

## PHY 310 1.0 / PHY 373 1.0 – Space Physics I

**Lecturer in Charge** : Dr. M. M. P. Madhuranga Fernando

### Objectives of the Course Unit:

This unit attempts to enhance the qualitative knowledge of students with the Space Physics.

### Field of Study

*This course is an qualitative introduction to the fields of Solar and Space Physics; it addresses the physics of plasmas in our solar system, emphasizing both observations and theory in a unified fashion. The domain of Space Physics is from Earth's upper atmosphere to the solar photosphere to the outer boundaries of our solar system where the solar wind encounters the local interstellar medium. This course should be of particular interest to people wanting to learn more about our solar system and near-Earth space environment, astrophysics, plasma physics, atmospheric physics, and solar-terrestrial interactions.*

<b>Method of Assessment</b>	:	Continuous Assignments	- 40%
		End of the Semester Theory Examination	- 60%
		Total	<u>- 100%</u>

### References:

- \* Space Physics and Space Astronomy – Michael D. Papagiannis
- \* Space Physics - May-Britt Kallenrode
- \* Horizons - Exploring the Universe – Michael A. Seeds
- \* Sun, Solar Cycle, Ionosphere, Absorption cross section, Maxwell's equations, Atmospheric dispersion modeling, Wave plate – Wikipedia (Internet)
- \* Sunspot Numbers - IPS - Solar Conditions (Monthly Sunspot Numbers) (Internet)
- \* Solar Physics – NASA - Marshall Solar Physics (Internet)
- \* Ionospheric Physics of Radio Wave Propagation - Edwin C. Jones (Internet)

**Syllabus :**

- Planetary Atmospheres
  - ★ Formation and Evolution of Planetary Atmospheres
  - ★ The Structure of the Terrestrial Atmosphere
  - ★ The Escape of the Atmospheric Gases
  - ★ The Atmospheres of the Earth
  
- Earth's Atmosphere
  - ★ Retaining of Gases in the Earth
  - ★ Barometric Equation & Scale Height
  - ★ Atmospheric Regions
  - ★ Temperature Profiles
  - ★ Number Density Profiles
  
- The Ionosphere
  - ★ Introduction
  - ★ The Chapman Layer Theory
  - ★ Plasma Frequency
  - ★ Collision Frequency and Absorption
  
- The Magnetosphere
  - ★ The Dipole Magnetic Field
  - ★ The Earth's Magnetic Fields
  - ★ The Radiation Belts
  
- The Active Sun
  - ★ Introduction of the Active Sun
  - ★ The Main Regions of the Sun
  - ★ Sunspots and the Solar Cycle
  - ★ Radio and X-ray Bursts from the Sun
  - ★ Effect of the Solar Cycle
  
- Radio Wave Communication
  - ★ Reflection of Radio Waves
  - ★ Absorption of Radio Waves
  - ★ Complex Refractive Index
  - ★ Reflection Heights
  - ★ Ionosphere – Sounding Techniques
  - ★ Pulse Reflection Methods
  - ★ Expectable Crisis of Radio Wave Communication

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