Chemistry 3321 – Physical Chemistry 1 – *Thermodynamics and Kinetics*
Fall 2014

Instructor:
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Required Materials:

Physical Chemistry, 3rd Edition, by Thomas Engel and Philip Reid
Access to *Mastering Chemistry* online homework (available with the Engel & Reid textbook and from http://masteringchemistry.com). The course id for Mastering Chemistry is CHEM3321FALL2014 .

Course Description: This course will cover the following topics: thermodynamics, ideal and real gases, thermochemistry, chemical equilibrium, pure substances, mixtures and solutions, statistical thermodynamics; chemical kinetics, rates, mechanisms, transition state theory.

Course Prerequisites: Students must have completed the following courses with a grade of C or better: Quantitative Analysis (CHEM 2335), Calculus 3 (MATH 2326), and calculus-based Physics (PHYS 1443 and PHYS 1444). Concurrent enrollment in Differential Equations (MATH 3318 or 3319) is recommended.

Student Learning Outcomes: By the end of the semester you should be able to:

- apply the First and Second Laws to understand heat engines, chemical reactors, and biological metabolisms
- derive and use approximate descriptions for non-ideal systems in chemistry (real gases, solutions)
- develop mechanisms of simple reactions, calculate rate laws, and solve them numerically (reactor design)
- understand and use the basic principles of statistical thermodynamics

Course Schedule:
Week 1-3: Thermodynamics, gases, First Law: Chapters 1-4
Week 4-6: Thermodynamics, Second Law, equilibrium and phases: Chapters 5-8
Week 7-9: pure substances, ideal and real solutions: Chapters 9-11
Week 10-12: Statistical Thermodynamics: Chapters 29-32 (excerpts)
Week 13-15: Kinetics, rates, mechanisms, transitions state theory: Chapters (33), 34-36
As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.

Exam Dates: Please note that each exam will be on a Tuesday evening, 6:00-8:30 PM. The location will be announced in class prior to each exam.

Exam 1 (Ch. 1-4)	**Tuesday, September 16, 6:00-8:30 PM**
Exam 2 (Ch. 5-9)	**Tuesday, October 7, 6:00-8:30 PM**
Exam 3 (Ch. 29-32)	**Tuesday, November 4, 6:00-8:30 PM**
Exam 4 (Ch. 35-36)	**Tuesday, November 25, 6:00-8:30 PM**
Final Exam (Comprehensive)	**Monday, December 8, 8:00-10:30 AM**

Other Important Dates:

September 1	Labor Day Holiday; Classes do not meet.
September 8	Census Date
October 29	Last Day to Drop a Class (submit requests to advisor prior to 4:00 pm)
November 27-28	Thanksgiving Holiday; Classes do not meet.
December 3	Last day of classes
December 8	Final Exam, 8:00-10:30 AM

Grading: Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance falls below satisfactory levels.

Homework	10%
In-Class Quizzes	10%
4 mid-term exams	60%
Comprehensive Final Exam	20%

Four mid-term exams will be given. These exams will cover the reading, lecture material, and assigned problems. The final exam will be comprehensive and will be given on ***Monday, December 8, 8:00-10:30 AM***. Grades will be assigned according to the following scale:

Total Numerical Grade	Letter Grade
90-100	A
80-89	B
70-79	C
60-69	D
Below 60	F

No make-up exams will be given, and any missed exams will result in a grade of zero. However, the final exam score will replace the lowest mid-term exam score if it is to the student's benefit.

Homework: The *Mastering Chemistry* online homework system will provide part of the homework grade in this class. Additional homework will be assigned in class and taken up for grading.

In-Class Quizzes: Unannounced in-class quizzes will be given periodically throughout the semester. *No make-up quizzes will be given*; however, the four lowest quiz grades will be dropped. If a student misses a quiz due to absence or tardiness, he or she will not be allowed to make up that quiz regardless of whether the absence is excused or unexcused.

Dropping the Course:
Students may drop or swap (i.e., add/drop simultaneously) classes through self-service in MyMav from the beginning of the registration period through the late registration period. *After the late registration period, students must see their academic advisor to drop a class or withdraw*. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Paperwork: When dropping the course, *you* are responsible for seeing that all of the proper paperwork is completed and submitted to your academic advisor. If this paperwork is not completed, you will receive a letter grade corresponding to your earned grade, including zeros for all missed work.

Attendance: At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. *As the instructor of this section, I have elected to take attendance because most students in Physical Chemistry find that faithful attendance is necessary for succeeding in this course.* However, attendance alone is not sufficient. In order to succeed in the course, you must master the material, and this requires active participation. Participation includes advance preparation of reading assignments, working online homework problems as well as end-of-chapter problems in the textbook, and involvement with classroom discussions. You are responsible for all of the material covered in the lectures, the assigned text, and the problems.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional twelve-to-fifteen hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for class quizzes, and preparing for midterm exams.

Electronic Communication Policy: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. ***All students are assigned a MavMail account and are responsible for checking the inbox regularly***. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Examination Needs: You must bring the following to each examination:

Scientific Calculator (You may not use a graphing calculator or a calculator capable of storing alpha-numeric/textual material.)
No. 2 pencils with eraser
Photo ID, such as UT-Arlington Student ID card or valid Driver's License
Students are not allowed to have access to cell phones during any exam.

Cell Phones: Please silence all cell phones prior to class. *Texting during class is inappropriate and will not be tolerated.*

Course Goals:

Upon completing the course, the student should

1) understand fundamental chemical concepts, including atomic and molecular structure, chemical bonding, some chemical reactions, the relationship of the electronic structure of elements to the periodic table, and periodic physical and chemical properties of elements and compounds;
2) perform quantitative calculations related to chemical stoichiometry, the behavior of gases, and enthalpy changes; and
3) be prepared to enter Chemistry 1442.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Problem-Solving Skills Session: Dr. Rogers will conduct a "Physical Chemistry Problem Session" each Wednesday afternoon, 3:30-5:00 PM in SH 100. Attendance is optional, and students who are unable to attend due to a course conflict will be able to watch the Problem Session on Echo.

Strategies for Succeeding in Chemistry 3321:

1. Attend *every* lecture. Physical Chemistry is an extremely challenging course, and attending every class should be your highest priority.
2. Prior to class, read the chapter which will be covered in lecture.
3. Review your lecture notes after each class. Correct obvious errors and note topics which require further study or clarification.
4. Work all of the suggested homework problems. Do not look in the solutions manual until you have given your best effort to solve the problem on your own.
5. Don't procrastinate. These concepts take time to sink in, and you may have to practice these exercises over a period of many days in order master the necessary skills.
6. Form a study group. This is your first avenue for getting help. Be able to communicate with each other on short notice, not just before class.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Title IX: The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

Academic Integrity: All students enrolled in this course are expected to adhere to the UT-Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
>
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Bomb Threats:
In the event of a bomb threat to a specific facility, University Police will evaluate the threat. If required, exams may be moved to an alternate location, but **exams will not be postponed**. UT-Arlington will prosecute those phoning in bomb threats to the fullest extent of the law.

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911.