# PHY216 – Galaxies: Syllabus

-------------------------------- **The Basics** -------------------------------------------------------------------
- **Lecture 1: General introduction:** historical context; general overview of galaxies and why they are important; key issues; what the course is about
- **Lecture 2: Astronomical distances I:** parallax; moving cluster method; secular parallax; revision of magnitudes; distance modulus; reddening/extinction; main sequence fitting
- **Lecture 3: Astronomical distances II:** RR Lyrae stars; Cepheid variables; W Virginis stars; novae; Type Ia supernovae; Tully Fisher relationship; Hubble's law
- **Lecture 4: Galaxy classification and general properties:** Hubble tuning fork; other classification schemes; general properties of Spiral galaxies; general properties of E galaxies
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-------------------------------- **The Milky Way** -------------------------------------------------------------------
- **Lecture 5: The contents of the Milky Way:** population I/II; old disk/thick disk; halo; bulge; globular clusters; open clusters; Galactic centre; gas content
- **Lecture 6: The motions of gas and stars in the solar neighbourhood I:** local standard of rest; Oort's constants; HI 21cm observations; the Galactic rotation curve
- **Lecture 7: The motions of gas and stars in the solar neighbourhood II:** the mass of the Galaxy; stellar kinematics; epicyclic motions
- **Lecture 8: The local environment of the Milky Way:** dwarf companion galaxies; tidal streams; the Local Group; the local super-cluster

-------------------------------- **Spiral Galaxies** -------------------------------------------------------------------
- **Lecture 9: Spiral galaxies – kinematic properties:** rotation curves; masses; mass-to-light ratios; the evidence for dark matter
- **Lecture 10: Spiral galaxies – photometric properties:** luminosity profiles; star formation indicators; stellar populations; star formation profiles; theories of spiral structure

-------------------------------- **Elliptical Galaxies** -------------------------------------------------------------------
- **Lecture 11: Elliptical galaxies – photometric properties:** de Vaucouleurs profile; Sersic law; disky and boxy elliptical galaxies; colour-magnitude relationship; cores and cusps
- **Lecture 12: Elliptical galaxies – stellar kinematics I:** observed kinematics; Faber-Jackson relationship; fundamental plane; link with disky/boxy properties
- **Lecture 13: Elliptical galaxies – stellar kinematics II:** virial theorem; masses of elliptical galaxies; application to star/galaxy clusters; degree of rotational support

-------------------------------- **Active Galactic Nuclei** -------------------------------------------------------------------
- **Lecture 14: AGN – general properties:** discovery; optical morphologies and spectra; radio lobes and jets; characteristic properties
- **Lecture 15: AGN – structure and theories:** energy generation; evidence for black holes; Eddington luminosity; structural components; unified schemes

-------------------------------- **Galaxy Evolution** -------------------------------------------------------------------
- **Lecture 16: Galaxy evolution:** theories of galaxy evolution; the fossil approach; evidence for mergers in the local universe; spiral vs elliptical galaxy evolution; the historical approach; summary