Course	**CHEM 4473 / Physical Measurements Laboratory**
Instructor	Dr. Warren Goux
Term	Spring 2009
Meetings	Mondays and Wednesdays / 1:30 – 5:15 pm

Instructor's Contact Information

Office Phone	972-883-2660
Office Location	Berkner Hall (BE) Room 3.510
Email Address	wgoux@utdallas.edu
Office Hour	By appointment
Other Information	**Room Availabilities** Mondays and Wednesdays CBW 1.101 1:30 – 2:30 pm Mondays and Wednesdays BE 3.314 2:30 – 5:15 pm Mondays and Wednesdays BE 3.102 3:00 – 4:30 pm **Graduate Student Teaching Assistants (TAs)** Jane Nguyen BE 2.506 972.883.2662 (lab) 214.680.8813 (cell) hnguyen@utdallas.edu Office Hour: M 10 am - noon Pooja Bajaj BE 3.414 214-886-7077 (cell) pxb044000@utdallas.edu Office Hours: TBA

General Course Information

Pre-requisites & other restrictions	CHEM 3472 and CHEM 3321, or consent of instructor.
Course Description	This course emphasizes the techniques and results of physical measurements and the growth and emerging maturity of senior (bio)chemistry majors as young professional scientists. Modules may include topics in physical chemistry and biophysics such as bionanotechnology, calorimetry, centrifugation, computational methods, computer-instrument interfaces, electrochemistry, electronics, kinetics, literature skills, properties of matter, spectroscopy, and statistical methods.
Learning Outcomes	Given access to classroom lectures, to written descriptions of laboratory modules, to laboratory equipment, materials, and supplies, and to assistance from the instructor and teaching assistants, students will: 1. Carry out experimental/computational studies of kinetics, thermodynamics, spectroscopy, and/or computational quantum mechanics. Assessment: by successful performance on graded lab reports/lab notebooks. 2. Be able to demonstrate skilled laboratory work and methods development with physical chemistry equipment. Assessment: (i) by instructor's evaluation of readiness and performance during laboratory periods, and (ii) by successful performance on graded lab reports/lab notebooks. 3. Be able to prepare a draft scientific paper, including necessary revisions, based on one of the lab reports submitted during the semester. Assessment: by successful performance in the preparation of a draft scientific paper, including revisions.
Required Texts & Materials	"Experiments in Physical Chemistry", by C.W. Garland, J.W. Nibler, D.P. Shoemaker, McGraw-Hill, 8th edition, ISBN 978-0-07-282842-9. The purchase of a simple Laboratory NoteBook and Z-87 Safety Eye Protection are required. Other course materials will be given as handouts.
Supplemental Materials	*Physical Chemistry; 2006; by Thomas Engel and Philip Reid* (E&R)*; ISBN 0-8053-3842-X* or any other comprehensive physical chemistry textbook

Table I. Nominal Lecture Schedule

Date	Day	Topic	Reading	Assignment
12-Jan	Mon	Laboratory notebook/report	Chapt 1	
14-Jan	Wed	Treatment of experimental data	Chapt 2	Hmwk 1
21-Jan	Wed	Treatment of experimental data	Chapt 2	pb 1-4
21-Jan	Wed	**Lab check-in**; Spreadsheet calc	Chapt 3	Hmwk 2
26-Jan	Mon	Spreadsheet calculations	Chapt 3	pb 1-4
28-Jan	Mon	Heat capacities of gases	Exp 3; E&R Chapt 1-3	
2-Feb	Wed	Calorimetry	Exp 6&7; E&R Chapt 4	
4-Feb	Mon	Viscosity	Exp 27; E&R Chapt 17	
9-Feb	Wed	Partial Molar Volumes	Exp 9; E&R Chapt 9	
11-Feb	Mon	Surface Tension	Exp 25;E&R Chapt 9	
16-Feb	Wed	Kinetics	Exp 23; E&R Chapt 18	
18-Feb	Wed	Intro to spectroscopy	Handout	
23-Feb	Mon	CD spectroscopy	Handout; E&R	
25-Feb	Wed	Fluorescence spectroscopy	Handout;E&R	
2-Mar	Mon	NMR spectroscopy	Exp 21; E&R	
4-Mar	Wed	NMR spectroscopy		
9-Mar	Mon	Vibrational-Rotational spect	Exp 37; handouts	
11-Mar	Wed	Vibrational-Rotational spect		
16-Mar	-20-Mar	Spring break		
4-May		**Lab check-out**		

Table II. Experiment Due Dates

No.	Date
1	1-Feb
2	11-Feb
3	23-Feb
2	9-Mar
5	30-Mar
6	8-Apr
7	15-Apr
8	27-Apr
9	4-May
10	8-May, 11 am

* Reports may be turned in prior to these dates

Course Policies

Experimental Modules

Each student will perform 10 experimental laboratory modules and submit 10 laboratory reports submitted on or before the due dated listed in Table II. Due to the diversity of topics and the limited time available for lectures you may be required to carry out many experiments prior to the lecture dates listed in Table I in which the background material is covered in class. In these cases you are responsible for acquainting yourself with the background and theory necessary to perform and write-up the modules prior to the in-class lectures. Some of the experiments (5) require synthesis or preparation of standards and samples. For these experiments you may choose to work in pairs. However, each student is responsible for his or her own lab report.

