

PX283-30 Astrophysics Laboratory II and Skills

22/23

Department

Physics

Level

Undergraduate Level 2

Module leader

Martin Lees

Credit value

30

Module duration

20 weeks

Assessment

100% coursework

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module develops experimental skills in a range of areas including astronomical experimentation. The module also explores retrieval and evaluation of information, and the oral and written presentation of scientific material.

[Module web page](#)

Module aims

To develop experimental skills by carrying out practical experiments using a range of laboratory apparatus. Experiments will be drawn from different areas of physics and astrophysics.

To provide experience of searching for, accessing and evaluating, information from the scientific literature using computer databases.

To develop skills in transferring scientific information on a particular topic clearly and concisely in a presentation and in writing.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1. Each student is expected to complete a series of exercises on data analysis and the estimation and propagation of errors. Each student (working with a partner) is expected to complete three astrophysics experiments in addition to a selection of experiments from different areas of physics.
2. Each student will either work (with a partner) through an introduction to programming using LabVIEW, or will (on their own) build and test a functioning electronic circuit.
3. Each student (working with a group of 4 or 5 other students) is allocated a topic in astrophysics to review. The group selects about 5 references on which their work will be based. The group writes one summary of the science associated with their topic including a critique of the 5 sources. Each student in the group gives a 5 minute talk as part of a 25 minute presentation on the chosen topic. The group prepare a set of web pages on the chosen topic. In addition, each student writes a one (A3) page fact sheet on the topic.

Learning outcomes

By the end of the module, students should be able to:

- Use many pieces of standard laboratory equipment including oscilloscopes, telescopes and spectrometers
- Read manuals and follow instructions when using less standard pieces of laboratory equipment (e.g. gamma ray spectrometers, x-ray sets)
- Carry out a scientific investigation, to analyse their data and the methods used, and to compare the findings with theory and with published experimental data
- Retrieve information on a particular topic in physics or astrophysics from the scientific literature (including printed materials and computer databases), and to make sense of these different sources of information
- Use PC's for data acquisition and analysis
- Communicate their ideas verbally and in writing and to use word processing (e.g. Word, LaTeX) and presentation (PowerPoint) software packages
- Demonstrate organisational skills including planning and time management on experiments and group working

Subject specific skills

Use of laboratory equipment including spectrographs, and telescopes. Ability to follow detailed instructions when using less standard pieces of laboratory equipment (such as gamma ray spectrometers and x-ray sets); ability to analyse data and the methods used. Ability to retrieve and present information on a particular topic in physics from the scientific literature.

Transferable skills

Analytical, communication, self-study. Ability to use standard (e.g. Origin, LabVIEW, Python, LaTeX, PowerPoint) and specialised computer software for data acquisition, analysis, and presentation.

Study

Study time

Type	Required
Lectures	5 sessions of 2 hours (3%)
Seminars	10 sessions of 1 hour (3%)
Supervised practical classes	20 sessions of 4 hours (27%)
Private study	200 hours (67%)
Total	300 hours

Private study description

Reading laboratory scripts, analysing results, completing error exercises, maintaining lab book, writing scientific reports. Studying an assigned topic, searching for and evaluating relevant information, preparing a presentation and website.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time
Laboratory and Skills Assessed Work	100%	
Laboratory Reports. Practical assessments. Presentations.		

Feedback on assessment

Face to face discussions with demonstrators and markers, written feedback on formal reports.

Availability

Courses

This module is Core for:

- UPXA-F3F5 Undergraduate Physics with Astrophysics (BSc)
 - Year 2 of F3F5 Physics with Astrophysics
 - Year 2 of F3F5 Physics with Astrophysics
- Year 2 of UPXA-F3FA Undergraduate Physics with Astrophysics (MPhys)