



Course	CHEM 2401 / Quantitative Chemical Analysis ("QCA")
Professor	Dr. Haines
Term	Spring 2008
Meetings	MW; 8:30 am –12:15 pm

Professor's Contact Information

Office Phone	972-883-4542
Office Location	Berkner Hall (BE) Room 2.518
Email Address	haines@utdallas.edu
Office Hours	Monday and Wednesday 1:30–2:30 pm
Other Information	<p style="text-align: center;"><u>Room / Times</u></p> FN2.104 08:30 - 09:45 a.m. BE 3.314 09:45 - 12:15 a.m. We will also use BE3.102, the laptop computer lab, for some lectures and data analysis. Dates and times will be announced. TA: Mary Osasere

General Course Information

Pre-requisites, Co-requisites, & other restrictions	CHEM 1312 and 1112 (General Chemistry II Lecture and Lab).
Course Description	A study of the theory, applications, and calculations involved in the methods of analysis; theory and practice of volumetric, gravimetric, and spectrophotometric methods.
Learning Outcomes	<p><u>Objectives</u> 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.</p> <p><u>Expected Learning Outcomes</u> Students should be able to:</p> <ol style="list-style-type: none">1. Solve stoichiometric and other analytical calculations2. Demonstrate their ability to carry out quantitative volumetric, photometric, and potentiometric determinations3. Explain the necessity for and use of error estimates and statistical methods4. Master the use of spreadsheets like Excel5. Operate at a level of good laboratory practice including safety and cleanliness6. Implement a professional-level lab notebook7. Construct professional-level lab reports
Required Texts & Materials	"Quantitative Chemical Analysis, 7th ed." by Daniel C. Harris www.whfreeman.com/qca "Cold Springs Harbor Research Laboratory Notebook" This 8.5"x11" notebook was chosen since it has carbon-copy pages.
Supplemental Texts, Readings, & Materials	<ul style="list-style-type: none">• Students are financially responsible for any item checked out of the stockroom.• Other course materials may be recommended or required.• Gen Chem I and II TAs: visit BE 3.502 for a list of their office hours.• Tutors: See the Chem. Dept. AA (BE 2.312) for the updated list of tutors.• General Chemistry version 3.0 (interactive DVD-ROM covering one year of freshman general chemistry); available through CSA or at www.t2i2edu.com

Schedule & Academic Calendar

	<u>Lecture</u>	<u>Chapter</u>	<u>Lab</u>		<u>Labs Due</u>	<u>Quiz Due (by 5pm Wednesday)</u>
M	1/7 Introduction	0,1,2				
W	1/9 Introduction	0,1,2		Safety and Check in		
M	1/14 Error and statistics	3,4	1	Calibration of Volumetric Glassware		
W	1/16 Error and statistics	3,4	1	(continue exp)		Quiz 1
M	1/21 HOLIDAY	HOLIDAY	HOLIDAY	HOLIDAY	HOLIDAY	
W	1/23 Calibration and Qual. Assur.	5		(no lab - catchup day) Statistical Evaluation of Acid-Base Indicators	Lab 1 Due	Quiz 2
M	1/28 Equilibrium	6	5			
W	1/30 Titrations	7	5	(continue exp)		Quiz 3
M	2/4 Activity	8	6	Preparing Standard Acid and Base		
W	2/6 Advanced equilibria	8	6	(continue exp)	Lab 5 Due	Quiz 4
M	2/11 Exam 1					
W	2/13 Acids and Bases	9	7	Using a pH electrode for an acid base titration		
M	2/18 Acids and Bases	10	7	(continue exp)	Lab 6 Due	
W	2/20 Acids and Bases	11	8	Analysis of a mixture of carbonate and bicarbonate		Quiz 5
M	2/25 Acids and Bases	11	8	(continue exp)	Lab 7 Due	
W	2/27 EDTA Titrations	12	11	EDTA Titration of Ca and Mg in natural waters		Quiz 6
M	3/3 EDTA Titrations	12	11	(continue exp)	Lab 8 Due	
W	3/5 Exam 2					
M	3/10 SPRING BREAK				Lab 11 due by 5pm Friday 3/9/08	
W	3/12 SPRING BREAK			SPRING BREAK	SPRING BREAK	
M	3/17 Advanced Equilibria	13	15	Potentiometric Halide Titration with Ag+		
W	3/19 Intro to Electrochemistry	14	15	(continue exp)		Quiz 7
M	3/24 Electrochemistry	15	15	(continue exp)		
W	3/26 Electrochemistry	16	19	Spectrophotometric Analysis of Iron in Vitamins		Quiz 8
M	3/31 Electrochemistry	17	19	(continue exp)	Lab 15 due	
W	4/2 Spectrophotometry	18	19	(continue exp)		Quiz 9
M	4/7 Spectrophotometry	18	22	Spectrophotometric Analysis of a Mixture (Caffeine Benzoic)		
W	4/9 Spectrophotometry	19	22	(continue exp)	Lab 19 Due	Quiz 10
M	4/14 Exam 3					
W	4/16 Analytical Separations	23	26	Properties of an Ion-Exchange Resin	Lab 22 Due	
M	4/21 Analytical Separations	23	26	(continue exp)		
W	4/23 Analytical Separations	23	26	Exp + Checkout of lab		Quiz 11
M	4/28 Final exam review and course review				Lab 26 Due	
M	5/5 Comprehensive Final Exam (8:30am)					

