AS521 - Observational Techniques in Astrophysics

Credits: 15.0  Semester: Whole Year
Number of Lectures: 10  Lecturer: Dr Aleks Scholz, et al.
Academic Year: 2018-19

Overview
Astrophysics is an observational, rather than an experimental, science. Nearly all the information that astronomers can gather about the Universe at large and the objects within it, comes to us in the form of electromagnetic radiation. In this two-part course students will gain a comprehensive understanding of the observational work required for astronomical research.

Aims & Objectives
The aim of this module is to familiarise students with a wide range of observational techniques in astronomy and astrophysics, while allowing the pursuit of individual scientific interests. Students will gain theoretical knowledge and practical experience in instrument building, planning, documenting and conducting of astronomical observations, measurements, data analysis, proposal writing and report writing. The module consists of a laboratory part in semester one and a lecture part in semester two, combined with telescope training.

Learning Outcomes
By the end of the module, students will have a comprehensive knowledge of astronomical observational facilities, observational techniques and data-analysis methods. They will be able to:

- Write an observing proposal for advanced astronomical facilities.
- Plan a set of observations, including scheduling, instrument setup, exposure times, lunar phase.
- Operate optical telescopes competently.
- Acquire optical images of various astronomical objects, including the necessary calibration data.
- Carry out the basic reduction and advanced analysis of optical images.
- Record and write up results in a professional manner.

Synopsis
This is a module that provides a complete overview of the practical part of research in observational astronomy. In the laboratory part, students learn how to plan observations with telescopes at the university observatory, followed by data reduction and analysis. The lecture part prepares the students for working with large-scale professional facilities and advanced observing techniques. The module is rounded off by hands-on observing training with the James Gregory Telescope in St Andrews and (optional) with telescopes overseas as part of a field trip. Overall, students gain valuable experience in observation, data analysis, astronomical software, observing techniques, report and proposal writing.

Laboratory Hours Mondays and Thursdays (semester one): 14:00 to 17:30, Honours astro lab.
Lecture Hours Mondays (semester two): 17:05 to 17:55 in the SUPA videoconferencing room (10 lectures)

In addition, the course includes observing training with the James Gregory Telescope in small groups and an optional field trip to two telescopes at the Teide observatory on Tenerife in semester two. The observing training provides opportunities for taking data for research projects and is supervised by staff.

Pre-requisites
BSc or equivalent in the physical sciences
Co-requisites
AS5500

Assessment
Continuous Assessment = 100%

Additional information on continuous assessment etc
Please note that the definitive comments on continuous assessment will be communicated within the module. This section is intended to give an indication of the likely breakdown and timing of the continuous assessment.

This is a 15 credit module, so is expected to take 150 hours of study for the average student at this level.

The laboratory part of the module has two assessed assignments (60% of the total mark). The lecture part has one assignment, a mock telescope proposal (40% of total mark).

Recommended Books
Please view University online record:
http://resourcelists.st-andrews.ac.uk/modules/as5521.html

General Information
Please also read the general information in the School's honours handbook.