Course	**CHEM 2401-003 / Quantitative Chemical Analysis ("QCA")**
Professor	Dr. Nimanka Panapitiya
Term	Spring 2017
Meetings	Tuesdays & Thursdays / 8.00 AM to 11:45 PM

Professor's Contact Information

Office Phone	972-883-6271
Office Location	BE 3.330
Lab Location	Berkner Hall (BE) Room 2.506
Email Address	nimanka.panapitiya@utdallas.edu
Office Hours	Monday 10-11 AM and by appoinment
Other Info: **Rooms & Times & Teaching Assistant**	**CHEM 2401 / Section 003 (Tuesdays & Thursdays)** SLC 2.202 8:00 – 9:15 am BE 2.506 9.15 – 11.45 am *Note: We read only ___@utdallas.edu Email; We do NOT read WebCT, BlackBoard, or any other blogs.* **TA: Hamilton Lee** **Email Address:** hxl154130@utdallas.edu **Office Hour: Office Hour Location:**

General Course Information

Pre-requisites, Co-requisites, & other restrictions	CHEM 1312 and 1112 (General Chemistry II Lecture and Lab).
Course Description	A study of theories, applications, and calculations involved in methods of analysis, and the practice of volumetric, gravimetric, and spectrophotometric methods.
Learning Outcomes	*Objectives:* This course emphasizes the theory, applications, and calculations involved in the methods of analysis; and the theory and practice of volumetric, gravimetric, and spectrophotometric methods of analysis. *Expected Learning Outcomes* *Students should be able to:* 1. Solve stoichiometric and other analytical calculations 2. Demonstrate their ability to carry out quantitative volumetric, photometric, and potentiometric determinations 3. Explain the necessity for and use of error estimates and statistical methods 4. Master the use of spreadsheets like Excel 5. Operate at a level of good laboratory practice including safety and cleanliness 6. Implement a professional-level lab notebook 7. Construct professional-level lab reports
Required Materials	• "Quantitative Chemical Analysis, 9th ed." by Daniel C. Harris or any other www.whfreeman.com/qca8e • Two pad locks (combination or keyed) and a folder/binder for handouts • "Cold Springs Harbor Research Laboratory Notebook (NB)" This 8.5"x11" NB was chosen since it has *carbon-copy pages*.
Supplemental Material & Info	• Other course materials may be recommended or required. • Gen Chem I and II TA Office Hours: visit the GEMS Center for schedules. • Tutors: See the Chem. Dept. AA (BE 2.312) for a list of private tutors.

Schedule & Academic Calendar

Meeting	Date	Lecture and/or Activity	Lab Exp.#	Due Dates
01 T	01/10	Welcome to the World of Analytical Chemistry / Excel & Word / Lab Safety		
02 TH	01/12	Linear Regression / Schedules / Grading	Drawers	
03 T	01/17	Volumetric Flask Calibrations	Calibrate Flasks	
04 TH	01/19	Pipette Calibrations / Lab NoteBooks	Calibrate Pipettes	
05 T	01/24	Buret Calibrations / Lab Reports	Calibrate Your Buret	
06 TH	01/26	Experiment #6 / Statistics Lectures	Calibrate Your Buret	
07 T	01/31	Acids, Bases, Buffers, Titrations	Exp. 6	Buret Graph
08 TH	02/02	Acids, Bases, Buffers, Titrations	Exp. 6	
09 T	02/07	Lab Reports / Midterm Problems	Exp. 6	
10 TH	02/09	Acids, Bases, Buffers, Titrations	Exp. 8	
11 T	02/14	More Titrations / Discuss Midterm	Exp. 8	Exp. 6
12 TH	02/16	The pH of High-Purity Water	pH meters	
13 T	02/21	Acids, Bases, Buffers, Titrations	Exp. 7	
14 TH	02/23	Working Midterm Problems	----------	Exp. 8
15 T	**02/28**	**Midterm Exam**	----------	
16 TH	03/02	Electrochemistry	----------	Exp. 7
17 T	03/07	Potentiometric Titrations	Exp. 16	
18 TH	03/09	Analytical Sampling	----------	
MARCH 13 to MARCH 18			**SPRING BREAK**	
19 T	03/21	EDTA Titrations	Exp. 12	Exp. 16
20 TH	03/23	EDTA Titrations	Exp. 12	
21 T	03/28	EDTA Titrations	Exp. 12	
22 TH	03/30	Spectrophotometry and Calibrations	Exp. 20	
23 T	04/04	Spectrophotometry and Calibrations	Exp. 20	Exp. 12
24 TH	04/06	Analytical Separations	Exp. 27	Exp. 27
25 T	04/11	Analytical Separations	Exp. 27	Exp. 27
26 TH	04/13	More spectrophotometry	IA LAB	
27 T	04/18	How much caffeine is in Mountain Dew ?	Exp. 23	
28 TH	04/20	More Calibrations and Course Review	Exp. 23	Exp. 20
29 T	04/25	Final Exam Review	Drawers	Exp. 23
Final Exam		**TBA**		

