**II SEMESTER 2023-24**

# Course Handout Part II

**Date: 09.01.2024**

**Course No**. **: PHY F215**

###### Course Title :INTRODUCTION TO ASTRONOMY &ASTROPHYSICS

**Instructor in Charge :Subhash Karbelkar**

**Objectives & Scope of the Course:**

The course aims to give Physics/non-Physics major students an elementary introduction and overview of Astronomy &Astrophysics. This is for students who were always curious about the sky out there but never had a chance to know it deeper. And of course, for students who want to pursue their career in Astro. The course covers a broad spectrum of topics, in astronomy and astrophysics.

**Text Book:** Fundamentals of Astronomy, HannuKarttunnen, 6th edition, Springer 2017

**Reference books:**

**1** The Physical Universe, F Shu, University Science Books, 1981

**2** Modern Astrophysics, Carrol and Ostlie, Cambridge 2017

**Detailed Course Plan:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Number of lectures** | Learning objectives | Topics to be covered | **Chapter in the Text Book** |
| **4** | **Sperical astronomy, Instruments** | Coordinate system, spherical trigonometry, sidereal and solar times, astronomical time systems, Optical and radio telescopes, other wavelength regions | 2, 3 |
| **2** | **Photometric concepts and magnitudes** | Luminosity, magnitude system, extinction and optical thickness | 4 |
| **3** | **Radiation mechanisms** | Radiation of atoms and molecules, Hydrogen atoms, line profiles, molecular spectra, Blackbody radiation other radiation mechanisms, radiative transfer | 5 |
| **2** | **Celestial mechanics** | Kepler’s laws, orbit determination | 6 |
| **3** | **Stellar spectra** | Spectral classification, Hertzsprung Russel diagram | 9 |
| **2** | **Binary stars and stellar masses** | Types of binary stars and the determination of their parameters | 10 |
| **6** | **Stellar structure and Stellar evolution** | The interior of stars, mass-luminosity relation, Evolution on the main sequence, late stages of stellar evolution, stellar clusters | Shu  TB:  11,12 |
| **2** | **Variable stars** | Observations and the physics of stellar pulsation, other variable stars | 14 |
| **4** | **Compact stars I** | White dwarfs, the physics of degenerate matter, the Chandrasekhar limit, neutron stars, Pulsars | 15.1, 15.2 |
| **4** | **Compactstars II** | Black holes, x-ray binaries | 15.3-15.6 |
| **3** | **Milky way** | Methods of distance measurements, stellar statistics, rotation of the Milky way, types of galaxies | 18,19 |
| **2** | **galaxies** | The extragalactic distance scale, the expansion of the Universe, clusters of galaxies | 19 |
| **3** | **cosmology** | Newtonian cosmology, the cosmic microwave background | 20 |

**5. Evaluation Scheme:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Evaluation componenet | Duration | **Weightage (%)** | **Date, Time** | **Nature of Component** |
| 1. | Mid-Sem | 90 mins. | 30 | 11/03 - 4.00 - 5.30PM | Closed Book |
| 2 | Class tests I before and II after the midsem | 50 minutes each | 30 |  | Closed Book |
| 3 | Comprehensive Examination\* | 180 mins. | 40 | 07/05 AN | Open Book |

**\*:** A common article on a current topic will be assigned to all, in the beginning of the course, and question/s will be asked in the comprehensive exam based on itl

**6. Chamber Consultation Hour:** TBA

**7. Notices:** Notices for the course will be displayed only on CMS.

**8. Make-up Policy:**  Make up will be given to emergency (hospitalization) case only. Make up requests should reach the ICbefore the examination.

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor-in-charge**

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