Table III. Laboratory Modules

No.	Exp	Description	Page
1	3	Heat Capacity Ratios for Gases	106
2	7	Strain Energy of the Cyclopropane Ring* Bomb Calorimetry	158
3	9	Partial Molar Volumes	172
4	21	NMR Study of a Reversible Hydrolysis Reaction	263
5	23	Kinetics of the Decomposition of Benzenediazoium Ion*	283
6	25	Surface Tension of Solutions	299
7	27	Intrinsic Viscosity: Chain Linkage in PVA	318
8	Handout	CD Method for Heat Capacity Determination in Proteins*	
9	Handout	A Fluorimetric Approach to Studying the Effects of Ionic Strength on Reaction Rates*	
10	37	Vibrational-Rotational Spectra of HCl/DCl*	416

* Students may work in pairs

A schedule of which students carry out each of the modules on which dates will be provided by the instructor. Two students will be assigned to each of the 10 modules. If the module is not one of those where the students work in pairs then each student must collect his/her own data.

All but two experiments are from the textbook. Handouts will be provided for these two experiments. In addition supplemental material may be provided for experiments out of the text and in some cases, modifications may be made to the experiments in the text.

Lab 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 Dr.P.'s supplemental handout concerning optical and electrical safety issues.

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 the instructor and TAs at the end of each module and included in the lab report grade.
Lab Reports	Each student must prepare his or her own Lab Report for each of the 10 experimental modules based on the guidelines described in Chapt 1 of the text. All lab reports must be typed. Data sections should include graphs and tables of tabulated results. Calculations should be carried out with a spreadsheet and included in the appendix of the report. The appendix should also include copies of relevant notebook pages and raw graphical data. A 'good' Lab Report comprises quality science/data (50%), quality arguments/discussion (40%), and a complete appendix with an appropriately kept Notebook (10%). Discussions should contrast your results to relevant data from the scientific literature. Lab Reports will be collected at the beginning of class. Late lab reports will be penalized at a deduction rate of 20% per week. Any lab report not turned in at the beginning of the lab period on the due date will be considered one week late.
Lab NoteBooks	Each student must bring his or her Lab NoteBook to Berkner every Monday and Wednesday. Failure to do so means that the student is not ready to carry out an experiment and he/she will be asked to leave the lab until the Notebook can be retrieved. 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. Your NoteBook must be signed and dated by your TA at the end of any day you spend working in the lab. NoteBooks will be periodically checked and suggestions will be made as to how the student can improve their Notebook. Since the Notebook pages are included as an appendix in the lab report they will count for 10% of the lab report grade.
Assignments	Two assignments concerning statistics and other chemistry topics, will be administered throughout the semester. There will not be make-up Assignments; a missed Assignment equates to 0 pts. In general, Assignments will be due 7 days after it is announced. Assignments will be collected at the beginning of class. Late Assignments will be penalized at a deduction rate of 20% per week.
Grading (credit) Criteria	The course grade will be based on student performance with respect to: 10 lab reports 100 2 Hmwk assignments 10 Total 110 points There are no exams in Chem 4473 and there is no final exam. The last lab report is due on the scheduled date of the final exam (May 8, 11 am).
Extra Credit	**None**
Late Work	Make-up of lab periods/experiments missed (for valid medical or emergency reasons) will be attempted based on the constraints of the apparatus, BE 3.314, and professor/TA availabilities.
Special Assignments	**None**
Class Attendance	*It is typical for the class activities to utilize the entire 225 minutes of class time such that one can not simultaneously enroll in other classes whose meeting days and times conflict with those of CHEM 4473.*
Classroom Citizenship	*vide supra*
Field Trip	*Off-campus, out-of-state, and foreign instruction and activities are subject to state*

Policies Off-Campus Instruction & Course Activities	*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.* **None**
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.
Student Conduct and Discipline	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, *A to Z Guide*, which is provided to all registered students each academic year. 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 *Rules and Regulations, Series 50000, Board of Regents, The University of Texas System*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. 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 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.
Academic Integrity	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. 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. 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.
Copyright Notice	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 info, see http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm
Email Use	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.
Withdrawal from Class	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, the instructor(s) cannot drop or withdraw any student. The student must do the proper paperwork to ensure that he/she will not receive a final grade of "**F**" in a course if he/she chooses not to attend the class once he/she is enrolled.
Student Grievance Procedures	Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures.* 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 deal 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. 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.
Incomplete Grades	As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of "**F**".

Disability Services	The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m. The contact information for the Office of Disability Services is: The University of Texas at Dallas, SU 22 PO Box 830688 Richardson, Texas 75083-0688 (972) 883-2098 (voice or TTY) disabilityservice@utdallas.edu If you anticipate issues related to the format or requirements of this course, please meet with the Coordinator of Disability Services. The Coordinator is available to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Services to notify them of your eligibility for reasonable accommodations. Disability Services can then plan how best to coordinate your accommodations. It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.
Religious Holy Days	The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated. The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment. If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

All descriptions and timelines are subject to change at the discretion of the instructor.