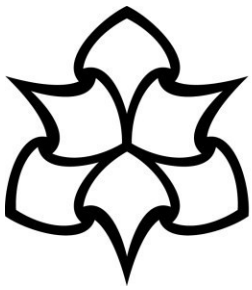

Manchester Metropolitan University

Department of Computing and Mathematics

6G6Z3008 Mathematics Projects

2021 – 2022

Project co-ordinator: Dr Philip Sinclair

Contents

Assessment Details

Course:	BSc. (Hons) Mathematics MMath (Hons) Mathematics	
Units:	6G6Z3008 Mathematics Project	
Project co-ordinator:	Philip Sinclair (email: p.sinclair@mmu.ac.uk, office: E116a, Phone: 0161 247 1663)	
Assessment type:	Individual self-study	
Assessment weighting:	100%	
Issue date:	13th September 2021	
Submission dates:	5th November 2021:	terms of reference
	21st January 2022:	interim report
	13th May 2022:	main project report
	Week of 3rd May 2022:	poster presentation
	Week of 3rd May 2022	oral presentations

Learning Outcomes

The coursework assignment assesses the following Learning Outcomes (LOs) for this unit:

1. Critically develop and apply the concepts and techniques taught in the undergraduate programme of study.
2. Independently plan, manage, control and successfully complete a project of substantial size.
3. Develop understanding and use of new skills and knowledge, appropriate to level 6, independently of teaching.
4. Critically evaluate and reflect on existing work as well as the student's own work.

Procedure for handing in work

See submission instructions on the separate deliverables.

Penalties for late submission

Any project report submitted:

- 5 working days after the deadline, without exceptional factors, will be marked but this mark will be capped at 40%.
- later than 5 days after the deadline, without exceptional factors, will receive a mark of 0%.
- after the deadline but with exceptional factors please see below.

Please see the university regulations on this at:

https://www.mmu.ac.uk/academic/casqe/regulations/assessment/docs/ug-regs.pdf

Exceptional Factors

If there are any Exceptional Factors than are affecting your performance at any time during the course of the project, you must contact either your project supervisor, Mathematics Level 6 tutor (as well as Mathematics Programme Leader): Steve Lynch (s.lynch@mmu.ac.uk) at the earliest opportunity. See also the guidance on Exceptional Factors using the link below

http://www.mmu.ac.uk/sas/studentservices/guidance/

Plagiarism

Students are reminded that plagiarism is a serious disciplinary matter. Checks are regularly made for misuse of the Internet and other existing materials. See the assessment regulations using the link below

http://www.mmu.ac.uk/academic/casqe/regulations/docs/policies_regulations.pdf

Mathematics Project

The assessment for this unit takes the form of an independent self-study project where students are required to research, plan and implement skills, concepts and techniques developed during the programme of study to investigate a given problem or topic. On completion of the project, students will have communicated their work in the form of a written report, an oral presentation and a poster from which students will be assessed.

The project unit is a self-study unit and unlike most of the other units in the programme, the mathematical content is not supported by lectures and tutorials. Instead, students will be assessed on their ability to use existing knowledge in addition to conducting their own research to develop their knowledge and skills and apply it to the task in hand. It is the responsibility of the student to plan their time to ensure that they are assigning sufficient time to work on their project consistently throughout the academic year. It is recommended that students assign approximately 8 to 10 hours per week in which to focus on their project work to ensure consistent progress and that stress is kept to a minimum.

Project supervision

Undertaking a large project is a challenging and often daunting task, which is why students will be assigned a project supervisor who will offer guidance, support and formative feedback during the course of the project. Students should contact their project supervisor no later than the first week in term 1, arrange a mutually agreeable day, and time in which to have weekly project meetings. These project meetings should be approximately 30 minutes in duration and give an opportunity for the student and their supervisor to discuss the project on a one-to-one basis.

It is vitally important that students make full use of these meetings and the support on offer, not only because it will help greatly in the successful completion of the project, but also because the student's attendance and performance during these meetings contribute towards the final project mark.

The project unit is a self-study unit, which means that it is the student, not the supervisor, who should be taking the lead on the project. It is appreciated that students may require more guidance at critical times, e.g., during the early stages of the project, which will be provided when necessary by the project supervisor.

In addition to supporting students with their project work, the supervisor will also assume the role of personal tutor to their project students. It is expected that some of the time allocated for the project meetings will be spent on personal tutoring matters.

Project deliverables

During the academic year, students are required to deliver the following, which will be used to inform the overall mark for the project.

- Terms of Reference
- Interim Report
- Project Report
- Oral Presentation
- Poster Presentation

Terms of Reference (Deadline: 5th Nov. 2021 – 9 pm)

A Terms of Reference (TOR) is a short document that describes the purpose and structure of a project. This is written at the commencement of a project and used to define the scope of the project, the aims and objectives, deliverables, stakeholders and resources required.

