Programme: M. Sc. Part-I (Chemistry)
Course Code: PCO-401 **Title of the Course: Topics in Physical Chemistry**
Number of Credits: 03 **Effective from AY: 2018-19**

Prerequisites for the course:	Should have studied the courses in Physical Chemistry at F Y B Sc, S Y B Sc and T Y B Sc levels so as to have basic knowledge of Physical Chemistry and basic principles.	
Course Objectives:	1. Introduction of various mathematical concepts forChemistry. 2. Introduction of topics viz. magnetic materials and properties, photochemistry, Nano materials.	
Course Outcomes:	1. Students should be in a position to understand various concepts in physical chemistry. 2. Students should be in a position to apply these concepts during the lab course in physical chemistry. 3. Students shall be in a position to answer the NET / SET examination questions based on these topics.	
Content:	1.**Mathematical Preparations:** 1.1 Introduction to various functions and function plotting (exponential, logarithmic, trigonometric etc.), functions of many variables. Complex numbers and complex functions. 1.2 .Linear equations, vectors, matrices and determinants. 1.3 Basic rules of differentiation and integration, Partial differentiation, location and characterization of critical points of a function, Regression methods, curve fitting. 1.4 Introduction to series, convergence and divergence, power series, Fourier series, Fourier transformations and Numerical methods 2.**Magnetic Properties** 2.1 Types of magnetism (dia, para, ferro, antiferro and ferrimagnetism) Magnetic susceptibility and its determination. 2.2 Magnetization curves and hysteresis, magnetic anisotropy, magnetic exchange interactions, Neel temperature and magnetic transition. 2.3 Ceramic magnetic materials, Applications of magnetic Materials 3.**Photochemistry**: 3.1 Absorption and emission of radiation of photochemical interest. Einstein's equation. 3.2 Jablonskii's diagram illustrating fluorescence and phosphorescence. 3.3 Prompt and Delayed Fluorescence. Factors affecting Fluorescence life time and quantum yield. 3.4 Flash photolysis and lasers. Photosensitised reactions and photosynthesis. 4. **Nanomaterials:** 4.1 Introduction, Chemical synthesis and methods of structural characterization.	18 hrs 08 hrs 06 hrs 04 hrs

	4.2 Areas of application, Societal health and environmental impact.	
Pedagogy:	Mainly lectures & tutorials. Seminars / term papers / assignments / self-study / or a combination of some of these can be used to some extent. Sessions shall be interactive in nature to enable peer group learning.	
References/ Readings	1. P.L. Alger, *Mathematics for Science and Engineering*, McGraw-Hill, New York (1963). 2. E. Kreyszic, *Advance Engineering Mathematics*, Wiley-Eastern, New Delhi (1987). 3. L.N. Muley, *Magnetic susceptibility*, Interscience Publishers, New York (1963). 4. K.K. Rohatgi-Mukherjee, *Fundamentals of Photochemistry*, Wiley Eastern Ltd. New Delhi (1988). 5. G.A. Ozinand A.C. Arsenault, *Nanochemistry: A chemical approach to Nanomaterials*, RSC Publishing, Cambridge, (2005).	