



INTRODUCTION TO CLASSICAL MECHANICS

PROF. ANURAG TRIPATHI

Department of Physics

IIT Hyderabad

TYPE OF COURSE : New | Core | PG

COURSE DURATION : 12 weeks (20 Jul' 20 - 9 Oct' 20)

EXAM DATE : 18 Oct 2020

PRE-REQUISITES : B.Sc in Physics. A course on Mechanics at B.Sc. level.

INTENDED AUDIENCE : M.Sc. Students

COURSE OUTLINE :

This introductory course on Classical Mechanics covers the following topics: Euler Lagrange Equations, Small Oscillations, Central Force Problem, Rigid Body Motion.

ABOUT INSTRUCTOR :

Prof. (Dr.) Anurag Tripathi is an Assistant Professor at IIT Hyderabad since 2015 and his area of research is Theoretical High Energy Physics.

COURSE PLAN :

Week 1: Generalised coordinates, D' Alembert's Principle, Euler Lagrange equation of motion and its applications.

Week 2: Hamilton's Principle. Conservation laws.

Week 3: Small oscillations: Free Oscillations, Damped oscillations

Week 4: Forced Oscillations, Resonance, Normal Coordinates.

Week 5: Central force problem, reduction to 1 body problem, Equation of motion and first integrals.

Week 6: Classification of orbits. Scattering in central field.

Week 7: Kinematics of rigid body motion: Degrees of freedom of rigid body, orthogonal transformations.

Week 8: Euler angles, Euler's theorem.

Week 9: Finite and infinitesimal rotations. What are tensors? Moment of inertial tensor

Week 10: Principle axis transformation, Euler Equation of motion

Week 11: Torque free motion of a rigid body. Heavy symmetrical top with one point fixed

Week 12: Hamilton equation of motion, Conservation theorems, Canonical transformations.