

PHY-261 Astronomy

Credit Hours: 3-0

Pre-requisite: None

Course Objectives: Astronomy has always fascinated humans because of its beauty, use and the feeling it engenders of being above the petty worries of ordinary life. It was used in ancient times to find the way home after traveling afar and later used for navigation and timekeeping, at the hourly, daily, weekly, monthly, seasonal, and annual scales. It was misused for predicting human affairs and used for religious purposes. For those reasons, the positions of planets relative to the stars were required with great precision. That led to laws of motion and mechanics being developed. It has led to an understanding of the weather and seasonal variations and been used for surveying and now for precise positioning by the global positioning and similar satellites. In this course the subject is introduced.

Textbooks: J.B. Kaler, Astronomy! Harper Collins College Publishers, 1994.

Weekly Breakdown		
Week	Section	Topics
1	1.1-3, 2.2-7	Introduction to Astronomy and astronomical scales. The size and rotation of the Earth, latitudes and longitudes, motions in the sky.
2	3.1-7	The apparent path of the Sun in the sky, seasons, tropics, time measures, revolution of the Earth.
3	4.1-6	The constellations and naming stars, the Milky Way.
4	5.1-6, 6.1-4	The Moon its orbit and phases, lunar and solar eclipses. Planetary motions in the sky and planetary orbits, early Greek theories, Copernicus' system and Kepler's laws. Galileo's telescope.
5	7.1-6, 7.8-9	Newton's laws of motion and gravitation, energy, generalized Kepler laws, mass measurement. Einstein and relativity. Chaos.
6	8.1-4	Atomic spectra, radiation and matter, the Doppler effect.

7	9.1-4, 9.6-7	Optics, refracting, reflecting and radio telescopes, analysis.
8	10.1-6	Age of the Earth, the Earth's structure and tectonic plates, the atmosphere, the magnetosphere.
		Midterm Exam
9	11.1-7	Lunar properties and tides, surface features and lunar mountains, the "seas" of dust, the Earthly origin of the Moon.
10	12.1-4	Mercury and Venus seen from the Earth, the properties of Mercury, Venus and its properties.
11	13.1-6	Mars as seen from the Earth, the atmosphere surface and interior, of Mars, details found by Viking and the Rovers. The moons of Mars – Phobos and Deimos, life on Mars.
12	14.1-6, 15.1-3	Jupiter as seen from Earth and information from satellite flybys. Its atmosphere and magnetosphere, Jupiter's satellites and rings. Saturn as seen from the Earth and flybys, its moons and rings.
13	16.1-6	The outer planets Uranus and Neptune, and the ex-planet Pluto. Their discovery, as seen from Earth and from satellites.
14	17.1-4	Meteors and meteorites, asteroids and the asteroid belt, comets, the formation of the solar system.
15	18.1-5	Properties of the Sun, the photosphere and chemical position of the Sun, sunspots and the solar wind, the interior and energy generation mechanism of the Sun. The solar neutrino problem and its resolution.