| Course Code | Course Name | Credits |
|---|---|---|
| 26PH613 | ASTROPHYSICS | 04 |

**Course Objectives**

- The students are expected to understand the fundamentals, principles, physical concepts and recent developments in the Astrophysics area.
- The practical course is framed in relevance with the theory courses to improve the understanding of the various concepts in Astronomy and Astrophysics.
- It is expected to inspire and boost interest of the students towards Astrophysics as the interdisciplinary Course.

**Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

- Understand the fundamentals in the Astrophysics
- Design and perform experiments in the laboratories to demonstrate the concepts,
- Principles and theories of Astrophysics learned in the classroom.
- Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Astrophysics.

**Unit 1 – Telescopes (12 Hrs.)**

Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes –astronomical spectrographs - photographic photometry - Hubble space telescope.

**Unit 2 – Galaxy (12 Hrs.)**

The sun-physical and orbital data - Photosphere - Chromosphere - corona – solar prominences - sunspot - sunspot cycle - theory of sunspots - solar flare - mass of the sun – solar constant - temperature of the sun - source of solar energy - solar wind. Other members of the solar system - Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune - Pluto – Moon.

**Unit 3 - Asteroids, Meteors and Comets (12 Hrs.)**

Discovery of minor planets (Asteroids), their orbits and physical nature - Meteors and meteorites - Observation of meteor showers- Meteorites, its types and composition -Meteorite craters. Discovery and designation of Comets - Nature of dust particles and origin of comets Periodic comets and their physical nature.

**Unit 4 – Origin of Universe (12 Hrs.)**

The expansion of the Universe-Hubble's law- redshift - Evidence for the evolution of the universe - Cosmological models: Big Bang theory and Steady-State theory – Nature of space time – Discovery of Gravitational waves - Dark matter.

**Unit 5 - Stellar Evolution & Galaxies (12 Hrs.)**

H-R diagram – birth & death of low mass, intermediate mass and massive stars – Chandrasekar limit – white dwarfs – neutron stars – pulsars – black holes – supernovae - Classification of galaxies – galaxy clusters –interactions of galaxies, dark matter and super clusters – evolving universe.

**Reference Books:**


1. K.S. Krishnasamy, 'Astro Physics a modern perspective,' Reprint, New Age International (p) Ltd, New Delhi, 2002.
2. BaidyanathBasu, 'An introduction to Astro physics', second printing, prentice - Hall of India Private limited, New Delhi,2001.
3. R. Murugesan, ' Modern Physics', Eleventh revised edition, S. Chand & Company Ltd,New Delhi, 2003.
4. S. Kumaravelu, 'Astronomy, Janki calendar corporation, Sivakasi, 1993
5. Baker and Fredrick, Astronomy ninth edition, Van strand Rein hold, New York-1964.


**Websites and eLearning Sources:**

1. https://nptel.ac.in/courses/115105046

| COs and Bloom's Taxonomy Mapping – 26PH613 | | |
|---|---|---|
| **Course Outcomes** | **On successful completion of this course, students will be able to** | **BTL** |
| **CO1** | Recall and explain principles of telescopes, detectors, and astronomical observations. | K1, K2 |
| **CO2** | Apply knowledge of solar system bodies and solar physics to interpret astronomical phenomena. | K3 |
| **CO3** | Analyze properties and behavior of asteroids, meteors, comets, and their observational characteristics. | K4 |
| **CO4** | Analyze cosmological models including expansion of the universe, dark matter, and gravitational waves. | K5 |
| **CO5** | Evaluate stellar evolution and galactic structures to understand the origin and evolution of the universe. | K6 |

**BTL (Bloom's Taxonomy Level) - K1 – Remembering, K2 – Understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6 - Create**

| Relationship Matrix – 26PH613 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes** | **Programme Outcomes (POs)** | | | | | | **Programme Specific Outcomes (PSOs)** | | | | | | **Mean Score of Cos** |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** | |
| **CO1** | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1.42 |
| **CO2** | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 1 | 2.00 |
| **CO3** | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 2.33 |
| **CO4** | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2.50 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2.75 |
| | | | | | | | | | | | | **Total** | 2.20 |

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

FULLY HUMAN
Fully
Alive