Indian Institute of Technology, Kanpur

Proposal for a New Course

1. Course No: CHM324A
2. Course Title: Basic Physical Chemistry Laboratory
3. Per Week Lectures: 0 (L), Tutorial: 0 (T), Laboratory: 2 (P), Additional Hours[0-2]: ___(A),

   Credits (3*L+2*T+P+A): 0-0-6-0

   Duration of Course: Full Semester
4. Proposing Department/IDP: CHM

   Other Departments/IDPs which may be interested in the proposed course: Only those students who will do major and dual (category B) from other departments.

   Other faculty members interested in teaching the proposed course: All the members of Physical Chemistry Division of department of chemistry
5. Proposing Instructor(s): All the members of Physical Chemistry Division of department of chemistry
6. Course Description: Department Compulsory

A) Objectives: To introduce BS students the basic concepts of solutions, thermodynamics, phase equilibrium, spectroscopy, and quantum mechanics in chemistry through simple experiments.

B) Contents (*preferably in the form of 5 to 10 broad titles)*:

S. No	Broad Title	Topics	No. of Lectures
1.	**Solutions, Thermodynamics and Phase equilibrium**	Calibration of volumetric apparatus. (One day) Determination of partial molal volume. (One day) Determination of the isotherm for a three-component system. (Two days) The measurement of electrical conductance for the determination of the equivalent conductance at infinite dilution. (Two days) Determination of transport number by moving boundary method. (One day) Polarizability from refractive index measurements. (One day)	10
2.	**Kinetics**	Kinetics of fast reactions by stopped-flow technique. (One day) Rate of the hydrolysis of sucrose using polarimeter. (Two days)	4

		Determination of pKa of poly-basic acid with the pH meter. (One day)	
3.	**Spectroscopy**	Analysis of the rotational-vibrational spectra of HCl molecules. (One day) Spectrophotometric determination of the acid dissociation constant (Two days) Fluorescence quantum yield determination of an unknown molecule. (One day) IR and Raman spectroscopy of solvent mixtures. (Two days) Formula and stability constant of a complex by spectrophotometry. (One day) Fluorescence spectrum and stern-volmer quenching constant. (One day) Determination of critical miceller concentration. (One day)	12
4.	**Quantum mechanics**	Computing Potential Energy Surface of molecules using Quantum Mechanics. (Two days)	2
	Total		28

C) Pre-requisites, if any (*examples: a- PSO201A,or b- PSO201A or equivalent*): CHM101

D) Short summary for including in the Courses of Study Booklet: The basic physical chemistry laboratory will introduce students the concepts in solutions, thermodynamics, phase equilibrium, spectroscopy and quantum mechanics through simple experiments and computational methods.

7. Recommended books:

Textbooks:

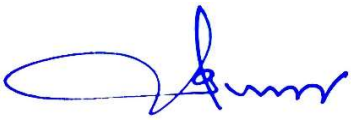
Reference Books:

1. Experimental physical chemistry, F. A. Bettelheim
2. Experimental physical chemistry, G. P. Matthews
3. Experimental physical chemistry, F. Daniels
4. Experimental physical chemistry, A. Halpern and G. McBane
5. Experimental Physical Chemistry, D. P. Shoemaker, C. W. Garland, and J. W. Nibler

8. Any other remarks: None

Dated: 10.05.2022

Proposer: All the members of Physical Chemistry Division of department of chemistry

Dated: 14.05.2022 DUGC/DPGC Convener: 

The course is approved / not approved

Chairman, SUGC/SPGC

Dated:_____