Curriculum Plan by Dr. Sajid Iqbal

Even Semester (2021-22)

B.Sc. (H) Chemistry (I year) Semester- II

Name of Paper and code: Physical Chemistry II: Chemical Thermodynamics and its Applications, UPC: 32171202

2 Periods per Week

Contents	Allocation of Lectures	Month wise schedule to be followed
Chemical Thermodynamics: Intensive and extensive variables; state and path functions; isolated, closed and open systems. Mathematical treatment - Exact and inexact differential, Partial derivatives, Euler's reciprocity rule, cyclic rule.	4 Lectures	7th April – 3rd week of April
First law: Concept of heat, Q, work, W, internal energy, U, and statement of first law; enthalpy, H, relation between heat capacities, Joule Thompson Porous Plug experiment, Nature of Joule Thompson coefficient, calculations of Q, W, ΔU and ΔH for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions. **Thermochemistry**: Enthalpy of reactions: standard states; enthalpy of neutralization, enthalpy of hydration, enthalpy of formation and enthalpy of combustion and its applications, bond dissociation energy and bond enthalpy; effect of temperature (Kirchhoff's equations) on enthalpy of reactions.	12 Lectures	3rd week of April – 4th week of May
Second Law: Concept of entropy; statement of the second law of thermodynamics, Carnot cycle. Calculation of entropy change for reversible and irreversible processes (for ideal gases). Free Energy Functions: Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity (for ideal gases). Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state.	12 Lectures	4th week of May – 2nd week of July