

PX271-30 Physics 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 and introduces the concepts involved in controlling an experiment using a microcomputer. 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 a number of practical experiments using a range of laboratory apparatus, the construction and testing of a functioning electronic circuits and the principles of computer interfacing to laboratory equipment.

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

To develop skills in transferring scientific information on a particular topic in as clear and concise way as possible in a presentation and in written form.

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 one experiment from each of three groups of experiments; each group of experiments providing experience of a different area of Physics.
2. Each student (working alone) is required to complete an electronics laboratory, building and testing a functioning electronic circuit.
3. Each student (working with a partner) will work through an introduction to programming using LabVIEW, which ensures they have the knowledge to process and display data and communicate with experiments through a data-acquisition card within a PC. Students will then carry out an experiment using LabVIEW to control the experiment and analyse the data output.
4. Each student (working with a group of 4 or 5 other students) is allocated a topic in Physics 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 and telescopes
- Read manuals and follow detailed instructions when using less standard pieces of laboratory equipment (e.g. NMR and 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 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, Tex) and presentation (PowerPoint) software packages
- Demonstrate organisational skills including planning and time management on experiments and group working

Subject specific skills

Use of standard laboratory equipment including oscilloscopes, and telescopes. Ability to follow detailed instructions when using less standard pieces of laboratory equipment (such as NMR and 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 A1

	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-F300 Undergraduate Physics (BSc)
 - Year 2 of F300 Physics
 - Year 2 of F300 Physics
 - Year 2 of F300 Physics
- UPXA-F303 Undergraduate Physics (MPhys)
 - Year 2 of F300 Physics
 - Year 2 of F303 Physics (MPhys)
- Year 2 of UPXA-F3N1 Undergraduate Physics and Business Studies
- Year 2 of UPXA-F3N2 Undergraduate Physics with Business Studies