

Course Objective:

This course focuses on cosmology and the Universe as a whole. It begins with an observational outlook, exploring how the distances to distant objects are determined and what the content of the distant universe is. From the observed properties of the universe, theories of galaxy and structure formation are first developed. Physical cosmology is then studied, describing the shape and evolution of the Universe under different cosmological models. Finally, theoretical models of galaxy and structure formation are explored using physical cosmology as a base, and the predictions of these theoretical models are tested using the observed properties of the distant universe.

This class will give students a physical picture of the Universe on the largest scales, emphasizing how observations are used to test different cosmological models for the structure and evolution of the Universe.

1.

Distance Scale

Cepheid distance scale to LMC, M32, and Virgo

Secondary distance indicators: supernovae and luminosity functions
Dynamical distance indicators: Tully-Fisher and Dn-sigma

2.

Inventory of the High-Redshift Universe

Field galaxies

Galaxy clusters

Dark matter

High redshift galaxies

Quasars and QSO absorption line systems

3.

Galaxy Formation from the Observational Record

Clues from stellar populations: ages and metallicities
Starburst galaxies and interactions

Formation of ellipticals and spirals

Cluster formation