CHEM 3451 Quantitative Analysis

Spring 2015

Course Description: CHEM 3451 (Quantitative Analysis) introduces students to the theory and practice of the quantitative aspects of the basic analytical chemistry. Topics to be discussed in lecture include solution preparation, statistical analysis, equilibrium calculations, titration analysis, electrochemistry, spectrophotometry, and introductory instrumental analysis. (Quant. Lab. CHEM 3452 is a separate course)

(Notice: CHEM 3451 requires extensive calculations based on chemical equilibriums)

Course Objectives:
- Introduce QA as a measurement science that bridges wide range of scientific disciplines.
- Enhance understanding of statistical terminology and its QA applications.
- Provide practices of volumetric and gravimetric analysis.
- Introduce modern instrumental analysis.

Instructor: Prof. F. D’Souza
Voice (940) 369-8832, Chemistry Building, room 307C
E-mail: francis.dsouza@unt.edu


Class Schedule: Tuesday/Thursday, 4:00-5:20 PM.
Chem 106

Office Hours: (Tuesday & Thursday, 2:30 – 3:30 PM) (or by arrangements if need extra help.)

Exams: Three terms exams will be held on Tuesdays of Feb. 24, March 31, and April 28 (100 points each). Please plan accordingly. The lowest test score will be dropped for final grade provided you take ALL three exams and receive >50\% on EVERY exam.
Final exam (100 points) will be comprehensive (Finals: May 12: 1:30 PM to 3:30 PM).

A preparatory quiz will be held on January 22nd 2015 based on selected chapters from Chem 1420 to test your readiness (for no credit; study materials is posted on blackboard “Prep quiz sample questions’ and ‘Answers to prep quiz sample questions’. Also, go over the ‘Basic algebra formulas’ document).

Please note: If UNT is closed on the test date, then the test will be moved to the next class date that UNT is open.

Missing Exam: Plan your schedule accordingly. If you must miss an exam, permission (with proper documentation) must be obtained in advance. Medical absence requires proper doctor’s statement.
Homework: On-line homework assignment – 100 points
Sign-up for Sapling Learning. Assignments will entail mastery performance. There will be a total 20 homework assignments for a maximum of 100 points (each homework assignment is weighed equally). Homeworks are due by the assigned date.

Attendance Policy: Class attendance is required and will be monitored periodically. Students will be dropped for nonattendance after four absences. Students who miss the class are responsible for all the missed class materials that may not be addressed by the instructor in a subsequent class.

➢ Phone Policy: No Phone usages (texting, web surfing etc.) during the class time.

Grading Scale:

<table>
<thead>
<tr>
<th>Final percent Average</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 - 100 %</td>
<td>A</td>
</tr>
<tr>
<td>80 - 89 %</td>
<td>B</td>
</tr>
<tr>
<td>70 - 79 %</td>
<td>C</td>
</tr>
<tr>
<td>60 - 69 %</td>
<td>D</td>
</tr>
<tr>
<td>Below 60 %</td>
<td>F</td>
</tr>
</tbody>
</table>

Chapters to be covered

Chapter

Introduction 1
Chemicals, Apparatus, Unit Operations 2
Spreadsheets in Chemistry 3
Calculations used in Analytical Chemistry 4
Errors in Chemical Analysis 5
Random Errors in Chemical Analysis 6
Statistical Data Treatment and Evaluation 7
Sampling, standardization, and calibration 8
Aqueous Solutions and Chemical Equilibria 9
Effect of Electrolytes on Chemical Equilibria 10
Solving Equilibrium Calculations for Complex Systems 11
Gravimetric Methods of Analysis 12
Titrimetric methods: Precipitation Titrimetry 13
Neutralization Titrations 14
Applications of Neutralization Titrations 16
Complexation Reactions and Titrations 17
Introduction to Electrochemistry 18
Applications of Oxidation/Reduction Titrations 19,20
Introduction to Spectrochemical Methods 24
Molecular Absorption Spectrometry 26
**Distribution of Points:**

<table>
<thead>
<tr>
<th></th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests</td>
<td>200</td>
</tr>
<tr>
<td>Finals</td>
<td>100</td>
</tr>
<tr>
<td>Homework</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
</tr>
</tbody>
</table>

**To Access Sampling Learning**

1. Go to [http://saplinglearning.com](http://saplinglearning.com) and click on your country ("US Higher Ed" or "Canada") at the top right.

2a. If you already have a Sapling Learning account, log in and skip to step 3.

2b. If you have a Facebook account, you can use it to quickly create a Sapling Learning account. Click “Create an Account”, then “Create my account through Facebook”. You will be prompted to log into Facebook if you aren't already. Choose a username and password, then click “Link Account”. You can then skip to step 3.

2c. Otherwise, click "Create an Account". Supply the requested information and click "Create My Account". Check your email (and spam filter) for a message from Sapling Learning and click on the link provided in that email.

3. Find your course in the list (you may need to expand the subject and term categories) and click the link.

4. If your course requires a key code, you will be prompted to enter it.

5. If your course requires payment, select a payment option and following the remaining instructions.

Once you have registered and enrolled, you can log in at any time to complete or review your homework assignments. During sign up or throughout the term, if you have any technical problems or grading issues, send an email to support@saplinglearning.com explaining the issue. The Sapling Learning support team is almost always faster and better able to resolve issues than your instructor.

**To access Blackboard:**

Visit: [https://learn.unt.edu/](https://learn.unt.edu/)

Login using your EUID and Password

Click on Chem 3451 Quantitative Analysis
NOTICE FOR CHEM 3452 (QUANT LAB, MEETS IN CHEM 283)

Lab starts on the week of Jan 26
(1st lab: Check in/Lab Safety)

Notice: More than 15 minutes late will be counted as lab absence.

Note:

I reserve the right to make changes/modifications of the syllabus if needed.

The Chemistry Department believes in reasonably accommodating individuals with disabilities and complies with university policy established under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (1990) to provide equal access and opportunity. Please communicate with your professor as to your specific needs and/or the office of Disability Accommodation (ODA) (Room 321, Union, 565-4323).

Academic Ethics: A high level of ethical conduct will be maintained in this course. Any evidence of an act of academic dishonesty during the exams will result in an automatic F and expulsion from this course. Please adhere to University policies and the UNT Code of Conduct and Discipline with respect to academic ethics and honesty.

http://vpaa.unt.edu/academic-integrity.htm