

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, S. Saha

Teaching assistants: Sayak, Shraddha, Kuldeep, Mohit

Mode of Instruction: English

Syllabus

The Sun(3 Lectures)

Instructor: S. Saha

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: S. Saha

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: S. Saha

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, A. Raj, T. Basak, D. Bhowmick, S. Biswas

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