Course	**CHEM 2401-001 / Quantitative Chemical Analysis ("QCA")**
Professor	Dr. Dushanthi Dissanayake
Term	Fall 2019
Meetings	Mondays & Wednesdays / 12:00 – 3:45 pm

Professor's Contact Information

Office Phone	972-883-3992
Office Location	Berkner Hall (BE) BE 2.316
Email Address	dxd122030@utdallas.edu
Office Hours	Mondays 10-11 am and Fridays 2-3 pm and by appointment
Other Info: **Rooms & Times & Teaching Assistant**	**CHEM 2401 / Section 001 (Mondays & Wednesdays)** SLC 2.302 12:00 – 1:15 pm BE 3.102 1:15 – 3:45 pm BE 2.506 1:15 – 3:45 pm *Notes: We read Emails only from ___@utdallas.edu senders; and, We do NOT read/use WebCT, eLearning, BlackBoard, etc.* **TA:** Yafen Tian **Email Address:** yxt180000@utdallas.edu **Office Hour:** TBD **Office Hour Location:** TBD

General Course Information

Pre-Requisites	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, calculations, and practice involved in volumetric, gravimetric, and spectrophotometric methods of analysis (in other words: "What Analytical Chemists Do"). *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, 7th, 8th, 9th, or 10th ed." by Daniel C. Harris http://bcs.whfreeman.com/webpub/chemistry/qca9e/Catalog_Resources/QCA9eStudentExperimentsforwebsite29Mar2015.pdf • One pad lock (combination or keyed) and a big 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	• The Office of Undergraduate Education https://oue.utdallas.edu/ • Gen Chem TA Office Hours: visit SLC 3.409 for their weekly schedules. • Please go to the Chem. Dept. Mailroom (BE 2.502) for a list of private tutors.

Schedule & Academic Calendar

Meeting	Date	Lecture and/or Activity	Lab Exp.#	Due Dates
01 M	8/19	Welcome to the World of Analytical Chemistry /Schedules/Grading/Lab Safety		
02 W	8/21	Linear Regression / Excel & Word	Drawers	
03 M	8/26	Pipette Calibrations / Lab NoteBooks	Calibrate Your Pipettes	
04 W	8/28	Buret Calibrations / Lab Reports	Calibrate Your Pipettes	
M	9/02	Labor Day Holiday	----------	
05 W	9/04	Statistics Lectures	Calibrate Your Buret	
06 M	9/09	Experiment #6 / Statistics Lectures	Calibrate Your Buret	
07 W	9/11	Acids, Bases, Buffers, Titrations	Exp. 6	Buret Graph / Stat Quiz
08 M	9/16	Acids, Bases, Buffers, Titrations	Exp. 6	
09 W	9/18	Lab Reports / Midterm Problems	----------	
10 M	9/23	Acids, Bases, Buffers, Titrations	Exp. 8	
11 W	9/25	More Titrations / Discuss Midterm	Exp. 8	Exp. 6 / Calculations
12 M	9/30	The pH of High-Purity Water	pH meters	
13 W	10/02	Acids, Bases, Buffers, Titrations	Exp. 7	
14 M	10/07	Midterm Review / Exp. 7 Report Format	----------	Exp. 8
15 W	**10/09**	**Midterm Exam**	----------	
16 M	10/14	Electrochemistry	----------	Exp. 7
17 W	10/16	Potentiometric Titrations	Exp. 16	
18 M	10/21	NoteBook Assignment (NBA) Part I	Analytical Sampling	
19 W	10/23	EDTA Titrations	Exp. 12	
20 M	10/28	EDTA Titrations	Exp. 12	NB Pages
21 W	10/30	Spectrophotometry and Calibrations	Exp. 12	Exp. 16
22 M	11/04	Spectrophotometry and Calibrations	Exp. 20	
23 W	11/06	Spectrophotometry and Calibrations	Exp. 20	
24 M	11/11	Analytical Separations	----------	Exp. 12
25 W	11/13	Analytical Separations	Exp. 27	
26 M	11/18	More Spectrophotometry	IA Lab Tour	Exp. 27
27 W	11/20	How Much Caffeine is in Mountain Dew?	----------	Exp. 20
	11/25-30	Fall Break	----------	
28 M	12/02	More Calibrations/ NBA-II/Course Review	Exp. 23 / Drawers	
29 W	12/04	Final Exam-Review	Exp. 23 / Drawers	
Final Exam	**12/11/2019**	**Wednesday 11.00 AM – 1.45 PM**	**SLC 2.302**	Exp. 23

Course Policies

Experiments	Harris Exp # Title 9th Edition 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 uploaded on eLearning. In addition, arms, legs and feet should be **covered** in lab. Short pants and skirts (which expose calves or thighs) are not allowed. Sleeveless shirts (including spaghetti strap shirts), or shirts that expose your midriff are also not allowed—however, a lab coat may be worn over these shirts during lab. Closed-toed shoes that **fully** cover your foot are also required. Hair longer than shoulder length must be put up in an appropriate manner to keep it out of harm's way. Lab coats will be obtained from the dispensing machines in the BE building. The instructor will provide you with an access card for dispensing lab coats. Lab coats are single use and will be put in the soiled bin upon completion of the lab.
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 (3 % per day). 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, BE 2.506, and the professor & TA.
Lab NoteBooks	Each student must bring his or her Lab NoteBook to UTD every Monday and Wednesday. 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 25 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, October 09, 2019)** 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-001 Final = 12/11/2019 Wednesday 11.00 AM – 1.45 PM SLC 2.302**
Grading (credit) Criteria	**Summary of Points:** Lab Reports & NoteBook Pages — 42 Pts. Lab Technique — 9 Special NoteBook Assignment (Exp.12) — 2 Buret Calibration Graph — 4 Quizzes — 8 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 & -003 & -004 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.**
Class Attendance and Citizenship	*If a student is enrolled in Section-001, that student cannot attend Section-002 or -003 or -004 meetings (and vice versa). In addition, it is typical for CHEM-2401 activities to utilize the entire 225 minutes of class time such that students cannot simultaneously enroll in other classes whose meeting days and times conflict with those of the CHEM 2401 section they are enrolled in.*
Technical Support	If you experience any problems with your UTD account you may send an email to: assist@utdallas.edu or call the UTD Computer Helpdesk at 972-883-2911.

Other Official UT Dallas Policies and Procedures	*The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.* *http://go.utdallas.edu/syllabus-policies*

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