Birla Institute of Technology & Science, Pilani
Hyderabad Campus

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
PHY F215