

SEMESTER V
PH5D01.1U – **Open course**
Amateur Astronomy

Credits – 4

No. of contact hours – 72

Scope: To help students comprehend the cosmos and to develop scientific temper.

Prerequisites: This being a course open to students from different streams does not require a solid background in Physics. However a healthy curiosity for the subject is expected.

Module I

Observing the night sky. (24 hours)

Celestial sphere. The cardinal points and circles on the celestial sphere. Equatorial, ecliptic and galactic system of co-ordinates. Aspects of sky from different places on the earth. Twilight, Seasons, Sidereal, Apparent and Mean solar time and their relations. Equation of time. Ephemeris and Atomic Times. Calendar. Julian date and heliocentric correction.

Understanding star maps. Identification of bright stars, constellations, lunar asterisms. . Nebula – galaxies – Messier objects. Stellar magnitudes and nomenclature. Sky catalogues. . Classification of stars and galaxies.

Different types of telescopes – reflectors and refractors. Different types of eye pieces. Focal ratio, magnification etc. telescope mounts – equatorial and altazimuth mounts. Design of a simple reflectors and refractors. Magnification of telescopes.

Colin A Ronan: **The Sky-watcher's handbook**, Corgi Books.

Antonin Ruki, **A Guide to the stars, Constellations and Planets**, Caxton editions

Module II

Solar system and beyond (24 hours)

Structure and origin of the solar system The sun, a model star; The planets, asteroids and comets: Mercury-the elusive planet, Venus-the clouded planet, Mars-the red planet, The asteroid belt-rubble of the solar system, Jupiter-a strange veiled giant, Saturn-the ringed planet, Planets beyond the reach of the eye, A cloud made of comets; The Earth-the most familiar planet; Lunar and solar eclipses. Other moons in solar system.

Beyond the solar system; Distances to stars from parallaxes. Stellar motions. Magnitude scale and magnitude systems. Atmospheric extinction. Absolute magnitudes and distance modulus. color index. Black-body approximation to the continuous radiation and temperatures of stars. Variable stars as distance indicators.

<http://solarsystem.nasa.gov/planets/>

<http://www.nineplanets.org/>

Baidyanath Basu: Introduction to Astrophysics. Prentice-Hall of India Pvt. Ltd

K. D. Abhyankar, Astrophysics of the Solar System, Universities Press

Module III

Our Universe (24 hrs)

Historical perspective -Early models of the universe, Geocentric models – annual and diurnal motions of Sun - Ptolemy’s model – epicycles. Copernican model – Galileo and his telescopic observations. . Our place in the universe – Sun in the Milky Way – local cluster of Galaxies - super cluster - voids

Stellar evolution – interstellar cloud – protostar – main sequence – energy production – red giants, white dwarfs, super nova, neutron star, pulsar, black holes. The expanding universe. Galactic red shift – distance to galaxies – Hubble’s law –Big bang and Steady State models of the universe - Microwave background.

Observational evidence for the Big Bang model. Inflationary universe. Dark matter and dark energy

References

James B. Seaborn. **Understanding the Universe**, Springer

Jayant V. Narlikar, **Elements of Cosmology**, universities Press

Baidyanath Basu: Introduction to Astrophysics.