

PHY7256: ASTRO-PLASMA PHYSICS

1. Course Name: Astro-Plasma Physics

2. Course Code: PHY7256

3. Credit Units: 3

4. Course Description:

This course covers the evolution of the solar system, galaxies and cosmology, in general. It outlines how life came about, the abundances of different elements in the universe and their composition in space. The last part covers the plasma state of matter: its transport, thermal and radioactive properties.

5. Course Objectives:

At the end of the course, the students should be able to:

- Describe the evolution of the universe.
- Discuss the process of heat transfer from the stellar interior to the surface.
- Use models to describe interstellar medium.
- Discuss the plasma state of matter.

6. Course Outline:

Content	Hours
Hertzsprung-Russel diagram: Classification of stellar systems.	5
Physics of stellar interiors; Radiative transfer problems.	2
Abundances of the elements.	5
Stellar models; Physics of the interstellar medium.	5
Origin of cosmic rays; Thermal and non-thermal radiation processes.	5
The plasma state of matter– plasma concepts (Debye length, Plasma oscillations, etc.).	5
Plasma kinetics and magnetic-fluid dynamics.	5
Applications to magnetospheric, astro-, space-, and ionospheric physics.	5
Plasma transport phenomena: Thermal and radiative processes in plasmas; Plasma waves and instabilities.	5
Electromagnetic waves in plasma.	3
Total	45

7. Mode of Delivery:

This course will consist of lecture sessions and there will also be data analysis using theories learnt.

8. References:

1. Misra, P. & Enge, P., "Global Positioning Systems: Signals, Measurement and Performance" 2nd Ed. Ganga-Jamuna Press (2006).
2. Kilverson, M.G. & Russel, C.T. "Introduction to Space Physics". Cambridge Atms. & Space Sc. Series.
3. Corrol, B.W. & Ostile, D.A. "An Introduction to Modern Astrophysics" 2nd Ed. Addison-Wesley.

