

I	Course Code	PH224002
II	Course Title	Introduction to Astronomy and Astrophysics
III	Credits	L T P C 3 0 0 3
IV	Prerequisites (if any)	Physics-I course (PH 181001), Physics-II course (PH 181002)
VI	Learning Outcome	This course is aimed to provide a broad overview of the underlying concepts of astronomy and astrophysics. Students will learn how the fundamental principles of physics (Newtonian, statistical, and quantum mechanics) are useful in explaining all the processes occurring in celestial objects. In addition to this, they will learn how the great ideas and discoveries made in the past decades have helped to shape our scientific perspective on the creation of the universe. This will certainly help students to develop an understanding of the scientific aspects of the world around us. Further, the course will expose students to the recent challenges as well as advances in the area of cosmology and astrophysics right at the frontiers, and make them enable to look for career opportunities in these exciting areas by themselves e.g. There will be enormous opportunities for engineers in the future planned gravitational wave observatory in India, named, LIGO India project (http://www.gw-indigo.org/tiki-index.php?page=LIGO-India).
VII	Course Contents	<ol style="list-style-type: none"> 1. Rough scales of the astronomical universe, contents of the universe, measuring sizes and distances to various astronomical objects, astronomical co-ordinate systems. 2. An introduction to various kinds of telescopes, multi-wavelength astronomy, different ground and space-based observatories. 3. Stellar and galactic physics: Stellar parameters (temperature, mass, luminosity), Hertzsprung-Russell (H-R) diagram and its interpretation, main sequence stars, neutron stars, white dwarfs, black holes, the nature of galaxies, observables in galaxies, galaxy classification and Hubble sequence, cluster of galaxies, rotational curves of galaxies, Milky Way Galaxy, Dark Matter in galaxies. 4. Introductory Cosmology: brief introduction to General Relativity and curved space, The Big-Bang and creation of the universe, Hubble expansion rate and age of the universe, Cosmic Microwave Background (CMB), Dark Matter and Dark energy of the universe.
VII	Text books/References	<p>GENERAL ASTROPHYSICS:</p> <ol style="list-style-type: none"> 1. An Introduction to Modern Astrophysics - Bradley Carroll & D.A. Ostlie. 2. An introduction to astronomy and astrophysics - Pankaj Jain. 3. The Physical Universe - Frank H. Shu. 4. The Cosmic Perspective, seventh edition – Jeffrey O.Bennett, Megan O. Donahue, Nicholas Schneider, Mark Voit. 5. Astronomy: A Physical Perspective – Marc Leslie Kutner. <p>COSMOLOGY:</p> <ol style="list-style-type: none"> 1. Modern cosmology - Scott Dodelson. 2. The early universe- Edward W. Kolb and Michael S. Turner.