PX159-10 Physics Programming Workshop

26/27

Department
Physics
Level
Undergraduate Level 1
Module leader
Jiachen Jiang
Credit value
10
Module duration
10 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module introduces the Python programming language. It is quick to learn and encourages good programming style. Python is an interpreted language, which makes it flexible and easy to share. It allows easy interfacing with modules, which have been compiled from C or Fortran sources. It is widely used throughout physics and there are many downloadable free-to-user codes available. The module also looks at visualisation of data.

Module web page

Module aims

To introduce scientific programming with the help of the Python programming language, a language widely used by physicists.

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.

A brief introduction to python. Simple maths and physics on the computer. Data/File Input/ Output and control in Python. Loops, conditions and lists.

Functions: Algorithms and software design; tests, error handling and modules

Introduction to Numpy and scipy. Working with vectors and matrices, integration

Graphical representation of the calculation using matplotlib

Basic statistics, probability density distributions, random number generation

Simple data fitting using scipy, physics analysis

Learning outcomes

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

- Write python programs
- Formulate and solve simple maths and physics problems involving differential equations, linear algebra and integration, using python
- Use scientific and graphical libraries
- Perform statistical calculations using python
- Implement good software design
- Present results graphically

Indicative reading list

Reading lists can be found in Talis

Specific reading list for the module

Subject specific skills

Programming in Python

Transferable skills

IT, problem-solving, self-study

Study

Study time

Type	Required
Lectures	10 sessions of 1 hour (10%)
Total	100 hours

Type	Required
Practical classes	10 sessions of 2 hours (20%)
Private study	70 hours (70%)
Total	100 hours

Private study description

Work through module notes, write programs in Python, discuss with others taking the module, prepare and submit assessments

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	Eligible for self-certification
Assessment component			
Problem sets / Practical tasks Weekly problems sets, practical tasks	100%		No
Reassessment component			
Programming reassessment Additional coursework assignments where feasible			No

Feedback on assessment

Surgery discussions and comments on assessed work

Availability

Courses

Course availability information is based on the current academic year, so it may change.
This module is Core for:

- Year 1 of UPXA-GF13 Undergraduate Mathematics and Physics (BSc)
- UPXA-FG31 Undergraduate Mathematics and Physics (MMathPhys)
  - Year 1 of GF13 Mathematics and Physics
  - Year 1 of FG31 Mathematics and Physics (MMathPhys)
- Year 1 of UPXA-F300 Undergraduate Physics (BSc)
- UPXA-F303 Undergraduate Physics (MPhys)
  - Year 1 of F300 Physics
  - Year 1 of F303 Physics (MPhys)
- Year 1 of UPXA-F3F5 Undergraduate Physics with Astrophysics (BSc)
- UPXA-F3FA Undergraduate Physics with Astrophysics (MPhys)
  - Year 1 of F3F5 Physics with Astrophysics
  - Year 1 of F3FA Physics with Astrophysics
- Year 1 of UPXA-F3N2 Undergraduate Physics with Business Studies