School of Astrophysics

4 year Undergraduate Program: Multidisciplinary Elective (Intake: 30)

Sem	Credit	Course Name	Code	Course Type	FM: 50	Faculty
II	3	Space Time and the Universe	ASTP155MDC02	Taught	15*+35	Both†

*15 marks will be in the form of Continuous Evaluation throughout the semester. 35 marks will be allotted for the end-of-semester final examination.

†Open for all students

SPACE TIME AND THE UNIVERSE
(Credits: 3)
Theory: 45 Lectures

Historical and cultural perspective of our view of the Universe [7]: Traditional astronomy in ancient culture, Greek Astronomy, Astronomy in literature, music and arts, the Copernican revolution and its impact, Science Fiction and its impact

Our changing concept of Space and Time [18]: Macroscopic concept of space and time: Newton and Galileo, Concept of inertia, Newtons laws of motions, Newtons law of gravitation, Concept of unification of physical laws, Kepler's laws and planetary motions, Galilean invariance, Maxwell's electromagnetism and the concept of special relativity, postulates of special relativity, length contraction and time dilation, changing concept of space and time, Inertial and gravitational mass, equivalence principle, general theory of relativity, gravitational time-dilation,

Microscopic concept of space and time: Failure of classical physics, Wave particle duality, uncertainty principle, road to quantum mechanics, Copenhagen interpretation, Einstein-Bohr debate, relativity and quantum mechanics

Modern view of the Universe [20]: Cosmological principle, geometry of the universe, scale factor, redshift, expansion of the universe, idea of cosmological constant, Hubble's law, Big Bang theory, Cosmic microwave background, content of the Universe, Dark Matter and Dark energy,

Astronomical observations, multi-wavelength astronomy: Telescopes and their design, Stellar evolution and stellar spectra, end stages of stellar evaluation: white dwarfs, neutron stars, Pulsars and their importance in astronomy; concept of astrophysical black holes, solar system and extra-solar system of planets, distance scales in astronomy, gravitational waves and a new window of observational astronomy,

Hands-on Activity: Visit to the Observatory