

PHOE 121- OPEN ELECTIVE-1 (2021-2025)

ASTRONOMY – THE EVOLVING UNIVERSE

Prerequisite: PUC Pass.

The objective of the course:

1. To communicate the excitement about astronomy and to awaken students to the marvelous universe.
2. To understand and appreciate the evolving universe which eventually helps us to think about who you are and where you and the human race are going.

SYLLABUS

1. **The Foundations of astronomy:** Celestial sphere, constellations in the sky, celestial coordinates. The changing perceptions of the universe, our place in space, earth's orbital motion, rotational motion, seasonal changes and eclipses. (6 Hours)
2. **The tools of astronomy:** Electromagnetic spectrum, The seven astronomies, the visible astronomy, optical telescopes, functions of the telescopes - reflecting and refracting telescopes, invisible astronomy, radio telescopes, radio interferometers, advantages and disadvantages, space-based astronomy. Discovery of gravitational waves. (9 Hours)
3. **Solar System:** Origin of solar system, terrestrial planets, Jovian planets, moons and other celestial objects. Sun: Overall structure of sun, the solar atmosphere, sun spots, solar flares (4 Hours)
4. **Evolution of stars:** stellar classification, H-R-diagram, main sequence stars, evolution of sun like stars, planetary nebula, white dwarf- physical properties, Chandrasekhar limit, evolution of massive stars, supernova, neutron stars- physical properties, pulsars, Blackholes, event horizon. (9 Hours)
5. **The Milky Way Galaxy:** Overall structure, galactic disc, galactic halo and bulge. The galactic centre. The central black hole. (3 Hours)
6. **Universe beyond The Milky Way:** Hubble's galaxy classification, clusters of galaxies, Hubble's law, the expanding universe, the rate of expansion of the universe-Hubble's constant. Determination of an object's distance using Hubble's law and the recessional velocity of the object. (3)
7. **The Big Bang and the fate of the universe:** The Big Bang theory, red shift, distance and look-back time. calculation of the age of the universe. Cosmic Microwave Background Radiations (CMBR), dark matter and dark energy. (5 Hours)

Reference

1. Universe: Roger A. Freedman and William J. Kaufmann III, W. H. Freeman and company, New York.
2. Introductory Astronomy and Astrophysics 4th edn.1998 by Michael Zelik & Stephan A Gregory.