Course	**CHEM 3321.001**
Professor	Dr. Warren J. Goux
Term	Fall 2006
Meetings	MWF, FN 2.104

Professor's Contact Information

Office Phone	972-883-2660
Office Location	Berkner Hall (BE), room 3.510
Email Address	wgoux@utdallas.edu
Office Hours	MW 10:00 am - noon or by appointment. Please contact me by phone or email before coming to see me outside office hours. This insures that I will be available for you.

General Course Information

Pre-requisites, Co-requisites, & other restrictions	CHEM 2325, PHYS 2325 and MATH 2451, or consent of instructor (CHEM 3361 is recommended).
Course Description	Physical Chemistry I is designed to provide students of chemistry and biochemistry with a fundamental understanding of thermodynamics, chemical and phase equilibria, transport properties and kinetics.
Learning Outcomes	*Objectives* Fundamental properties of macroscopic biophysical chemical systems are introduced and described in quantitative terms. A core of topics in thermodynamics, molecular motion and transport properties and kinetics, is supplemented with topics germane to students taking physical chemistry with biophysical applications. *Expected Learning Outcomes* Upon successful completion of this course, students will therefore: 1. Demonstrate the use of the three laws of thermodynamics in calculating chemical and phase equilibria and assessing the spontaneity of chemical processes; 2. Interpret transport properties, such as diffusion, viscosity, and electrophoresis, in terms of kinetic theory; 3. Explain the rates of chemical reactions and enzyme kinetics in terms of simple models.
Required Texts & Materials	*Physical Chemistry: Principles and Applications in Biological Sciences: Fourth Edition: Tinoco, Sauer, Wang and Puglisi; Prentice-Hall, 2002; ISBN 0-13-095943-X*
Suggested Texts, Readings, & Materials	Selected reading will be assigned from other sources which are relevant to biophysical applications.

Schedule & Topics Outline

Period	Date	Chapt	Topic	Assigned Hmwk
1	18-Aug	2	Work and heat; PV and other work: The First Law	2, 4*, 7, 9*, 11, 16*, 19*
2	21-Aug	2	The First Law; State variables; Paths connecting states	20, 26*, 27*, 29, 34*
3	23-Aug	2	ΔE, ΔH, q, w for different paths; adiabatic processes	
4	25-Aug	2	Cv and Cp; ΔE and ΔH for phase change, chemical rx	
5	28-Aug	2	Thermochemistry; Temperature dependence of ΔH	
6	30-Aug	3	Historical development of entropy; The Second Law	2, 4*, 5*, 6, 8*, 10, 11*
7	1-Sep	3	Entropy and chemical rx; Third Law	14, 15, 16*, 17, 22*, 23*
8	6-Sep	3	Dependence of S on T and P; The Gibbs Function	
9	8-Sep	3	Dependence of G on T and P; Phase changes	
10	11-Sep	3	Relationships between partials; Noncovalent interactions	
11	13-Sep		Review of First and Second Laws	
12	15-Sep		EXAM 1	
13	18-Sep	4	Chemical potential; The equilibrium constant for gases	2*, 5, 6*, 7*, 8, 10, 15
14	20-Sep	4	Nonideal systems; standard states	16*, 20, 22, 27*, 31*
15	22-Sep	4	Standard Gibbs free energy; equilibrium concentrations	
16	25-Sep	4	Temperature dependence of Keq	
17	27-Sep	4	Galvanic cells: biochemical applications	
18	29-Sep	5	Phase equilibria; The Clapeyron equation	3*, 5, 7*, 9*, 10*, 11*
19	2-Oct	5	Multi-component systems; Colligative properties	13, 15, 18, 20*, 24*
20	4-Oct	5	Equilibrium dialysis; Binding of small molec to proteins	25*, 26*, 33
21	6-Oct	5	Free energy of transfer between phases; Donnan effect	
22	9-Oct	5	Membranes; surface free energy and surface tension	
23	11-Oct	5	Active and passive transport	
24	13-Oct		Review of equilibria phenomena	
25	16-Oct		EXAM 2	
26	18-Oct	6	Molecular motion; Maxwell-Boltman velocity distribution	1, 2, 3*, 6*, 7, 10*, 12*
27	20-Oct	6	Collision cross-sections; Diffusion	13, 14*, 17, 22*, 25
28	23-Oct	6	Diffusion; Sedimentation	
29	25-Oct	6	Viscostiy; Electrophoresis	
30	27-Oct	6	Electrophoresis; Determination of molec weights	
31	30-Oct	7	Reactions rates; 1st and 2nd order reactions	1*, 2, 3*, 4, 5, 9*, 10*
32	1-Nov	7	Determination of reaction order; applications	12, 18*, 19*, 20, 24,
33	3-Nov	7	Reaction mechanisms and rate laws; complex reactions	27*, 34, 36*, 37, 44*
34	6-Nov	7	Transition state theory; temperature dependence of rates	
35	8-Nov	7	Salt effects; isotopes; relaxation methods	
36	10-Nov	7	applications	
37	13-Nov		Review of transport phenomena and kinetics	
38	15-Nov		EXAM 3	
39	17-Nov	8	Enzyme kinetics; Michaelis-Menten	1*, 2, 3*, 5, 6*, 8, 11,
40	20-Nov	8	Competition and inhibition	15, 20*, 27*,
41	22-Nov	8	allosteric effects	
42	27-Nov	8	Applications of kinetics in biochemical systems	
43	29-Nov		FINAL EXAM 8:00 – 10:45 am	

