**II SEMESTER 2022-23**

# Course Handout Part II

**Date: 16.01.2023**

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

**Reference book:** The Physical Universe, F Shu, University Science Books, 1981

**Detailed Course Plan:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Number of lectures** | Learning objectives | Topics to be covered | **Chapter in the Text Book** |
| **3** | **Telescopes** | Basic optics, optical, radio telescopes, IR, UV, X-ray and gamma ray astronomy, gravitational wave astronomy | 6 |
| **3** | **Binary systems** | Determination of stellar parameters: classification and mass determination, | 7 |
| **3** | **Classification of stellar spectra** | The formation of spectral lines, the Herzsprung-Russel diagram | 8 |
| **6** | **Stellar atmossphere** | Radiation field, stellar opacity, radiative transfer, transfer equation, the profiles of spectral lines | 9 |
| **6** | **Stellar interiors** | Hydrostatic equilibrium, pressure equation of state, stellar energy sources, energy transfer and thermodynamics, stellar model building, the main sequence | 10 |
| **3** | **ISM and star formation** | Interstellar dust and gas, the formation of protostars, pre-main-sequence evolution | 12 |
| **3** | **Stellar evolution** | Evolution on the main sequence, late stages of stellar evolution, stellar clusters | 13 |
| **1** | **Stellar pulsation** | Observations and the physics of stellar pulsation | 14.1,14.2 |
| **3** | **Massive stars** | Evolution of massive stars, classification of supernovae, gamma ray bursts, cosmic rays | 15 |
| **3** | **Degenerate remnants of stars** | White dwarfs, the physics of degenerate matter, the Chandrasekhar limit, neutron stars, Pulsars | 16 |
| **3** | **The structure of**  **universe** | The extragalactic distance scale, the expansion of the Universe, clusters of galaxies | 27 |
| **3** | **cosmology** | Newtonian cosmology, the cosmic microwave background | 29 |
| **2** | **The early universe** | The very early universe and inflation, the origin of structure | 30 |

5. Evaluation Scheme:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Evaluation | Duration | **Weightage (%)** | **Date, Time** | **Nature of Component** |
| 1. | Mid-Sem | 90 mins. | 30 | 17/03 4.00 - 5.30PM | Closed Book |
| 2 | Class tests I before and II after the midsem | 50 minutes each | 30 |  | Open Book |
| 3 | Comprehensive Examination | 180 mins. | 40 | 18/05 AN | Closed Book |

**6. Chamber Consultation Hour:** TBA

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

**8. Make-up Policy:**  Make up for Mid-Sem and Compre will be given to emergency (hospitalization) case only. Make up requests should reach the IC before the examination.

**9. 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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