

## ASTRONOMY 310a COURSE OUTLINE

This course covers the basic astronomy of stars and galaxies that every astronomer needs to know at an intermediate level that assumes a knowledge of basic Freshman mathematics and physics. There are two roughly equal parts, Galactic Astronomy and Extragalactic Astronomy, separated by a midterm exam. Following is a summary of the main topics covered, although there may be some deviation from this exact sequence.

### A. GALACTIC ASTRONOMY (about 6 weeks)

1. **Stellar Distances.** A lot of basic astronomy has to do with figuring out how far away things are, and it is covered here, including geometrical parallax methods, stellar photometric systems, and the use of standard candles.
2. **Stellar Masses.** The use of binary orbits to determine the masses of stars, and the main results obtained, including the stellar mass-luminosity relation and the stellar “initial mass function.”
3. **Distribution of Stars in Space and Galactic Structure.** Old and new ideas about stellar populations and the major structural components of our Galaxy.
4. **Stellar Motions and Galactic Rotation.** Information from stellar motions about stellar populations and galactic structure, the Galactic mass distribution, and evidence for dark matter. Summary of our current picture of galactic structure and dynamics.

### B. EXTRAGALACTIC ASTRONOMY (about 7 weeks)

1. **Galaxy Classification.** Hubble's scheme of galaxy classification and some extensions.
2. **The Local Group.** This topic begins a survey of the universe with the nearest and best studied galaxies outside our own, including M31 and the Magellanic Clouds.
3. **Groups, Clusters, and Superclusters of Galaxies.** Nearby groups outside the Local Group, and the types of galaxies found in them; clusters of galaxies including the Virgo Cluster; superclusters and the large-scale distribution of galaxies in the universe.
4. **Rotation and Masses of Galaxies.** Methods of determining galaxy masses and evidence for dark matter in galaxies and clusters of galaxies. Evidence for massive black holes at the centers of galaxies.
5. **Evolution of Galaxies.** A brief summary of evidence and ideas concerning the evolutionary history of galaxies of various types.
6. **Peculiar and Interacting Galaxies.** The role of interactions and mergers in the structure and formation of many galaxies including our own.
7. **Active Galactic Nuclei.** Quasars, radio galaxies, and related objects and their place in galaxies and the universe.
8. **Cosmology.** A brief introduction to some of the basic ideas and current evidence about cosmology and the evolution of the universe; evidence for “dark energy.”