AS1001 - Astronomy and Astrophysics 1

Overview
This module surveys our present state of knowledge of the orbits, surfaces and atmospheres of the planets in our solar system; the structure and evolution of the Sun and other stars, including extra-solar planetary systems; the bizarre menagerie of star-forming regions, violent stellar objects and supermassive black holes found within our own Milky Way Galaxy and in other galaxies; and the large-scale structure and ultimate fate of the expanding Universe. Throughout the module, fundamental observations are interpreted using simple but powerful physical methods to show how distances and other properties of astronomical objects throughout the Universe have been measured, from the time of Copernicus to the era of the Hubble Telescope and beyond.

Aims & Objectives
The aim of this module is to provide an elementary understanding of the structure of the observable universe and our position within it. The physical content of the universe, its structures and their mutual interactions, are explored. It is shown how the properties of planets, stars, galaxies, etc may be determined from observations coupled with theoretical models based on physical principles. The module comprises four 11-lecture courses on The Solar System, Stars and Elementary Astrophysics, The Galaxy, and Cosmology, thereby providing a complete overview of the subject at this level.

Learning Outcomes
By the end of this module, students will have gained:

- an understanding of the structure and evolution of the solar system, through the galaxy, to the large-scale distribution of galaxies and the origin of the universe
- an ability to calculate astrophysical properties of planets, stars and galaxies from basic physical and mathematical models and simplified data.

Synopsis
(1) The Solar System
Brief historical introduction including basic observations and the calendar, leading to Kepler's laws of planetary motion and Newton's law of gravitation. Modern exploration of the Solar System and the study of the physical properties of the planets and their satellites - interior structure, atmosphere and climate, magnetospheres and interactions with the solar wind; physical properties of comets, meteors. The atmosphere of the Sun - photosphere, chromosphere, corona and the solar wind. Origin of the Solar System.

(2) Stars and Elementary Astrophysics

(3) The Galaxy
(4) Cosmology
A preview of the universe. The extragalactic nebulae (galaxies). The determination of extragalactic
distances. Types of galaxies. The Hubble classification. Properties of galaxies - sizes, masses,
spectra and luminosities. The distribution of galaxies in space - clusters and superclusters. The red-
shift - distance relation. Hubble's law. The expansion of the universe. The age of the universe. The
Big Bang origin of the universe. A critical density for expansion and contraction. The evolution of the
universe.

Pre-requisites
SQA Higher or A-level Physics and Maths, at grade B or better, or an equivalent set of qualifications.

Anti-requisites
AS1002, AS1101

Assessment
Laboratory work = 25%, 2 Class Tests = 15%, 2 Hour Examination = 60%

Additional information on continuous assessment etc

Recommended Books
Please view University online record:
http://resourcelists.st-andrews.ac.uk/modules/as1001.html

General Information
Please also read the additional information in the School's handbook for first and second level
modules.