Fourth year of Five Years integrated M.Sc (Physics) | **L** | **T** | **P** | **C**
M.Sc. - IV, Semester –VII | **3** | **2** | **0** | **5**

MP 403 : Advanced Quantum Mechanics

- **OPERATORS** **(05 Hours)**
  Operators and operator algebra, Dirac bra-kets, Hilbert space of state vectors, unitary transformations.

- **APPROXIMATE METHODS** **(06 Hours)**
  Variational method, WKB approximation, time dependent perturbation theory, Zeeman and Stark effect, Fermi's golden rule, transition probabilities, constant and harmonic perturbations, semiclassical treatment of radiation.

- **RELATIVISTIC WAVE EQUATIONS** **(06 Hours)**
  Klein-Gordon and Dirac equations, covariant form of Dirac equation, bilinear covariants.

- **QUANTUM THEORY OF SCATTERING** **(05 Hours)**
  Cross sections, partial wave analysis, phase shifts, optical theorem.

- **SCHROGINGER'S EQUATION AS AN INTEGRAL EQUATION** **(10 Hours)**
  Green's function, Lippman-Schwinger equation, Born's approximation, Coulomb scattering. Schrodinger, Heisenberg and interaction pictures, S-matrix, T-matrix.

- **SECOND QUANTISATION** **(10 Hours)**
  Quantisation of free fields, elastic and electromagnetic fields, quantisation of boson and fermion fields, illustration from problems in scattering.

(Total Contact Time (Theory) : 42 Hours)

BOOKS RECOMMENDED :

1. **L. I. Schiff,** *Quantum Mechanics,* McGraw-Hill, New York, 1968
2. **J. J. Sakurai,** *Modern Quantum Mechanics,* Addison-Wesley, 1994
3. **C. Itzykson and J.B. Zuber,** *Quantum Field Theory,* McGraw-Hill, New York, 1980
4. **F. Schwabl**, *Quantum Mechanics,* Narosa, 1998
5. **R. L. White.** *Basic Quantum Mechanics,* McGraw-Hill, New York, 1966