

# MA124-10 Mathematics by Computer

**23/24**

**Department**

Warwick Mathematics Institute

**Level**

Undergraduate Level 1

**Module leader**

Richard Lissaman

**Credit value**

10

**Module duration**

30 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 Python mini-course (input/output, loops, arrays, plots, collaborative tools (github))
- Term 2 Python mini-course (algebra and differential equations)
- Term 2 group project and presentation

## Learning outcomes

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

- learn how to graph functions, study vectors and matrices graphically and numerically
- solve algebraic and differential equations numerically and study statistical properties of sets of numbers
- learn foundations of programming in Python
- learn how to manage a group project, including collaborative tools such as Github
- develop research skills and practice presentation skills

## Indicative reading list

The reading list is going to change due to the switch from Matlab to Python

[View reading list on Talis Aspire](#)

## 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 matrices and differential equations graphically and numerically. They will employ iteration, recursion and computer generated random numbers to study sequences and series.

## 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 and how to use the collaborative tool (currently Github or Dropbox but it may change in future).

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## Study

### Study time

Type	Required
Tutorials	8 sessions of 1 hour (5%)
Project supervision	8 sessions of 1 hour (5%)
Online learning (scheduled sessions)	10 sessions of 30 minutes (3%)
Online learning (independent)	4 sessions of 8 hours (19%)
Total	165 hours

Type	Required
Private study	12 hours (7%)
Assessment	100 hours (61%)
Total	165 hours

## Private study description

Independent work on the group project with some guidance.

## 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
Quizzes	10%	10 hours
3 moodle quizzes		
Individual Assignment	40%	40 hours
3 individual assignments submitted as Jupyter files		
Group Project	50%	50 hours
Assessment contains three subcomponents: group presentation (10%), group report (30%) and individual report (10%)		

### Assessment group R1

	Weighting	Study time
Reassessment tasks - assignment	100%	
Instead of a group project the students will need to submit an extended individual assignment related to both the Jupyter and project tasks		

## Feedback on assessment

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

# Availability

## Courses

This module is Core for:

- Year 1 of UMAA-G105 Undergraduate Master of Mathematics (with Intercalated Year)
- UMAA-G100 Undergraduate Mathematics (BSc)
  - Year 1 of G100 Mathematics
  - Year 1 of G100 Mathematics
  - Year 1 of G100 Mathematics
- UMAA-G103 Undergraduate Mathematics (MMath)
  - Year 1 of G100 Mathematics
  - Year 1 of G103 Mathematics (MMath)
  - 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:

- UMAA-GV17 Undergraduate Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy