# PHY7207: QUANTUM MECHANICS I 2(2-0)

**1. Course Name:** Quantum Mechanics I

**2. Course Code:** PHY7207

**3. Credit Units:** 2

**4. Course Description:**

This course builds on the undergraduate course of Quantum Mechanics, starting with simple theories of probability. The time-dependent perturbation theory and the scattering theory will then be introduced.

**5. Course Objectives:**

At the end of the course, the students should be able to:

- Use the Heisnberg, Schrodinger and Interaction pictures.
- Apply the Schwinger's action principle and the canonical quantization rules.
- Use the Green's function in scattering theory.

**6. Course Outline:**

| **Content** | **Hours** |
|---|---|
| Expectation values; probabilities. | 5 |
| Heisenberg, Schrodinger and Interaction pictures. | 8 |
| Time-dependent perturbation theory; selection rules; Light scattering. | 7 |
| Second quantization; Schwinger's action principle and canonical quantization rules. | 10 |
| The density matrix (information function, etc); Identical particles. | 5 |
| **Scattering theory:** Green's function (and Born approximation); Scattering of a wave packet; Partial waves (phase shift and cross-section). | 10 |
| **Total** | **45** |

**7. Mode of Delivery:**

This course will consist mainly of lecture sessions.

8. References:


1. Griffiths, David J. Introduction to Quantum Mechanics. 2nd ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2004. ISBN: 9780131118928. (Textbook)

2. Amit Goswami,Quantum Mechanics ,Wm C. Brown Publishers (1992)

3. Gasiorowicz, Stephen. Quantum Physics. 3rd ed. Hoboken, NJ: Wiley, 2003. ISBN: 9780471057000.