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| 1. | Title of the course | Introduction to Classical Mechanics |
| 2. | Course number | PH101L |
| 3. | Structure of credits | 2-1-0-3 |
| 4. | Offered to | UG |
| 5. | New course/modification to | Modification To PH1101/4 |
| 6. | To be offered by | Department of Physics |
| 7. | To take effect from | January 2022 |
| 8. | Prerequisite | Nil |
| 9. | **Course Objective(s):** To provide fundamental concepts and application techniques of Newtonian mechanics employing rigorous methods of vector calculus which lay the foundation of fluid mechanics and electromagnetic phenomena. To deal with non-inertial frames and develop a handle on techniques such as GPS systems, etc. | |
| 10. | **Course Content:** Causality and determinism in Newton's laws, symmetry and conservation laws; Equations of motion in polar coordinate systems; Non-inertial frames: centrifugal, Coriolis and leap-second terms in a rotating frame; Rigid body dynamics; Gradient operator; Oscillations: simple, damped and driven oscillators, resonances; Non-linear terms and Chaos, Hausdorff-Besicovitch dimension, Mandelbrot set; Central forces, satellite orbits, Laplace-Runge-Lenz dynamical symmetry, effective radial potential in Kepler-Newton problem; Fluid Mechanics: flux and divergence of a force-field, Gauss' theorem, equation of continuity, Lagrange and Eulerian descriptions of fluid flow, circulation and curl of a vector field, Stokes' theorem, fluid flow, Bernoulli's principle. | |
| 11. | **Textbook(s):**<br>1. Deshmukh P C, *Foundations of Classical Mechanics*, Cambridge University Press (2019).<br>2. Morin D, *Introduction to Classical Mechanics with problems and solutions*, Cambridge University Press (2008). | |
| 12. | **Reference(s):**<br>1. Fowles G R, and Cassiday G L, Analytical Mechanics, Saunders Golden Sunburst Series, (2004).<br>2. Tél T, Gruiz M, and Kulacsy K, Chaotic dynamics: An introduction based on classical mechanics, Cambridge University, (2006). | |