

# MA4K9-30 Project (Research)

**23/24**

**Department**

Warwick Mathematics Institute

**Level**

Undergraduate Level 4

**Module leader**

Charles Elliott

**Credit value**

30

**Module duration**

28 weeks

**Assessment**

Multiple

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

N/A

[Module web page](#)

### Module aims

The primary aim of the Research Project is to give final year MMath students experience of mathematics as it is pursued close to the frontiers of research, not just as a spectator sport but as an engaging, evolving activity in which they can play a part.

### 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.

Before registering for a Research Project, the student must first take the following steps:

1. Find a member of staff willing to supervise;
2. Agree on a theme suited to mathematical background and interests, and to supervisor's expertise;

3. Negotiate a title and brief for project, and discuss its aims and objectives. It is normal for this to need renegotiating as the project evolves;
4. Discuss the criteria for assessment with supervisor. This will normally be the standard criteria listed under 'Assessment' below.

Project Supervisors and Themes: A list of the Research project themes offered by staff members is kept updated on the R-Projects Resource page.

Assessment: The Research Projects are assessed on the basis of

- A written dissertation (80% of the module credit)
- An interim 10 minute presentation to the Supervisor (start of Term 2, 5% of credit)
- A short oral presentation and defence of dissertation (15% of the module credit).

The Dissertation must be word-processed (normally in Latex using the template provided on the R-Projects Resource page). The main body of the dissertation should normally be about 30 pages (excluding the title page, table of contents and bibliography) and strictly no longer than 40 pages (except by individual permission from the course organiser). If necessary, additional information may be included in the form of appendices. Copies must be submitted by a deadline given (usually during Easter Vacation). If the dissertation does not satisfy these requirements, it may be

returned to and a resubmission required.

The Oral Presentation and Defence will take place on a designated day in Term 3 (typically set for the third or fourth Wednesday of Term 3). Each candidate will be expected to give a prepared talk, lasting between 20 and 25 minutes, on the theme of their dissertation. After their talk, they will submit to questioning and discussion of their work with the staff members in the audience for a further 20 minutes or so; thus, for each student, the examination should normally last no more than 45 minutes. Whenever possible, R-Project candidates will be divided into small groups (of up to four students), in cognate areas of mathematics. Students are expected to attend all the talks in their group and should therefore set aside half a day for the process.

Below we summarise the standard criteria for assessing an R-Project dissertation and oral component. Examiners may give different weighting to the criteria or add further criteria to suit the features of a specific project brief.

Students are strongly advised to discuss assessment with your supervisor.

Assessment of the R-Project Dissertation

These are the standard criteria for assessing a dissertation; marks awarded on the basis of the dissertation may be modified in the light of evidence from the oral.

- The amount of work and effort undertaken: This might be evidenced by the breadth and depth of reading and research in the literature, the organisation and presentation of the material, new skills acquired (e.g. learning to program or to use a mathematical package such as Matlab, etc.), work on examples and calculations.
- The clarity and accuracy of the explanation and justification: Is exposition of the material well directed at target audience, easy to read, and logical? Does it have a good story to tell? Are proofs comprehensive and mathematically correct?
- The level of the material and the depth of understanding: Is the intellectual content deep? Has the student assimilated and understood it well, and also convinced the reader of this? Does exposition carry the stamp of student's ownership of the material?
- The quality of the scholarship: Is written English concise, fluent, correctly spelled and

grammatical? Is the quality of the word-processing good (well laid out and free of typos)? Is the mathematics typeset well (with suitable font styles and sizes and well-displayed expressions)? Are sources reliable, and are they regularly cited (so that the reader can clearly distinguish student's own contributions) and listed in a conventional bibliography at the end? Is the material well-structured and sensibly numbered for cross-referencing?

- The degree of originality: Originality may be shown in a number of ways, for instance: in the way the material is organised; by making new connections between existing ideas or areas of knowledge; through a new proof or a generalisation of a known result, including perhaps relaxed hypotheses or a stronger conclusion; through the creation of examples that illustrate the theory or establish its limits of validity; by creative use of the library and the resources on the Web.

#### Assessment of the R-Project Oral Examination

Your mark for the oral examination will be based on the following:

- The prepared talk: The talk should be a succinct survey of the work. The account can be informal and personal but it should (i) show clearly that they have a good knowledge and understanding of the subject and its context and (ii) take into account to the likely knowledge of the students attending the talk.

#### Resources

1. List any additional requirements and indicate the outcome of any discussions about these.
- The defence of the dissertation: After the talk the examiners may ask questions about the material in the dissertation and the student will be expected to engage in a general discussion about such things as the motivation for choosing the topic, any difficulties met, and ideas for taking the work further.
  - Background knowledge and understanding: the student will be expected to know something about the background of the theme and its place in the broader scheme of things. The oral will be used to test the thoroughness of the understanding and to identify their own personal contributions as distinct from what is already in the public domain.

#### Research Project Important Dates:

- Registration: Registration will be within the first few weeks of Term 1.
- Interim Presentation: Expected to take place at the start of Term 2
- Submission of Dissertation: Two copies of your dissertation submitted by deadline during Easter Vacation. In addition, an electronic copy of dissertation must be submitted.
- The oral examination: This is likely to take place in the third week or possibly the fourth week of Term 3 at a time and place to be arranged by the supervisor.

## Learning outcomes

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

- Have experienced mathematics as it is pursued close to the frontiers of research, not just as a spectator sport but as an engaging, evolving activity in which the student has played a part.
- Carry out independent research, access and extract relevant information from suitable publications, organise time effectively.
- Have developed scholarly writing skills, which a coherent and substantial report, fully

referenced, and typeset.

- Have honed presentations skills with a substantial presentation in term 3 and present themselves with confidence.

## Subject specific skills

See learning outcomes.

## Transferable skills

Students will acquire key reasoning and problem solving skills which will empower them to address new problems with confidence.

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## Study

### Study time

Type	Required
Project supervision	20 sessions of 1 hour (7%)
Private study	280 hours (93%)
Total	300 hours

### Private study description

research and writing of project

## 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 A1

	Weighting	Study time
Dissertation	80%	
Interim Presentation to supervisor (start of term 2)	5%	
Final Presentation	15%	

## Assessment group R

	Weighting	Study time
Summary	100%	

## Feedback on assessment

Frequent meetings with supervisor, comments on drafts of dissertation, verbal feedback during presentations.

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## Availability

## Courses

This module is Core for:

- TMAA-G1PE Master of Advanced Study in Mathematical Sciences
  - Year 1 of G1PE Master of Advanced Study in Mathematical Sciences
  - Year 1 of G1PE Master of Advanced Study in Mathematical Sciences
- Year 5 of UMAA-G105 Undergraduate Master of Mathematics (with Intercalated Year)
- UMAA-G103 Undergraduate Mathematics (MMath)
  - Year 4 of G103 Mathematics (MMath)
  - Year 4 of G103 Mathematics (MMath)
- Year 4 of UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe

This module is Core optional for:

- Year 5 of UMAA-G105 Undergraduate Master of Mathematics (with Intercalated Year)
- UMAA-G103 Undergraduate Mathematics (MMath)
  - Year 4 of G103 Mathematics (MMath)
  - Year 4 of G103 Mathematics (MMath)
- Year 4 of UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe

This module is Option list A for:

- Year 1 of TMAA-G1P0 Postgraduate Taught Mathematics