Syllabus For Galaxies Course

1: Galaxies, Their Structure and Properties (I)

Galaxy catalogs, morphological classification, Hubble sequence
Variation of galaxy properties along the Hubble Sequence
Stellar populations and galaxian subsystems
Galaxy luminosity and mass functions
Properties of spiral galaxies, density wave theory

2: Galaxies, Their Structure and Properties (II)

Properties of elliptical galaxies
Supermassive black holes in nearby galaxies
Properties of dwarf galaxy families
Fundamental correlations, scaling relations, and their uses

3: Galaxy Evolution

Basic processes of galaxy evolution: merging, stellar pop. modeling
Deep surveys (imaging and redshift)
Selection effects and obscured star formation
Star formation history, assembly of the mass
The Olbers paradox
Optical/NIR and FIR/sub-mm diffuse backgrounds

4: Chemical Evolution, Intergalactic Medium and its Evolution

Chemical evolution of galaxies
Basic phenomenology of absorbers
LyA forest, Lyman limit systems, Damped LyA systems
Evolution of IGM and its chemical enrichment
Feedback processes and the cosmic web

5: Galaxy Formation

Basics of galaxy formation
The first galaxies and early stages of galaxy evolution
Reionization era
The first stars
The origins of black holes in the early universe

6: Quasars and Active Galactic Nuclei: Phenomenology and Physics

AGN properties, basics, classification, spectra

Supermassive black holes and their fueling
Emission mechanisms
AGN unification

7: Quasars and AGN: Unification, Evolution, High-Energy Backgrounds

Jets and beaming
Quasar surveys and evolution
X-ray, gamma-ray, and AGN-generated backgrounds
The origin of first quasars and supermassive black holes

Key concepts and ideas are summarized in these lectures presentations. For text-books for further readings see:

- "Extragalactic astronomy and cosmology: an introduction" by Peter Schneider, any edition.

- "Introduction to Cosmology", by Barbara Ryden, second edition.

- "Cosmology - The Science of the Universe", by Edward Harrison