Department of Physics

Indian Institute of Technology Kanpur

PHY601 : Review of Classical Mechanics

Course content:

S. No.	Topics	No. of Lecture and Tutorial Hours
1	Problem oriented review of Classical Mechanics, Newton's laws of motion, Galilean transformations, Particle mechanics, System of particles, Non-inertial frames, Pseudo-forces. Small oscillations and normal modes.	8
2	Lagrangian formulation, Configuration space, Hamilton's principle of least action, Symmetries and conservation laws, Rigid body motion, Hamiltonian formulation.	10
3	Phase space, Liouville's theorem, Canonical transformations, Poisson brackets, Hamilton-Jacobi theory, Action-angle variables.	10
4	Integrability, Perturbation theory, Time dependent Hamiltonian, Introduction to chaos, Chaotic attractor (and repeller), Lyapunov exponent, Special relativity.	12

Reference 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).