

FP041-15 Scientific Programming and Mathematical Modelling

23/24

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

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

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.

Assessment

You must pass all assessment components to pass the module.

Assessment group D

| | 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. (Approximately 1.5 pages) | | |
| Final Examination | 66% | 20 hours |
| Final Examination - Testing all unit content. | | |

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](#)

Availability

Courses

This module is Core for:

- Year 1 of FIOE Warwick International Foundation Programme