CHEM 3451 Quantitative Analysis
Spring 2020

Course Description: CHEM 3451 (Quantitative Analysis, QA) introduces students to the theory and practice of the quantitative aspects of the basic analytical chemistry. Topics to be discussed include solution preparation, statistical analysis, equilibrium calculations, titration analysis, electrochemistry, spectrophotometry, and introductory instrumental analysis. (Note: 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.
- Apply equilibrium concepts in chemical 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 term exams will be held on Tuesdays of Feb. 11, March 17, April 21 (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: Tuesday, May 5: 1:30 PM to 3:30 PM).

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 due to a University-approved absence, please see the instructor to discuss the needed accommodations. Permission (with proper documentation) must be obtained in advance. Medical absence requires proper doctor’s statement.
Homework: Working the problems is very important to achieve better understanding of materials taught and good grade in the class. A copy of the solution manual with detailed answers to the problems is reserved in the science library (UNT Willis Library at 1FL Library Services Desk -GRW 06239). Note: the solution manual is not errors free. Homework (handwritten or typed but not photocopied pages, show details of your work) is due week from completing a chapter. Late submission is highly discouraged and will result in partial credit.

Homework problems:
Chapter 4: 2,6,10,14,18,22,26,30,34, and 38 – 10 problems
Chapter 5: 2,4,6,8,10 - 5 problems
Chapter 6: 2,4,6,8,10,12,14 - 7 problems
Chapter 7: 2,4,6,8,10,12,14,16,18,20 - 10 problems
Chapter 8: 2,4,6,8,10,12,14,16,18,20 - 10 problems
Chapter 9: 2,4,6,8,10,14,16,20,24,28 - 10 problems
Chapter 10: 1,2,4,6,10,12,14 - 7 problems
Chapter 11: 2,4,6,8,10,12,14,16,18,20 - 10 problems
Chapter 12: 2,4,6,8,10,12,14 - 7 problems
Chapter 13: 2,4,6,8,10,12,16,18 - 8 problems
Chapter 14: 2,4,6,8,10,12,16,18,28,32 - 10 problems
Chapter 17: 1-5, 8, 12,14,18,22 - 10 problems
Chapter 18: 1-6, 8,10,12 - 9 problems
Chapter 20: 2,4,6,8,10,12 - 6 problems
Chapter 24: 2,4,6,8,12,16,22,24 - 8 problems
Chapter 26: 2,4,8,10,12,14,16 - 7 problems

Attendance Policy: Class attendance is required and will be monitored periodically. Students will be dropped for nonattendance after three 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, headphones, or handheld devices usage (texting, web surfing etc.) during the class time.

Grading Scale:

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

**Chapter** (chapters 2 and 3 are for self-study)

- 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
- Titrmetric methods: Precipitation Titrimetry .... 13
- Neutralization Titrations ............................. 14
- 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 :**

- Tests ........................................... 200 points (best 2 out of 3)
- Finals (comprehensive) ............................ 100 points
- Homework ........................................ 100 points
- Total ........................................... 400 points

**To access UNT-Canvas:**

Visit: [https://unt.instructure.com/login/ldap](https://unt.instructure.com/login/ldap)

Login using your EUID and Password

Click on Chem 3451 Quantitative Analysis

Copies of syllabi, lecture presentations, and other relevant materials will be posted in Canvas to download and study.
NOTICE FOR CHEM 3452 (QUANT LAB, MEETS IN CHEM 283)

Lab starts on the week of Jan 20
(1st lab: Check in/Lab Safety)

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

Note: The instructor reserves 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