AS100: Gateway to the Universe ***(8 lectures in 12 hrs.+ 1 interactive session)***

(A Certificate Course:Open to all space and astronomy enthusiasts of any educational background)
Instructors: *S.K. Chakrabarti, S. Palit, T. Basak, D. Bisht, P. Nandi, S. Biswas*
Mode of Instruction*: Bengali & English in alternate batches (every 4 weeks)*

Syllabus

Current picture of the Universe ***(1 Lecture)***
Instructor: Sandip K. Chakrabarti

The observable universe, age, size and content – galaxies, clusters and groups, intergalactic space – stars, planets and other objects – forces governing the universe – gravity, and space time – Universe mass distribution - dark matter, dark energy and accelerated expansion.

Exploration of the Universe ***(1 Lecture)***
Instructor: Sourav Palit

Balloon borne astronomy- Brief history of rockets to satellites – Scope of Rocket Science and Balloon Science -- Sputnik – human in space - moon landing – space shuttle program – satellite program and exploration –- planetary missions – missions to asteroid – missions to outer solar system and interstellar space – Voyager's long journey

The Stars ***(2 Lectures)***
Instructors: Devendra Bisht (English) / Tamal Basak (Bengali)

Stars and their structure and layers – energy source of a star - the sun as a star – stellar (solar) activity, flares, Coronal Mass ejections – Nova - stellar cycle, birth, evolution - main sequence stars & white dwarfs – death of a star – supernova.

The Solar system ***(1 Lecture)***
Instructor: Prantik Nandi

Origin- age of solar system - solar system's layout and characteristics – planetesimals – terrestrial and Jovian planets – laws of planetary motion, overview only – planetary satellites – planetary rings- asteroid belts – comets - Oort cloud.

The Milky way galaxy ***(1 Lectures)***
Instructor: Prantik Nandi

Milky way galaxy, structure and mass – shape of galaxies – rotation of galaxy – population-I and II stars - nucleus of a galaxy - quasars and supermassive black holes – merger of galaxies - group and cluster of galaxies.

Compact objects: Black holes and neutron stars (1 Lecture)
Instructor: Prantik Nandi

Black holes, event horizon and singularity - accretion and growth of black holes - types of black holes - planetary nebulae - white dwarfs - neutron stars and pulsars - origin of cosmic rays - gamma-ray burst - cosmic recycling.

Detection of Exoplanets and search of life beyond solar system ***(1 Lecture)***
Instructor: Shraddha Biswas (Bengali)

Different observational techniques for detecting exoplanets – exoplanet finding missions - exoplanet statistics – exoplanet host stars – life in exoplanets?

Sitapur Observatory trip ***(1 night)***
Instructors: Devendra Bisht, Kuldeep Belwal, Mohit Bisht, Shraddha Biswas, Soumojit Tiwari

Discussion on the observables in the night sky, software guided observation using optical telescopes.