CHEM 226 Quantitative Analysis

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XAVIER UNIVERSITY

Instructor: Dr. Supaporn Kradtap Hartwell
Contact: Logan Hall, Room 304 A, email: kradtaps@xavier.edu Phone: 745-3397
Office hours: M W F 11.00 AM-12.00 N and T R 2.15-3.00 PM
Class meetings: T R 1.00- 2.15 PM Room 101 Logan Hall

Course description: Quantitative chemical analysis including statistical data treatment. Theories and applications of volumetric and gravimetric analyses.


Prerequisites: Chem 162 (Gen. Chem. II) minimum grade of D
Please bring calculator to class

Tentative Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 13-29</td>
<td>Introduction to analytical chemistry and quantitative analysis, units of measurement, stoichiometry, and solution preparation Calibration of glassware/apparatus (Chapter 1, 2 (2.1-2.8) &amp; 5)</td>
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<tr>
<td>T Feb 3</td>
<td>TEST # 1</td>
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<tr>
<td>Feb 5 –Mar 17</td>
<td>Determination of concentration (external standard, standard addition, internal standard calibration) Errors and statistical treatment of data Figures of merit Method validation (Chapter 1 (p.13-16), 3, 4 &amp; 5)</td>
<td>No class on Mar 2-6 (Spring break)</td>
</tr>
<tr>
<td>Th Mar 19</td>
<td>TEST # 2</td>
<td></td>
</tr>
<tr>
<td>Mar 24 - April 28</td>
<td>Gravimetric analysis Introduction to volumetric (titrimetric) analysis, reagents and standard (Chapter 10, 5 (5.4-5.7) &amp; 6) Acid-base equilibria and acid-base titration Precipitation equilibria and precipitation titration Complex formation and complexometric titration Redox equilibria and redox titration (Chapter 7 (7.1-7.9), 8 (8.1-8.11), 9 (9.1-9.4), 10, 11, 12, 13 &amp; 14)</td>
<td>No class on April 2-6 (Easter break)</td>
</tr>
<tr>
<td>Th April 30</td>
<td>TEST # 3</td>
<td></td>
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<tr>
<td>Th May 7</td>
<td>FINAL EXAM 10.30 a.m. – 12.20 p.m.</td>
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</table>

NOTE: This syllabus is subject to change depending on class progress and extenuating circumstances. Any changes to this syllabus will be announced to the class in as timely a manner as possible.

(see back)
Grading :

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework / Quiz</td>
<td>20 %</td>
</tr>
<tr>
<td>Group work</td>
<td>30 %</td>
</tr>
<tr>
<td>Tests</td>
<td>3 x 12 = 36 %</td>
</tr>
<tr>
<td>Final exam</td>
<td>14 %</td>
</tr>
</tbody>
</table>

**15% of tests and final exam scores will be calculated into Lab scores**

Attendance: Instructor is requested to report attendance record to the Director of the Student Academic Support Service.

Grading scale:  
- A 94-100  
- A- 91-93,  
- B+ 88-90  
- B 84-87  
- B- 80-83  
- C+ 77-79  
- C 73-76  
- C- 70-72  
- D+ 67-69  
- D 60-66  
- F 59 and below

Upon review at the end of the semester, this scale may be adjusted downward.

NOTE :

1) According to the Xavier University Catalog, a grade A is earned for exceptional performance. This is also the grading policy of the faculty in the Chemistry Department. (Department Grading Policies can be found at http://www.xavier.edu/chemistry/dept_policies_grading.cfm)

2) Academic Honesty: Cheating on any test or examination will result in a grade of “F” for the course. The student may appeal according to normal procedures stated in the university catalog.

3) It is the responsibility of the student to inform the instructor at the beginning of the semester of any individual conditions that may require special attention. Appropriate consideration will be given in these situations.

4) Test/Exam absence: In case of sickness, bring letter from doctor and contact the instructor as soon as possible to schedule for test/exam. In case of necessary business e.g. sport meet, family issue, contact instructor in advance with letter from your academic advisor or sport director/coach to schedule for test/exam. Missed test/exam cannot be made up without evidence/document of reasonable excuses.

Student Learning Outcomes: At the end of this course the student will be able to:

- Tell the differences between quantitative and qualitative analysis and understand the steps to carry out quantitative analysis
- Properly calibrate balance and glassware used in quantitative analysis
- Properly record data, validate and report the performance of the analysis based on various statistical data treatment
- Use the computer software Excel to process data
- Understand the two main quantitative analysis methods: gravimetric and volumetric analyses
- Explain various chemical equilibria and variables that affect acid-base, precipitation, complexation reactions
- Have some idea of the similarities and differences in collection of various types of samples