Course Policies

Grading (credit) Criteria

Course Evaluation:

(i) Class participation	10%
(ii) Exams, best 2 of 3* (2 x 25%)	50%
(iii) Final Exam	40%

(i) *Homework:* Assigned homework from the text is listed in the schedule. Starred problems may be turned in for grading. Five homework sets turned in for grading can replace your lowest exam score if the average homework score is higher than the lowest exam score. Even if you choose not to turn in homework, working the problems is essential for scoring well on the exams. (Image running a marathon with no training!). Solutions to homework problems will be posted on Blackboard sometime prior to exams. You are ALWAYS welcome (encouraged with open arms!) to visit Dr. Goux and have him help you with these problems. There is no question too trivial.

(ii) *In-class participation*: 10% of your grade will be determined by class participation. Students who ask questions, participate in class problem solving sessions, or regularly visit with the instructor to work on homework problems will receive more credit in this area than those who do not. From time to time class attendance will also be taken and credit will be given for those present. Bring your calculator to class.

(iii) ***There will be no makeup exams given***. The lowest of the 3 exam scores will be dropped. Your hour exam grade will be based on your two highest hour exams OR your highest hour exam and the average score on five graded homework sets (whichever is higher).

Missed Exam: If you have an *acceptable reason* for missing an exam (i.e., documented illness, auto accident, participation in UTD sponsored sporting event, observance of religious holiday) you will be allowed to drop the missed exam with no penalty. If, for any reason, you miss two exams, you will receive a "zero" for the second missed exam. If you do not have an acceptable excuse for missing an exam or you miss an exam due to tardiness (see below) a score of “zero” will be averaged into your exam grade and your second lowest exam score will be dropped.

Exam Format: Exam format will vary from exam to exam. Generally, however, questions on exams will resemble homework problems. Chemistry is a science that requires both memorization and deduction using problem-solving skills. You will be expected to know all of the concepts contained in chapters. You may bring a 3” x 5” card (crib card) to the exam with as many formulas on one side as you can fit. You will NOT be expected to memorize tables of data or physical constants (these will be provided). You may not copy excerpts from chapters on your crib card. If you are unclear on whether other information contained in chapters is allowed on your crib card, it is best to ask your instructor. You will turn in your crib card with the exams.

Be On Time: It is best to be early to exams. This will give you the opportunity to mentally prepare yourself for the exam. ALL 3 “hour” exams will be 50 min long. You may arrive up until the first student finishes his/her exam (grace period), the only penalty being that you will have proportionally less time to finish the exam. After this grace period you will not be allowed

	to take the exam and will receive a score of "zero". Note: There is no way of determining when the first student will finish his/her exam. *Grading errors:* If you feel that an error has been made in grading of your exam you have up until one week after the exam is returned to bring the errors to the attention of the instructor. Errors found after this time will not be considered for more credit. *(iv)* *Final Exam:* The final exam will be comprehensive and cannot be replaced by any other grade, so don't miss it. ***The final exam cannot be dropped.*** *No makeup final will be given*. The final exam will be from 8:00 am – 10:45 am on Nov 29 in FN 2.104. *Final exam questions*: The final exam is comprehensive and approximately the same number of questions will be asked from each of the chapters covered in the text.
Make-up Quizzes & Exams	There are **no make-up exams** (see above).
Extra Credit	There is **no extra credit**. However, you may obtain maximum credit by attending class, taking all the exams and mentally being prepared to participate in class.
Computer	Relevant course material including lecture notes, exam keys, and homework solutions will be posted at http://blackboard.utdallas.edu. You may log onto the Blackboard site using your UTD assigned net ID and password. If you do not know your UTD NetID: * Go to the Blackboard gateway at http://blackboard.utdallas.edu/ * Click on the 'Login' button * Click on the 'Forgot your password?' link * Fill in your first and last name, and your UTD NetID. Please do not use your middle name or initial. Please be sure to capitalize your name appropriately. Please be sure to use the top section, where you enter a username; please do not use the section that asks for an email address. * Using your preferred email client, connect to your UTD email address and retrieve the email that was sent by the Blackboard system when you completed the previous step. Click on the link in the email, or copy and paste it into your browser. * Set your password. If you still have trouble logging onto Blackboard write to bbadmin@utdallas.edu or speak with your instructor. Full credit on quiz 1 will require that you have logged onto the Blackboard website.
Class Attendance	Your attendance and class participation will have an impact on your final grade. Taking an active role in your learning will help you perform better. *Lecture material:* Some Lecture material may be downloaded from the Blackboard site. This material will outline most of the basic concepts presented in class. Unless you come to class you will not be getting all of the material covered in lecture.
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 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, Board of Regents, The University of Texas System, Part 1,*

	Chapter VI, Section 3, 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). 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 includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings. 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.
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. Mail sent to you by the instructor will be sent to your university email address. If you wish to use other email addresses, you will need to visit http://netid.utdallas.edu/ and set up mail forwarding.
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, 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. The last day to drop without a "W" is June 6, 2006. The last day to drop the class with a "WP/WF" is July 5, 2006.
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) Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance. 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.

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