

# MA124-10 Mathematics by Computer

**26/27**

**Department**

Warwick Mathematics Institute

**Level**

Undergraduate Level 1

**Module leader**

Mark Cummings

**Credit value**

10

**Module duration**

22 weeks

**Assessment**

Multiple

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

The module provides an overview of using the computer as a tool to provide intuition, guide and test hypotheses, enhance understanding and make predictions on mathematical questions. It particularly aims at learning how to use computer-based mathematical tools (chiefly Python) through individual and group work.

### Module aims

The first aim is to learn Python. The second aim is to get experience work in a group on computer based mathematical project.

### 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.

Term 1:

- Fundamentals of programming in Python: input/output, conditional statements, functions, loops, lists, arrays and plotting.

- Mathematics using Python: solving equations, properties of functions, visualisation of functions and data; elementary number theory and abstract algebra, sequences and series, vectors and matrices, symbolic algebra, differential equations, probability, statistics and data analysis.

Term 2:

Group project and presentation

## Learning outcomes

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

- Learn foundations of programming in Python
- Use Python for: plotting data, curves and surfaces; vectors and matrices; symbolic algebra and solving equations, solving differential equations; statistics and data analysis.
- Learn how to manage a group project
- Develop research skills and practice presentation skills

## Indicative reading list

[Reading lists can be found in Talis](#)

[Specific reading list for the module](#)

## Subject specific skills

At the end of the module, students will be able to use software (currently Python but it may change in future, depending on the industry trends) to create simple programs and perform interactive analysis. They will understand rudimentary computer programming control structures and graph functions. They will use the computer to study various topics in mathematics including algebra, number theory, sequences and series, vectors and matrices, differential equations, probability, statistics and data analysis.

## Transferable skills

The module will teach students basic computer skills and their relationship with mathematics. It will encourage them to use the computer as an exploratory tool research and equip them with foundational programming knowledge. They will also learn to work in a group.

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## Study

## Study time

<b>Type</b>	<b>Required</b>
Lectures	4 sessions of 1 hour (4%)
Online learning (scheduled sessions)	7 sessions of 1 hour (7%)
Private study	89 hours (89%)
Total	100 hours

## Private study description

Work on quizzes, work on assignments and independent work on the group project with some guidance.

## Costs

No further costs have been identified for this module.

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## Assessment

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

### Assessment group A2

	<b>Weighting</b>	<b>Study time</b>	<b>Eligible for self-certification</b>
Quizzes	20%		No
3 moodle quizzes			
Individual Assignment	30%		No
3 individual assignments submitted as Jupyter files			
Group Project	50%		No
Assessment contains three subcomponents: group presentation (10%), group report (30%) and individual report (10%)			

### Assessment group A3

	<b>Weighting</b>	<b>Study time</b>	<b>Eligible for self-certification</b>
Quizzes	10%		No
Individual Assignment	40%		No
Group Project	50%		No

### Assessment group R2

	<b>Weighting</b>	<b>Study time</b>	<b>Eligible for self-certification</b>
Reassessment tasks - assignment	100%		No

Instead of a group project the students will need to submit an extended individual assignment related to both the Jupyter and project tasks

### **Assessment group R3**

	<b>Weighting</b>	<b>Study time</b>	<b>Eligible for self-certification</b>
Reassessment tasks - assignment	100%		No

### **Feedback on assessment**

Formative feedback available from the personal tutor throughout year. Assessment of earlier components is available during the year.

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## **Availability**

### **Post-requisite modules**

If you pass this module, you can take:

- MA3K7-15 Problem Solving with Python

## **Courses**

This module is Core for:

- Year 1 of UMAA-G105 Undergraduate Master of Mathematics (with Intercalated Year)
- Year 1 of UMAA-G100 Undergraduate Mathematics (BSc)
- UMAA-G103 Undergraduate Mathematics (MMath)
  - Year 1 of G100 Mathematics
  - Year 1 of G103 Mathematics (MMath)
- Year 1 of UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe
- Year 1 of UMAA-G1NC Undergraduate Mathematics and Business Studies
- Year 1 of UMAA-G1N2 Undergraduate Mathematics and Business Studies (with Intercalated Year)
- Year 1 of UMAA-GL11 Undergraduate Mathematics and Economics
- Year 1 of UECA-GL12 Undergraduate Mathematics and Economics (with Intercalated Year)
- Year 1 of UMAA-G101 Undergraduate Mathematics with Intercalated Year

This module is Option list C for:

- Year 1 of UMAA-GV17 Undergraduate Mathematics and Philosophy