Chem 351—Syllabus, Fall 2015

Course Description: Physical Chemistry, 4 semester hours (3 lecture, 4 lab)

Class Time and Location: **Lecture—** MW 9:30-10:45am; Sci 313
Laboratory--M 2:00-5:50pm; Sci 313

Instructor: Dr. Ben Jang; Sci 335, x5383, ben.jang@tamuc.edu

Office Hour: MW 8:00am-9:00am & WR: 2:30pm-4:00pm

Goals of the Course: Introduce the students into the field of physical chemistry and develop an understanding of the fundamentals in physical Chemistry, with emphasis on chemical kinetics, thermodynamics laws, equilibrium and solutions. Problem solving skills are keys to success in the class, and working practice problems is an absolute requirement for good performance on exams.

Course Requirements and Assignments:

Textbook: Physical Chemistry: A Guided Inquiry, Thermodynamics by James Spencer et al.; Published by Houghton Mifflin, ISBN 0-618-30853-9

Physical Chemistry, 4th Ed., Laidler/Meiser, Published by Houghton Mifflin, ISBN: 0-618-12341-5
Experiments in Physical Chemistry, 8th Ed. Garland et al., Published by McGraw Hill, ISBN 978-0-07-282842-9

Grading Procedure:

Quizzes: 20%
Lab: 15%
3 Tests: 45%
Final Comprehensive Exam and ACS Exam: 20%
A: >85.0; **B**: 75.0 ~ 84.9; **C**: 65.0 ~ 74.9; **D**: 55.0 ~64.9; **F**: <55.0

Attendance Policy: All students are expected to attend classes on a regular basis. The Department of Chemistry adheres to the attendance policy set by the University as stated in the most current Undergraduate Catalog. The attendance record is kept by **roll call**. Being more than 5 minutes late or missing a daily quiz is equivalent to missing a lecture. Excessive absence is defined as missing more than 10% of the lectures or more than 10% of the laboratory sessions without excusable reasons. Excessive absence will be reported to the Dean of the College and the Dean of Students. In addition, **according to the TAMU-Commerce Procedure A13.02, if a student has excessive absences, the instructor may drop the student from the course**. The instructor will only excuse an absence if the student provides, with appropriate

documents an excusable reason allowed by the TAMU-Commerce Procedure A13.02. Regular class attendance is necessary in order to pass this course.

Dishonesty:

Cheating on examinations and any other in-class assignments will not be allowed. Any instance of cheating will result in a grade of "F" for that assignment and could result in dismissal from the course. Working together for the post-laboratory or any other take-home assignment is encouraged; however, after the discussion, you should work out the assignments by yourself. Freedom to discuss problems on the homework or post-lab report does not mean that you can copy answers word-for-word. There must be evidence that you worked the problem out on your own. Blatant plagiarism will result in a grade of "F" for the assignment. Proven offenders will be dismissed from this course with a grade of "F" assigned. The offender will be reported to the Dean of the College and the Dean of Students.

Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:
Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library
Room 132
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
StudentDisabilityServices@tamuc.edu

Student Conduct Policy:

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment (see Student's Guidebook, Policies and Procedures, Conduct). Any student engaging in disruptive behavior will be dismissed from class on the first offense. A second offense may constitute dismissal from the course with a failing grade. Students are required to check their university email accounts daily for communication.

How to be Successful in Physical Chemistry

- This is probably the hardest course you have taken or will ever take, and hard work is required; expect to spend 10 to 20 hours per week outside of class studying. Learning requires practice that can only be done by the student alone,

by careful reading and working on exercises; it is as true in learning physical chemistry as it is in any pursuit.

- Attend class regularly; *do not fall behind*.
- Preview lecture/activities content *before* next lecture/activity; reread them afterwards.
- Study all *examples* carefully, filling in the missing steps and checking units at all stages.
- Do problems! Each assigned problem illustrates an important concept -- careful rereading and study of the text is usually required to work problems. Do all the problems assigned; then work some of your own choosing from the others in the chapter!
- Timing is important. Attempt exercises and problems immediately after covering the material; if you can't do them, reread the material. If you still can't do a problem, seek help immediately. This is a time-consuming process, but is important for the learning process. You CANNOT learn physical chemistry the night before an examination.

Class Schedule: (Tentative)

Week	**Lecture/Activities**	**Lab**
WK 1	Introduction to Chemical Kinetics	Check in/Safety
WK 2	Rate Laws	No Lab/holiday
WK 3	Reaction Mechanism and Activation Energy	Lab 1
WK 4	Collision Theory and Reactions	Lab 1
Test I		
WK 5	Work, 1st Law of Thermodynamics	No Lab/Test I
WK 6	Enthalpy	Lab 2
WK 7	Heat Capacity & Enthalpy of Reaction	
WK 8	Entropy & 2^{nd} Law of Thermodynamics	Lab 3
WK 9	3^{rd} Law of Thermodynamics	Lab 4
Test II		
WK 10	Gibbs and Helmholtz Energies	No Lab/Test II
WK 11	Equilibrium and Equilibrium Constant	Lab 4
WK 12	Phase Equilibria for Pure Phases & Phase Diagram	Lab 5
WK 13	Ideal Solution & Chemical Potential	Lab 5/6
WK 14	Partial Molecular Quantities & Colligative Properties	Lab 6
Test III		
WK 15	Review	Test III/Check out
WK 16	Final Exam	

LEARNING OUTCOMES / COURSE OBJECTIVES

1. Understand the concept and applications of conservation of energy (1st law of thermodynamics)
2. Understand the concept that entropy of universe increases for natural processes (2nd law of thermodynamics) and its application to Gibbs energy of the system.
3. Capable of calculating the entropy of different materials based on reversible processes and the 3rd law of thermodynamics
4. Understand the equilibrium constant expression and the conversion between various equilibrium constants
5. Capable of deriving phase diagrams based on data.
6. Capable of obtaining specific properties based on phase diagrams.
7. Apply knowledge and skills to safely operate bomb and solution calorimeters to obtain necessary data to calculate enthalpy of reaction or compound.
8. Apply the conclusions drawn from experiments to strengthen the concepts learned from lectures.
9. Work cooperatively with your team members in lectures and labs..