# P-103: Classical Mechanics I

**Syllabus:**

1. Review of Newtonian mechanics, generalized coordinates, constraints, principle of virtual work

2. Calculus of variation, Lagrange's equation

3. Central forces: planetary motion, collisions and scattering

4. Oscillations: small oscillations, anharmonic oscillators, perturbation theory, forced oscillators

5. Hamilton's Equation:  principle of least action, Noether's theorem

6. Canonical transformations: Poisson brackets

7. Hamilton-Jacobi theory: action angle variables

8. Rigid body dynamics: rotating top, precession and nutation, Euler angles

9. Equations of motion for continuous media


**Special topics:**

1. Nonlinear dynamics

2. Fluid dynamics: Navier-Stokes equation


**Recommended textbooks:**

1. Goldstein : Classical Mechanics (Addison-Wesley)
2. Rana and Joag : Classical Mechanics (Tata McGraw-Hill)