AA-201: Introduction to Astronomy

(Approximately 13 weeks ~ 32 Lectures & 7 Tutorials)

1. Astrophysical Scales and Nomenclature. (2-3 Lectures)

Astrophysical conditions, typical physical scales, Order of magnitude estimation, The Celestial Sphere, The Ecliptic.
Astrometry: Different Co-ordinate systems – RA/DEC, Galactic Co-ordinates, Sideral Time, Reference Epochs Recap of Kepler Laws, Parallax and Proper Motion.
Catalouge References – NGC, Messeier, 3C, Vizier, 2MASS.

2. Light, Spectra and its measurements. (4-5 Lectures)

Modes of Energy Transfer, Blackbody Radiation and Thermal Equilibrium, Continuum emission, spectral lines and non-thermal emission.
Photometry: Magnitude Scale, Concept of Color Index, Seeing, Extinction and Reddening, Multi-wavelength Observatories, Optical Telescopes: Reflecting and Refracting

3. All about Stars: From Formation to Death (8-9 lectures)

Interiors of a star: Hydrostatic Equilibrium, Viral Theorem, Kelvin Helmholtz Time scales, sound crossing time scales, Accretion times. Classification of Stellar Spectra
Formation of a single star – Jeans Mass, Accretion disk, Jets, Binary system : Estimating Mass, Stellar Evolution using HR Diagram,
Ultimate Fate of Stars: Supernova Types and Remnants.
Compact Objects: White Dwarf, Neutron Stars and Black Holes.

4. The Solar System (2-3 lectures)

Solar Interior and Atmosphere, Effective Temperature, Absorption Lines, Solar Flares and Solar Winds. Planets in our solar system: Retrograde Motion,
Extra-solar Planets and their detection techniques.

----------*MID SEMESTER* ----------

5. Galaxies & Extragalactic Astronomy (6-7 lectures)

Classification of Galaxies based on morphology and luminosity,
The Milky Way Galaxy, Galactic Center and Supermassive Black Hole, Differential Rotation and Evidence of Dark Matter,
Active Galaxies: Unified Model – Blazars, Quasars, Seyfert Galaxies.

6. Cosmology and Structure Formation (4-5 lectures)

Expansion of Universe and Hubble's Law : Concept of Redshift, Standard Candles, Cepheid Variables.
Cosmic Microwave Background, Composition of Universe & Galaxy Clusters.