

Semester	JAN 2022
Open to semester	4
Course code	PH2213
Course title	Classical mechanics
Credits	3 /
Course Coordinator & participating faculty (if any)	Arijit Bhattacharyay*, Sreejith G. J.
Nature of Course	Lectures
Pre-requisites	None
Objectives (goals, type of students for whom useful, outcome etc)	<p>So far you have been familiar with Newton's equation of motion where you identify the forces, write down the equations of motions and solve them to understand the dynamics of a system. However, this process becomes complicated and cumbersome for systems with lots of constraints. In this course we will discuss about two elegant formalisms (Lagrangian and Hamiltonian) using which one can circumvent the difficulties associated conventional Newtonian mechanics. Using these methods, we will study two classes of motion: (a) oscillations of a system about equilibrium positions and (b) motion of two bodies moving under the influence of mutual central force. This is a foundational course for physics students but could also appeal to those majoring in other disciplines, including mathematics.</p>
Course contents (details of topics /sections with no. of lectures for each)	<p>Mid Semester</p> <p>Introduction: To provide a detailed survey of the basic formalism and practical applications of classical mechanics.</p> <p>(1) Recap of basic concepts: Mechanics of single particle and many particles, constraints, etc.</p> <p>(2) D'Alembert's Principle and Lagrange Eqn.</p> <p>(3) Central force problems</p> <p>(4) Oscillations</p> <p>End Semester</p> <p>(5) Lagrange eqn. from variational principles, conservation theorems and symmetry properties.</p> <p>(6) Hamilton's eqn. of motion</p> <p>(7) Canonical transformation</p>

	(8) Hamilton-Jacobi theory and action-angle variables
Evaluation /assessment	End-Sem Examination-40% Mid-Sem Examination-40% Others-two quizzes of 10% each.%
Suggested readings (with full list of authors, publisher, year, edn etc.)	References 1. Classical Mechanics: H. Goldstein, C. Poole and J. Safko (2002) 3rd edition, Pearson 2. Classical Dynamics of Particles and Systems: Thornton and Marion (2003) Thomson Learning EMEA Ltd 3. Classical Mechanics: R.D. Gregory (2008) Cambridge University Press 4. Mechanics: L.D. Landau and E.M. Lifshitz (2007) 3rd edition, Butterworth-Heinemann 5. Classical Mechanics A Contemporary Approach: J.V. Jose and E.J. Saletan (2006) Cambridge University Press 6. Classical Mechanics- W Greiner- 2nd ed-Springer-2010 7. Classical Mechanics – NC Rana and PS Joag – Tata McGraw-Hill publishing company ltd.