Course Policies

	Harris Exp #	Title	PDF Page #
Experiments	1.	Calibration of Volumetric Glassware	2
	5.	Statistical Evaluation of Acid-Base Indicators	15
	6.	Preparing Standard Acids and Bases	18
	7.	Using a pH Electrode for an Acid-Base Titration	19
	8.	Analysis of a Mixture of Carbonate and Bicarbonate	22
	15.	Potentiometric Halide Titration with Ag ⁺	40
	11.	EDTA Titration of Ca ²⁺ and Mg ²⁺ in Natural Waters	29
	19.	Spectrophotometric Determination of Iron in Vitamin Tablets	48
	22.	Spectrophotometric Analysis of a Mixture: Caffeine & Benzoic Acid	54
	26.	Properties of an Ion-Exchange Resin	66
Safety	<p>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</p>		
Lab Reports	<p>Each student must prepare his or her own Lab Report for all 10 experiments based on the guidelines described in the Dr.P.'s Handout "Writing a Laboratory Report". The Lab Report for Exp. 1 will be evaluated but it will not count towards your grade. Each Lab Report will be worth 6 pts. Your 8 best Lab Reports will be summed for your Lab Report Score (48 pts. Total).</p> <p>Please refer to the Class 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). No late material will be accepted after the final exam.</p>		
Lab Notebooks	<p>Each student must bring his or her Lab Notebook to Berkner 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 (and in your Lab Reports) 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 at the end of any day you spend working in the lab.</p>		
Lab Technique	<p>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 (10 pts. Total). If you do not attend, you can not earn Technique Points.</p>		
Quizzes	<p>Quizzes will be in class, take home, and/or on WebCT. Most will be on WebCT.</p>		
Midterm Exams	<p>The Midterm Exams will be (Monday, February 12; Wednesday March 7; Monday April 16th). There will not be make-up Midterm Exams; a missed Midterm Exam equates to 0 pts, which will leave your other two exams as your best two.</p>		
Final Exam	<p>The Final Exam (Monday, May 5th at 8:30am-10:45am) is cumulative. Note that the final exam schedule says 8:00am, but we will start at our normal class time and use 2 hr and 15 minutes for the exam.</p>		

Grading (credit) Criteria	Summary of Points:																																									
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="text-align: right; border-bottom: 1px solid black;"><u>Pts.</u></th> </tr> </thead> <tbody> <tr> <td>Lab Reports & Notebooks (Best 8)</td> <td style="text-align: right;">48</td> </tr> <tr> <td>Lab Technique</td> <td style="text-align: right;">10</td> </tr> <tr> <td>Quizzes (Best 8 of 11)</td> <td style="text-align: right;">8</td> </tr> <tr> <td>Midterm Exams (Best 2 of 3)</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Cumulative Final</td> <td style="text-align: right; border-bottom: 1px solid black;">14</td> </tr> <tr> <td style="text-align: right;">Total</td> <td style="text-align: right;">100</td> </tr> </tbody> </table> <p>Your final letter grade for the course will be determined using the following scale:</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 15%;">A+</td> <td style="width: 35%;">97 & above</td> <td style="width: 15%;">C</td> <td style="width: 35%;">73-76</td> </tr> <tr> <td>A</td> <td>93-96</td> <td>C-</td> <td>70-72</td> </tr> <tr> <td>A-</td> <td>90-92</td> <td>D+</td> <td>67-69</td> </tr> <tr> <td>B+</td> <td>87-89</td> <td>D</td> <td>63-66</td> </tr> <tr> <td>B</td> <td>83-86</td> <td>D-</td> <td>60-62</td> </tr> <tr> <td>B-</td> <td>80-82</td> <td>F</td> <td>59 & below</td> </tr> <tr> <td>C+</td> <td>77-79</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Pts.</u>	Lab Reports & Notebooks (Best 8)	48	Lab Technique	10	Quizzes (Best 8 of 11)	8	Midterm Exams (Best 2 of 3)	20	Cumulative Final	14	Total	100	A+	97 & above	C	73-76	A	93-96	C-	70-72	A-	90-92	D+	67-69	B+	87-89	D	63-66	B	83-86	D-	60-62	B-	80-82	F	59 & below	C+	77-79	
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Make-up Exams	None																																									
Extra Credit	None																																									
Field Trip Policies Off-Campus Instruction & Course Activities	<p><i>Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm. Additional information is available from the office of the school dean. Below is a description of any travel and/or risk-related activity associated with this course.</i></p> <p><NONE></p>																																									
Technical Support	<p>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.</p>																																									
Student Conduct and Discipline	<p>The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD printed publication, <i>A to Z Guide</i>, which is provided to all registered students each academic year.</p> <p>The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the <i>Rules and Regulations, Series 50000, Board of Regents, The University of Texas System</i>, and in Title V, <i>Rules on Student Services and Activities of the university's Handbook of Operating Procedures</i>. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391) and online at http://www.utdallas.edu/judicialaffairs/UTDJudicialAffairs-HOPV.html</p> <p>A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.</p>																																									

<p>Academic Integrity</p>	<p>The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.</p> <p>Scholastic Dishonesty, any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.</p> <p>Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.</p>
<p>Copyright Notice</p>	<p>The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials, including music and software. Copying, displaying, reproducing, or distributing copyrighted works may infringe the copyright owner's rights and such infringement is subject to appropriate disciplinary action as well as criminal penalties provided by federal law. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. As a UT Dallas student, you are required to follow the institution's copyright policy (Policy Memorandum 84-I.3-46). For more information about the fair use exemption, see http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm</p>
<p>Email Use</p>	<p>The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.</p>
<p>Withdrawal from Class</p>	<p>The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.</p>
<p>Student Grievance Procedures</p>	<p>Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's <i>Handbook of Operating Procedures</i>.</p> <p>In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.</p> <p>Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.</p>

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