The Milky Way Galaxy

The historical approach to understanding the Galaxy: Galileo, Wright, Kant, the Herschels, Kapteyn, Shapley. The Kapteyn Universe, Shapley's model of the Galaxy. Star clusters in the Galaxy. Use of Cepheids to measure distances. The different components of the Milky Way. What is inside each of these components. Stellar populations. Gas and dust in the Galaxy. Spiral arms – how they are formed and how they are observed. The center of the Galaxy. Sgr A*. Rotation curves and mass. Dark matter. The formation of the Galaxy.

External Galaxies.

Galaxy classification. Hubble's tuning fork diagram. The four main types of galaxy: spiral, elliptical, lenticular and irregular. Galactic cannibalism. What each of these kinds of galaxy is made up of – gas & stars. Galaxy interactions and mergers. Starbursts. Hubble's Law. Hubble's constant.

External Galaxies *(continued)*

The expansion of the Universe. The distance scale ladder and the various methods of measuring distances.

Large Scale Structure in the Universe

Galaxy groups. Galaxy clusters. Relative sizes and numbers of galaxies in each of these. Types of galaxies found in each of these. Compact groups. Intercluster medium, x-rays. Superclusters and voids.

Cosmology

Big Bang theory versus Steady State theory. Einstein and the cosmological constant. Big Bang as explanation of Hubble's Law. Major events in history of Universe since Big Bang: Planck era, GUT era, etc....