 M Jan 31	8	Gravimetric Analysis
W Feb 2 M Feb 7	5, 6 and 7	Errors, Statistics, and Signals and Noise
W Feb 9	10A	Mass/Charge-Balance Equations
<b>M Feb 14</b>	Recitation	
<b>W Feb 16</b>	TEST # 1	
W Feb 23	11	Titrations
M Feb 28 W Mar 2	12	Acid/Base Titrations
M Mar 7	13	Titrating Polyfunctional Acids and Bases
W Mar 9	14	Applying Neutralization Titrations
M Mar 14	15	Complexation and Precipitation Titrations
W Mar 16 W Mar 30	15	EDTA Titrations
<b>M Apr 4</b>	Recitation	
<b>W Apr 6</b>	TEST # 2	

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M Apr 11	21	Spectrophotometry
W Apr 13	23	Applying Molecular and Atomic Spectroscopic Methods
M Apr 18	16	Electrochemistry
W Apr 20	17	Redox Titrations
<b>W Apr 27</b>	Recitation	
<b>M May 2</b>	TEST # 3	
<b>W May 11</b>	Final Exam	10:30 – 12:30 a.m.

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The schedule of lectures is tentative, although every effort will be made to stay on schedule. The dates of the tests, however, are definite. Each test will cover the material presented in lectures up to the date of the test.

Grading Policies:

Three tests and the final exam	20% each
Laboratory	35%
Homework	5%

The best three scores from the three tests and the final exam will be used for the final grading, which will be done using an absolute scale.

Tests and the final exams:

The course is divided into three approximately equal parts. Three 50-min tests will be on the material covered in class up to the time of the test and since the last test.

The final exam will be made up of all the material covered in class.

All three tests and the final exam are compulsory for all students. If one of the tests or the final exam is missed, that test/final exam will be dropped from the final grading. If two or more tests/final exam should be missed for valid and appropriate reasons an oral test/final exam may be arranged.

Laboratory work grating:

A 10-min quiz will be given prior each experiment on Wednesday beginning at 1:40 pm. The minimum score of 70% is required on the quiz to be allowed to proceed with the experiment. Should you fail, the next opportunity to take the quiz will be at 4 p.m. during the same lab session. To pass a quiz, you need to understand clearly (i) how to perform an experiment and (ii) how to treat the obtained data.

Complete reports, including a complete 4 x 6 index card, should be submitted no later than the lab meeting following completion of the experiment. Lab reports will lose 5 points/day if late, and will not be accepted (grade 0), if more than a week late. Up to 80% of lab grade is based on the accuracy and precision of the results (and I use your 4 x 6 card to determine this). The remaining 20% is based on the completeness and quality of your report, including calculations. A grade of 50 on the report means the report must be corrected and resubmitted on a new due date. The grade will be reduced by 10 points after every revision. When resubmitting do not remove or obscure any of the original. Resubmit the entire original report, along with any added corrections and a new 4 x 6 card. Labs finished, or reports returned with a 50 grade, on check-out day are due no later than the final exam. NOTE: All six determinations you do will be graded (none are “dropped”), and basic lab average is the average of all work done.

Homework:

Turn in your homework before the lecture begins on a due day. The homework will be examined to ensure that it is completed on time and that you have attempted to solve all problems. You should make sure to discuss any homework problems you are having trouble with during my office hour. You are unlikely to do well in class if you cannot do the homework.

Office hour:

My office hour will be on Fridays from 9:30 a.m. to 10:30 a.m. I encourage you to come to my office hour to ask questions and to discuss any problems. I will work diligently helping students be successful in the course.

## HOW TO DO WELL IN THE COURSE:

- ✓ Do reading assignments prior to the date of the lecture.
- ✓ Come to every class.
- ✓ After class, revise the notes and reread relevant part of the reading assignment.
- ✓ Do homework on time.
- ✓ Prepare for, come to, and work hard in laboratory.
- ✓ Come to talk with me during my office hour.

Laboratory Schedule:

Date	Exp #	Subject
W Jan 19		Check-in, general lab introduction. <u>Quiz for exp. B-1</u> includes Chapter 2, Chapter 8 and 27B-1 (pages 729 and 730)
W Jan 26 W Feb 2 W Feb 9	B-1	Gravimetric determination of chloride.
W Feb 16 W Feb 23	C-8	Determination of KHP
W Mar 2 W Mar 9	D-2	Determination of chloride
W Mar 16 W Mar 30	I-3 (modified)	Vitamin C determination

Choose at least two additional experiments from the list below – minimum of six total.

Date	Exp #	Subject
W Apr 6 W Apr 13 W Apr 20 W Apr 27		Check-out (you must check out even if withdrawing early or risk a HOLD)
Spectrophotometry	L-2 L-3 L-4	Iron with 1,10-phenanthroline Manganese in Steel, Standard Addition Spectrophotometric determination of pH
Fluorescence	L-5	Acetylsalicylic Acid in Aspirin

Homework:

Due Date	Chapter	Problems
M Jan 24	3	3 - 4, 3 - 5, 3 - 7 a, 3 - 9 a, 3 - 11 a, 3 - 16 a
W Jan 26	4	4 - 1, 4 - 2, 4 - 4, 4 - 6 a,b, 4 - 7 a, 4 - 10 a, 4 - 11
M Jan 31		
W Feb 2	8	8 - 1 a, b, d, f, 8 - 2 a, b, d, e, g, 8 - 4, 8 - 10, 8 - 12, 8 - 22
M Feb 7	5	5 - 1, 5 - 2, 5 - 3, 5 - 4, 5 - 8 a, 5 - 10 a
W Feb 9	6 and 7	6 - 2 b,c,d, 6 - 3, 6 - 5 A (a,b,d), 7 - 1 A
M Feb 14	10A	10 - 4 a,c, 10 - 6 a,c, 10 - 7 a
M Feb 28	11	11 - 2, 11 - 3, 11 - 8 a, 11 - 19, 11 - 34
W Mar 2		
M Mar 7	12	12 - 1, 12 - 3, 12 - 18, 12 - 23, 12 - 47
W Mar 9	13	13 - 1, 13 - 3, 13 - 4 c, e, g, 13 - 6, 13 - 10 a
M Mar 14	14	14 - 1, 14 - 3, 14 - 8, 14 - 10 a and the standard deviation, 14 - 14 a, b
W Mar 16		
W Mar 30	15	15 - 18 a, c, e, 15 - 19 a, e, 15 - 20 c
M Apr 4	15	15 - 12, 15 - 14 a, c, e, 15 - 16
W Apr 13	21	21 - 2, 21 - 6 a,c,e,f, 21 - 7 a,d, 21 - 8, 21 - 14 a,c, 21 - 15 a,c, 21 - 19, 21 - 21 a,b,c
M Apr 18	23	23 - 13, 23 - 15, 23 - 17, 23 - 16, 23 - 18
W Apr 20	16	16 - 1 a,b,c,e, 16 - 2 a,c, 16 - 3 a,b,c, 16 - 5, 16 - 13 a,b
W Apr 27	17	17-8a, 17-9a, 17-12a