

# FP041-15 Scientific Programming and Mathematical Modelling

**24/25**

**Department**

Warwick Foundation Studies

**Level**

Foundation

**Module leader**

Joe Alcantara

**Credit value**

15

**Module duration**

12 weeks

**Assessment**

34% coursework, 66% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

FP041-15 Scientific Programming and Mathematical Modelling

[Module web page](#)

### Module aims

To develop an understanding of the basic principles of mathematical models and demonstrate basic competence in computer programming.

This is an interdisciplinary module which links Mathematics, Data Science, and Computer Science.

### 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.

Unit 1. Introduction to data science and scientific programming i

Unit 2. Introduction to Mathematical Modelling

- Unit 3. Basics of descriptive and inferential analysis
- Unit 4. Statistics fundamentals
- Unit 5. Modelling with regression models.
- Unit 6. Modelling with classification models.
- Unit 7. Applying data science models to real world problems.

## **Learning outcomes**

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

- Critically observe a real-world problem and apply a mathematical model to provide insights and/or solutions.
- Demonstrate understanding of basic mathematical concepts in data science, relating to descriptive analysis, and inferential analysis, and regression and classification algorithms.
- Utilize a programming language such as Python to prepare data for analysis and build mathematical models.
- Produce a rigorous analytical report which considers a broad range of mathematical and statistical methods to describe and analyse a given dataset.

## **Indicative reading list**

Bender, E.A., 2012. An introduction to mathematical modeling. Courier Corporation.

Hill, C., 2016. Learning scientific programming with Python. Cambridge University Press.

Langtangen, H.P. and Langtangen, H.P., 2009. A primer on scientific programming with Python (Vol. 2). Berlin, Germany: Springer.

[View reading list on Talis Aspire](#)

## **Interdisciplinary**

This module has links between Mathematics, Data Science, and Computer Science.

## **Subject specific skills**

Mathematical Skills

Analytical Skills

Problem-solving skills

Investigative Skills

IT Skills

## **Transferable skills**

Mathematical Skills

Analytical Skills

Problem-solving skills

Communication Skills

Investigative Skills

IT Skills

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## Study

### Study time

Type	Required
Seminars	48 sessions of 1 hour (32%)
Private study	72 hours (48%)
Assessment	30 hours (20%)
Total	150 hours

### Private study description

Private Study.

### Costs

No further costs have been identified for this module.

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## Assessment

You must pass all assessment components to pass the module.

### Assessment group D1

	Weighting	Study time
Case Study	34%	10 hours
Analyse a data set using a board range of mathematical and Statistical Methods, producing an analytical report.		
Final Examination	66%	20 hours
Final Examination - Testing all unit content.		

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## Weighting

## Study time

- Answerbook Pink (12 page)
- Students may use a calculator

## Feedback on assessment

Written feedback provided on Tabula

[Past exam papers for FP041](#)

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## Availability

## Courses

This module is Core for:

- Year 1 of FIOE Warwick International Foundation Programme