AS104: Space weather, *exploring the outer atmosphere* *(20 lectures in 30 hrs)*

(A certificate course for UG, PG and PG+ students)

Instructors: *S. Palit, T. Basak*

Mode of Instruction*: English*

Syllabus

***The Sun* (3 Lectures)**

Instructor: Tamal Basak

Sun as a star, solar radiations, inside the sun, solar eruptions, the phenomenon of solar flare, coronal mass ejection (CME), solar wind, interplanetary magnetic field, solar coronal hole.

***Top of our atmosphere* (2 Lectures)**

Instructor: S. Palit

Basics of magnetosphere, geomagnetic field, components of magnetosphere: outer, inner & polar structure, radiation belts, plasmasphere.

***Ionosphere* (3 Lectures)**

Instructor: T. Basak

Introduction to ionosphere, different ionospheric layers, impact of the sun on ionosphere: photo-chemical equilibrium, photo-ionization and Chapman production function.

***Chemistry of the ionosphere* (3 Lectures)**

Instructor: S. Palit

Chemical processes in ionosphere, the role of recombination and electron density, vertical transport, different types of recombination processes in E & F1-regions, protonosphere. TEC measurement, airglow emissions, ionospheric sounding, effects of lightning over the ionosphere, aurora.

***Investigating the ionosphere* (3 Lectures)**

Instructor: T. Basak

Complexity in ionospheric research, direct satellite measurement techniques, radio-signal propagation techniques, sub-ionospheric Very Low Frequency signal propagation, radar techniques, balloon-borne techniques, optical emissions.

***Geomagnetic storms* (3 lectures)**

Instructor: Tamal Basak

Solar wind- magnetosphere interaction, Geomagnetic storm, substorm, aurora, geomagnetic indices, magnetospheric currents.

***Effects of Space weather* (1 Lectures)**

Instructor: S. Palit

Power-Grid failure, satellite orbit decay, Radiation hazard and aviation safety, GPS communications.

***Ground and Space-based instrument in Space weather research* (2 lectures)**

Instructor: Sourav Palit

Ground-based instruments spread all over the globe, satellite missions, measurement of ionospheric total electron content, space weather models.

***Sitapur Observatory trip* (1 night)**

Instructors: Devendra Bisht, Kuldeep Belwal, Mohit Bisht, S. Biswas, Soumojit Tiwari

Discussion on the observables in the night sky, software guided observation using optical telescopes; Handling of VLF instruments