

Course Information		
Course Code, Number & Name	CHM 222 Physical Chemistry	Total Credit hours: 3 Cr.Hrs
Prerequisite/s	CHM 103	
Time, Days & Hall		
Instructor		
Office Location & Tel		
Office Hours		
E-mail		
Teaching Assistant		

Course Description: From the College Catalog

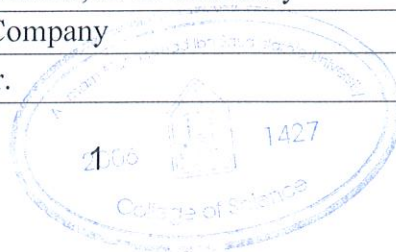
An examination of the laws of classical thermodynamics followed by applications to the properties of gases, liquids, and solids as well as to solutions, phase and chemical equilibria. Kinetic theory of gases at equilibrium.

Course Objectives: To be specified according to the nature and level of the course

1. To know the main gas laws and their applications.
2. To understand the concept of standard state and calculate the changes in thermodynamic functions of pure substances due to change of temperature.
3. To evaluate the change of vapor pressure of pure liquids and solids due to change in temperature.
4. To calculate the heat of reaction from tabulated bond energy values.
5. To comprehend the thermodynamic concept of phase equilibria, chemical equilibria, entropy, and Gibb's free energy.
6. To calculate the rise in boiling point and depression in freezing point of solutions due to salt addition.

Textbook

Title	Physical Chemistry
Author(s)	K. J. Laidler, J. H. Meiser, B. C. Sanctuary
Publisher	Houghton Mifflin Company
Year & Edition	2003, 4 th Ed or later.



Course Content		
Week	Topics to be covered	Chap. in Text.
1	Nature of physical chemistry, system, state and equilibrium .	Ch 1
2	Classical mechanics and properties of gases . Kinetic theory of gases.	Ch 1
3	Gas Laws: Boyle's law, Char'l's and Gay-Lussac's law, Graham's law, ideal gas law, General gas law.	Ch 1
4	Real gas behavior, Van der Waal's equation of state, compressibility factor. Thermophysical properties of pure substances: C_p , C_v , β , γ , κ , vapor pressure, boiling point.	Ch 1
5	Energy, heat, and work. Interaction of heat and work with the system boundaries. The first law of thermodynamics.	Ch 2
6	Thermochemistry : standard state, heat of formation, heat of solution, heat of dilution, heat of reaction, heat of combustion. Exothermic and endothermic reactions. Temperature dependence of the equilibrium constant.	Ch 2
7	The second law of thermodynamics. Carnot Cycle and entropy.	Ch 3
8	Changes of thermodynamic functions: Internal energy, enthalpy and Gibb's free energy. Equations of State.	Ch 3
9	Chemical Equilibrium involving ideal and non-ideal gaseous systems.	Ch 4
10	Chemical equilibrium in solution, heterogeneous equilibria. Factors affecting chemical equilibria.	Ch 4
11	Gibb's phase rule. Phase recognition, phase equilibria of 1-component system. Entropy and phase transition. Clausius-Clapeyron equation. Ideal gas mixtures and liquid solutions. Partial pressure and Dalton's law. Ideal gas mixtures and liquid solutions. Kay's rule and properties of Ideal mixtures and solutions.	Ch 5
12	Solution thermodynamics: Phase diagram, ideal solutions, Raoult's law and Henry's law. Mixing of ideal gases.	Ch 5
13	Thermodynamics of solution. Activities of ions in liquid solutions. Colligative properties: boiling-point elevation and freezing point depression.	Ch 6
14	Chemical kinetics, chemical reaction equilibrium. Gibbs free energy and chemical equilibrium.	
15	Reaction kinetics, 1st and 2nd order reactions	

Assessment Methods		
Assessment Type	Date	Weight %
First Exam	At the end of the 6 th week	25
Second Exam	At the end of the 12 th week	25
Home works	Are due two weeks from assignment time	10
Final Exam	At the end of the semester as per the university schedule	40%
Total		100%

