Semester VI						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1		Program Elective-III	2	1	0	6
	PH 203	Quantum Mechanics - I	2	1	0	6
	PH 304	Statistical Physics	2	1	0	6
		Institute Elective – 1	2	1	0	6
		Institute Elective – 2 / Minor Project-1	0	0	6	6
		ALO				
		Total Credits				27

1	**Title of the course** (L-T-P-C)	**Quantum Mechanics - I** **(3-1-0-8)**
2	**Pre-requisite courses(s)**	PH101 MA101
3	**Course content**	Review of Wave mechanics, Schrodinger equation, Uncertainty principle, wave packets, group velocity and phase velocity. Postulates of quantum mechanics, probability and probability current density, operators, eigenvalues and eigenfunctions. Bound states, delta-function potential, and harmonic oscillator. Formalism: Hilbert space, Observables, Eigenfunctions of Hermitian operator, Dirac's notation, matrix representations of vectors and operators, parity operation, matrix theory of harmonic oscillator. Theory of Angular Momentum: Spherical harmonics, eigenvalues of L^2 and L_z, addition of angular momentum, commutation relations, degeneracies. Hydrogen atom, quantum numbers, two particle systems.
4	**Texts/References**	1. Introduction to Quantum Mechanics, D. J. Griffiths and D. F. Schroeter, Cambridge University Press, 3rd edition, 2019. 2. Modern Quantum Mechanics, J. J. Sakurai, Cambridge University Press, 2017. 3. Principles of Quantum Mechanics, R. Shankar, Springer, 2014. 4. Quantum Physics, S. Gasiorowicz, John Wiley, 2000. 5. Quantum Mechanics, L. D. Landau and E.M. Lifshitz, Pergamon press, 1965

1	**Title of the course** (L-T-P-C)	**Statistical Physics** **(2-1-0-6)**
2	**Pre-requisite courses(s)**	None
3	**Course content**	Thermodynamics: Thermal equilibrium, the laws of thermodynamics; temperature, energy, entropy, and other functions of state. Probability Theory: Probability densities, cumulants and correlations; central limit theorem; laws of large numbers. Kinetic Theory: Phase space densities; Liouville's theorem, the Boltzmann equation; transport phenomena. Classical Statistical Mechanics: Postulates; microcanonical, canonical and grand canonical ensembles; Gibb's paradox, non-interacting examples. Maxwell Boltzmann distribution, ideal gas. Quantum Statistical Mechanics: Indistinguishability, Bose-Einstein and Fermi-Dirac distributions and Applications Interacting Systems: Virial and cluster expansions; van der Waals theory; liquid-vapor condensation. Quantization effects in molecular gases; phonons, photons; density matrix formulation. Identical Particles: Degenerate quantum gases; Fermi liquids; Bose condensation; superfluidity.
4	**Texts/References**	**1.** Huang, Kerson. Statistical Mechanics. 2nd ed. Wiley, 1987. **2.** Baierlein, Thermal Physics (Cambridge University Press, 1999). **3.** Pathria, R. K. Statistical Mechanics. Pergamon Press, 1972. **4.** Ma, Shang-keng. Statistical Mechanics. Translated by M. K. Fung. World Scientific Publishing Company, 1985. **5.** J. K. Bhattacharjee, Statistical Physics: Equilibrium and Non-Equilibrium Aspects, Allied Publishes, 2000 **6.** F. Reif, Fundamentals of Statistical and Thermal Physics Statistical Physics :Amit and Verbin, Word Scientific, 1999.