Department of Chemistry
The University of Texas at El Paso
Physical Chemistry I: Thermodynamics

CHEM 3351 (CRN 11551**)** Fall Term, 2017

Instructor: Prof. Lela Vuković
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Lectures will be held on Monday, Wednesday and Fridays from 9:30 AM – 10:20 AM. Office hours will be held on Tuesdays from 12:00 PM – 13:00 PM (tentative) or by appointment; in case of changes, the class will be informed in time.

Course Description
The objective of this course is to describe the fundamentals of thermodynamics in chemical systems. We will provide a description of matter at the macroscopic level utilizing bulk properties such as density, pressure, volume temperature, and the introduction of other more complex concepts. Basic concepts such as Heat, Work, Internal Energy, and Enthalpy and their relationship to the first law of thermodynamics will be discussed. The second law of thermodynamics and the concept of entropy and the second and third law of thermodynamics. We will discuss chemical equilibrium as it relates to Free energies (Gibbs and Helmholtz). We will revisit ideal gases and discuss concepts related to real gases. We will also cover phase diagrams and the relative stability of solids, liquids, and gases, and if time permits, we will discuss the basics for electrochemistry. We will try to cover chapters 1 to 11 from the textbook. This is a mathematics intensive course, and understanding of integral, differential and multivariable calculus is required. We will follow the textbook.

Textbook:
Physical Chemistry; Thomas Engel, Philip Reid, 3rd. Edition; *Pearson*. If needed, additional handouts will be uploaded on the web and the information will be provided.

Additional reading:
Principles of Physical Chemistry; Lionel M. Raff, Prentice Hall.

Grading:
The grade for this course will be determined by three exams (30% each) and problem sets (10%).

Problem sets will be assigned throughout the course. This is a difficult course. Most of the material will be learned by you outside of class. *Just attending lecture will probably not be enough to pass this course*. It is in your best interest to fully understand the assigned homework. This homework will be graded with **heavy emphasis on the effort, and understanding the concepts**. Students are encouraged to work collaboratively in these problem sets, but the work **must** show individual work. Sets of identical solutions by two or more students will **not** be tolerated. It is in your best interest to do all the problems in the back of each chapter.

Each exam will build upon the previous one, and all material covered will be considered for each exam. (i.e. you should be aware that Exam 2 may include content covered before Exam 1, etc.). In particular, Exam 3 will be a cumulative exam for the whole course.

Random quizzes may be given occasionally during the semester and the percentages will be applied to the homework contribution.

Syllabus (tentative)
1. Fundamental concepts in thermodynamics
2. First law of thermodynamics
3. State functions: enthalpy and internal energy
4. Thermochemistry: Hess law (Exam 1)

5. Second law of thermodynamics
6. Third law of thermodynamics
7. Chemical equilibrium
8. Real gases (Exam 2)
9. Phase diagrams (Solid, liquids, gases)
10. Solutions
11. Electrochemistry (Exam 3)

Course Drop Policy: Drop date deadline is of November 3rd, 2017.
All grades of Incomplete must be accompanied by an Incomplete Contract that has been signed by the instructor of record, student, departmental chair, and the dean. Although UTEP will allow a maximum of one year to complete this contract, the College of Science requests it be limited to month based upon completion data. A grade of Incomplete is only used in extraordinary circumstances confined to a limited event such as a missed exam, project, or lab.

Other considerations: Please turn your cell phones off and keep them away during lectures and practices.

Disability If you believe you may qualify for special accommodations due to disability contact the Disabled Student Services Office: http://sa.utep.edu/dsso; 915-747-5148.