



**Department of Physics, Indian Institute of Technology Kanpur**

**PHY601A: Review of Classical Mechanics**

*Instructor-in-charge: Sagar Chakraborty*

(Weekly 1 lecture and 3 tutorials. Only the PhD students of Physics Department are expected to take the course. Students, who have already done PHY401A, should opt for other elective courses.)

**Course Contents:**

Newtons laws of motion, Galilean transformations, Particle mechanics, System of particles, Non-inertial frames, Pseudoforces.

Small oscillations and normal modes.

Lagrangian formulation, Configuration space, Hamiltons principle of least action, Symmetries and conservation laws, Rigid body motion, Hamiltonian formulation.

Phase space, Liouville's theorem, Canonical transformations, Poisson brackets, Hamilton–Jacobi theory, Action-angle variables.

Integrability, Perturbation theory, Time dependent Hamiltonian, Introduction to chaos, Chaotic attractor (and repeller), Lyapunov exponent, Special relativity.

*References/Text Books:*

1. *J. V. Jose & E. J. Saletan, Classical Dynamics, Cambridge University Press (1998).*
2. *I. C. Percival & D. Richards, Introduction to Dynamics, Cambridge University Press (1982).*
3. *L. D. Landau & E. M. Lifshitz, Mechanics, Butterworth-Heinemann (1976).*
4. *H. Goldstein, Classical Mechanics, Addison Wesley (1980).*
5. *S. H. Strogatz, Nonlinear Dynamics and Chaos, Westview Press (2001).*
6. *M. Tabor, Chaos and Integrability in Nonlinear Dynamics, Wiley Interscience (1974).*