

Phys 4102	RELATIVITY AND COSMOLOGY	(CR3)
Preq.	Phys 3503/ ADP (Physics)	

Objectives

The purpose of this course is to introduce the field of general relativity and cosmology.

Syllabus

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. Elements of Tensor 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, Cosmology, Newtonian cosmology, cosmological redshift, luminosity and redshift relation, Hubble's law, microwave background, the Big Bang, Friedmann models and cosmological constant, FRW metric.

Recommended Books

1. *Dynamics and Relativity* by W. D. McComb, Oxford (1999)
2. *Introduction to Cosmology* by J. V. Narlikar, Cambridge (2002).
3. *Introduction to Cosmology* by B. Narlikar, Cambridge (2016).
4. *Special Relativity: For the Enthusiastic*, CreateSpace, (2017).
5. *Introduction to General Relativity*, C. Bambi, Springer, (2018)
6. *Introducing Einstein's Relativity*, by R. D'Inverno, Oxford (1992).