Course Policies

Experiments

Harris 9ed Exp #	Title	PDF Page #
6.	Preparing Standard Acids and Bases	34
8.	Analysis of a Mixture of Carbonate and Bicarbonate	40
7.	Using a pH Electrode for an Acid-Base Titration	37
16.	Potentiometric Halide Titration with Ag^+	71
12.	EDTA Titration of Ca^{2+} and Mg^{2+} in Natural Waters	58
20.	Spectrophotometric Determination of Iron in Vitamin Tablets	83
27.	Properties of an Ion-Exchange Resin	102
23.	Spectrophotometric Analysis of a Mixture: Caffeine & Benzoic Acid	90

Safety

IMPORTANT: In accordance with University and Chemistry Department safety rules, any time anyone (student, TA, instructor, or visitor) is in a lab, Z87-rated safety eyewear must be worn. The first violation in the semester will result in a warning and removal from the lab until the safety eyewear is in-place. The second violation in the semester will result in dismissal from that lab period with no extra time being allowed for make-up of the work scheduled for that lab period. Similar penalties will apply if any other safety rules are violated. In summary, all students are responsible for all information inside the undergraduate safety manual; it is located at:

www.utdallas.edu/nsm/chemistry/resources/safety.html

In addition, please refer to the supplemental handout concerning optical and electrical safety issues.

Lab Reports

Each student will prepare their own Lab Report for all 8 experiments based on the guidelines described in the Handout "Writing a Laboratory Report". The Lab Report for Exp. 6 will be evaluated but it will not count towards your grade. The remaining 7 Lab Reports are each worth 7 pts. Your 6 best Lab Reports will be summed for your final Lab Report Score (42 pts. Total).

Please refer to the Class Schedule/Calendar for all Lab Report Due Dates. Lab Reports are due at the beginning of class. Late Lab Reports will be penalized at a deduction rate of 21% per week. No final lab reports will be accepted after 04-26-2016.

If a student does not perform an Experiment, the student will receive zero (0) points for the corresponding Lab Report. Make-up of lab periods/experiments missed (for valid medical or emergency reasons) will be attempted based on the availability of the apparatus, SLC 3.220, and the professor & TA.

• If you wish to submit an exam or lab report for a re-grade because you believe you lost points unfairly, you must do so within the next class meeting of receiving your quiz, exam, or lab report; meaning within 48 hours.
• Your entire exam and/or lab report will be re-graded, not just the particular problem you pointed out.
• Quizzes will not be re-graded.

Lab NoteBooks

Each student must bring his or her Lab NoteBook to UTD every Tuesday and Thursday. Each student must keep his or her own neat and orderly Lab NoteBook using ink. Please put your name and a date on every NoteBook page you use. In addition, be sure to include data labels and units on all tables and graphs. Drawing chemical structures and balanced chemical reactions in your NoteBook is highly encouraged. Additional tips for keeping a professional NoteBook can be found on page 22 of your textbook. Your NoteBook must be signed and dated by your TA (or professor) at the end of any day you spend working in the lab.

Lab Technique

Each student will be evaluated with respect to their: adherence to good safety practices, laboratory technical skills, and laboratory etiquette/professionalism. The evaluations will be made by your TA (with the professor) at the end of each Experiment (9 pts. total). If one does not attend, one cannot earn Technique Points.

Quizzes	The majority of Quizzes will be administered after the Midterm Exam and before the Cumulative Final Exam. There will not be make-up quizzes; a missed quiz equates to zero (0) points. There will also be one Take-Home Statistics Quiz in the first month.
Midterm Exam	The Midterm Exam **(Wednesday, March 01)** will focus on Equilibrium, Acids and Bases, pH and pKa Calculations, Buffers, and Titration Curves. There will not be a make-up Midterm Exam; a missed Midterm Exam equates to zero (0) pts. Students must take the Midterm corresponding to the Section they are enrolled in.
Final Exam	The Final Exam is Cumulative There will not be a make-up Final Exam; a missed Final Exam equates to 0 pts. Students must take the Final Exam corresponding to the Section they are enrolled in. **Section-003 Final = Friday, May 05 @ 11.00 AM**
Grading (credit) Criteria	**Summary of Points:** Lab Reports & NoteBook Pages — Pts. 42 Lab Technique — 9 Special NoteBook Assignment (Exp.12) — 4 Buret Calibration Graph — 4 Quizzes — 6 Midterm Exam — 11 Cumulative Final — 24 Total 100 *Quizzes, the Midterm, and The Final will be different for each Section.* Your final letter grade for the course will be determined using a scale such as the one below where the class average is set at the "B-/C+" border (e.g., 79.5 points): A+ 97 & above; A 93-96; A- 90-92; B+ 87-89; B 83-86; B- 80-82; C+ 77-79; C 73-76; C- 70-72; D+ 67-69; D 63-66; D- 60-62; F 59 & below *Sections -001, -002, and -003 are unique courses and are not graded together.*

Make-up Exams	*vide supra*
Extra Credit	**None ☺**
Late Work	*No assignments will be accepted after the conclusion of "Final Exams Week" ☺.*
Special Assignments	**Students are financially responsible for items checked-out of the stockroom ☹.**

Course Policies
The University's policies and procedures segment of course syllabi can be found at
http://provost.utdallas.edu/syllabus-policies/

These descriptions and timelines are subject to change at the discretion of the Professor.