

CHM222: Basic Physical Chemistry

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Lectures: M, W, & F 1000 – 1100 @ FB426			
Month	Monday	Wednesday	Friday
Jan	8, 15, 22, 29	10, 17, 24, 31	5, 12, 19
Feb	5, 12	7	2, <u>3</u> , 9, 16
Mar	5, <u>10</u> , 12, 19, 26	7, 14, 21, 28	9, 16, 23
Apr	2, 9, 16	4, 11, 18	6, 13, 20

Course Contents: Thermodynamics and Kinetics

- 0th Law of Thermodynamics: Equilibrium, State Functions, Temperature, and Equations of State
- 1st Law of Thermodynamics: Work, Heat, Internal Energy, Heat Capacity, and Concept of Enthalpy.
- 2nd Law of Thermodynamics: Reversible and Irreversible Process, Heat Engines, Carnot Cycle, Different statements of the Second Law, Spontaneous Change, Entropy
- 3rd Law of Thermodynamics: Concept of the absolute zero temperature.
- Free Energy and Standard States: Free energies and Thermodynamic potentials, Legendre Transforms, Equilibrium and Non Equilibrium, Chemical Potentials, Free Energy, Standard States, Reaction Thermodynamics, Equilibrium Constant
- Equilibrium Thermodynamics: Chemical Potential of Mixtures, Phase Equilibrium, Phase Rule, Clapeyron Equation, and Phase Diagram
- Real Gases: Equations of State, Phase Transitions.
- Solutions: Molarity, Partial Molar Quantities, Mixing, Ideal Solutions, Non Ideal Solutions, Electrolytes, Ionic activity and the Debye Hückel Theory, the Nernst Equation, Colligative properties, Multi component phase diagrams
- Kinetic Theory of Gases and Transport Processes: Molecular Theory of Gases, Distribution of Molecular Speeds, Molecular Collisions and Mean Free Path, Maxwell and Boltzmann Distributions
- Reaction Kinetics: Reaction Rates, Rate Laws, Reaction Mechanisms, and Applications

Reference textbooks:

- P. W. Atkins and Julio de Paula, *Physical Chemistry*
- D. A. McQuarrie and J. D. Simon, *Physical Chemistry A Molecular Approach*
- R. S. Berry, S. A. Rice and J. Ross, *Physical Chemistry*
- R. J. Silbey, R. A. Alberty and M. G. Bawendi, *Physical Chemistry*
- I. N. Levine, *Physical Chemistry*

Exams (2017-2018–II Semester)

Quiz-1	[10%]	29-01-2018
Mid-Semester	[30%]	Will be scheduled by DOAA [between Feb 19 th – 24 th , 2018]
Quiz-2	[10%]	26-03-2018
End-Semester	[40%]	Will be scheduled by DOAA [between Apr 22 nd – May 2 nd , 2018]
Assignments	[10%]	Periodic assignments will be supplied during the course.

Note: Attendance is important; encouraged to have minimum 85% in this course.