

<b>Course Title</b>	<b>RELATIVITY AND COSMOLOGY</b>
<b>Course Code</b>	<b>MPHY-415</b>
<b>Credit Hours</b>	<b>CH3</b>
<b>Pre- requisites</b>	<b>MPHY-231, APHY-354</b>
<b>Learning outcomes</b>	The purpose of this course is to introduce the field of general relativity and cosmology.
<b>Contents</b>	<p><b>Special theory of relativity:</b> Einstein's postulates of special relativity, Lorentz transformations, structure of spacetime, Minkowski spacetime tensors, the light-cone, line element, four-vectors, relativity of simultaneity, velocity transformation and velocity addition. Force equation in relativity, rest mass, kinetic and total energy, conservation of energy and momentum. Covariant form of Maxwell's equations, four vector potential and field strength tensor.</p> <p><b>General theory of relativity:</b> Tensors, Calculus, Manifolds and coordinates, curves and surfaces, tensor fields, geodesics, Riemann tensor, Bianchi identity, metric tensor, Ricci tensor, Einstein's tensor. General Relativity, Principles of general relativity, weak and strong equivalence principle, equation of geodesics deviation, Einstein's field equations, tests of general theory of relativity.</p> <p><b>Cosmology:</b> Newtonian cosmology, cosmological redshift, luminosity and redshift relation, Hubble's law, microwave background, the Big Bang, Friedmann models and cosmological constant, FRW metric.</p>
<b>Teaching-learning Strategies</b>	Class room teaching / Lecturing.
<b>Assignments- Types and Number</b>	Problem sheet: 3-4
<b>Assessment and Examinations</b>	<p>Mid-Term Assessment: 35%</p> <p>Formative Assessment: (25%): It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.</p> <p>Final Term Assessment: 40%</p>
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Introducing Einstein's Relativity, by R. D'Inverno, Oxford (1992).</li> <li>2. Dynamics and Relativity by W. D. McComb, Oxford (1999)</li> <li>3. Introduction to Cosmology by J. V. Narlikar, Cambridge (2002).</li> <li>4. Introduction to Cosmology by B. Narlikar, Cambridge (2016).</li> <li>5. Special Relativity: For the Enthusiastic, CreateSpace, (2017).</li> <li>6. Introduction to General Relativity, C. Bambi, Springer, (2018)</li> </ol>