For this project unit the TOR should include the following:

- **The project title** – the full title of the project correct at the time of writing (occasionally the title of the final project report may differ slightly from the one specified in the TOR).
- **Stakeholders** – the name of the student and that of the supervisor.
- **Project background** – a description of the project that should explain to a non-specialist the context and relevance of the problem that the project is investigating. This should include some citations to sources demonstrating that the student has done some preliminary reading on the subject.
- **Aims** – the aims of the project should be clearly defined using general non-subject specific terms in a single sentence.
- **Objectives** – a list of objectives that are to be completed in order to help achieve the aims identified in the previous section. Each objective should indicate an approximate date for completion to ensure that the project deliverables are submitted before the deadline.
- **Project deliverables** – a list specifying what is to be delivered on completion of the project. For most projects, this will consist of those listed in the previous section.
- **Required resources** – a list of resources that are required in order to complete the project. These include resources that are made available to students as part of their programme of study, e.g., use of a computer, a word processing package, access to the internet, access to the library etc. There may be additional resources that student will need to procure independently, e.g., specialist software not provided on the university machines. If the student chooses to use their own machines on which to do project work, it is their responsibility to ensure that the hardware and software performs as required.
- **Ethics form** – an ethics checklist form is required before the commencement of any research project to ensure that anyone involved in any kind of project work demonstrates that they are both aware of, and are taking the appropriate steps to deal with any ethical issues that the work may raise. The expectation is that for most projects there will be no such issues to declare, however some situations may involve handling of confidential or sensitive data (as defined by data protection legislation), contact with young or vulnerable people, subjects of experimentation etc.
  The university's ethics weblink can be found either on moodle or at:

  https://ethos-apply.mmu.ac.uk/

Work should begin on the TOR immediately at the beginning of term 1.

Procedure for handing in work

The deadline for the TOR and ethics form is the **5th November 2021.** To submit their work, students are required to do the following:

- Submit a single PDF file containing the TOR using the TurnItIn submission link on Moodle.
- Electronically complete the ethics form online, see the link above plus help on its completion on the Moodle page.

Interim Report (Deadline: 21st Jan. 2022 – 9 pm)

The interim report is produced at the halfway stage of a project, summarises the progress that has been made in the project to date, and outlines the plan for the successful completion of the project.

The interim report should be no more than six pages in length and should include sections on the following:

- **Project description** – a brief (approximately half a page) description of the project. Students may base their description on the project background section from the TOR but revised to reflect the additional understanding that they now have.
- **Project report outline** – a plan of the content of the final project report that lists chapter and section headings with a brief explanation of what each will contain and showing how they fit into the structure of the report (no more than one and a half pages).
- **Progress to date** – a discussion on what the student has achieved so far in terms of the aims and objectives specified in the TOR (no more than two and a half pages).
- **Work still to be completed** – a brief discussion about the objectives that have yet to be achieved including steps that are proposed to achieve them (no more than one page). This should include a timetable giving an idea of how the student is progressing towards the completion of the project. If the student is behind schedule there should be an indication of how they intend to recover the situation (approximately half a page).

Work on the interim report should begin during the Christmas break. It is expected that it should take a student approximately 2 - 4 hours to produce provided they have made consistent progress in term 1.

Procedure for handing in work

The deadline for the interim report is the **21st January 2022.** To submit their work, students are required to do the following:

- Submit a single PDF file containing the interim report using the TurnItIn submission link on Moodle.

Project Report (Deadline: 13th May 2022 – 9 pm)

The project report is probably the largest and most comprehensive document that a student will have produced to date in their programme of study. Its purpose is to communicate the work done throughout the course of the project to a non-specialist (but one who has a good understanding of undergraduate level mathematics) so that the reader fully understands what is being presented. This carries the largest weighting of all of the project deliverables and is expected to take the majority of the time allocated for the project unit to produce.

Formatting of the project report

The project report should comply by the following university standards for academic project reports:

- The report must have a title page that includes: the university logo; the name of the faculty; the name of the student; the degree title of the programme; the title of the project; the month and year that the project was completed; the name of the school to which the student belongs.
- The report must have a preamble consisting of (on separate pages): a full-page abstract; an acknowledgements page; a signed university plagiarism disclaimer; a table of contents; a list of figures.
- The report should use a 12pt Times New Roman (or the LaTeX equivalent) font with double lined spacing for the main text with suitable larger bold type fonts for the chapter, section and sub-section headings. Chapters, sections and sub-sections should be numbered appropriately. All chapters should start on a new page.
- All pages with the exception of the title page should be numbered at the bottom aligned to the centre of the page. Roman numerals should be used for pages in the preamble and Arabic numerals used for all other pages starting at 1 for the first page of the first chapter.
- All mathematical expressions should be typeset using an equation editor. All display equations should be centred on the page. Where a display equation is numbered, the number should be aligned to the right-hand margin alongside the equation and enclosed in parentheses.
- All figures and tables should be centred on the page and should not have elements placed alongside. Numbered figure captions should appear below figures and above tables.
- All sources should be cited using the Harvard method with a list of references containing the citation information in alphabetical order by the first author's surname a placed after the conclusions chapter. See the university's referencing guide for more information using the link below.

http://libguides.mmu.ac.uk/refguide/mmuharvard

Report writing guidance

Detailed guidance on the preparation of the project report will be provided on the Moodle area for this unit and in a project talk delivered in term 1 (see the Project Talk Schedule on page 13). The project supervisor will advise on the detailed aspects of the project report and will provide formative feedback of small sections of the report. Students should note that project supervisors will not proof read the whole report prior to submission.

Students are advised to use either LaTeX or Microsoft Word software available on the university machines on which to prepare their project report. Skeletal templates that give an indication of the basic formatting in both LaTeX and Microsoft Word formats are provided on the Moodle area for this unit.

Work should begin on the project report no later than the beginning of term 2.

Procedure for handing in work

The deadline for the submission of project report is the 13th **May 2022.** To submit their report, students are required to do the following:

- Submit a single PDF file containing the project report using the online **Report Submission Link** on the Moodle area for this unit.
- It is **not** required for you to submit hard copies of your project.

Marking procedure

The project report is marked by the project supervisor and a second marker chosen from the other academic staff from the division of Mathematics and Computation. The marks awarded are based on the Project report mark given on page 15 to ensure consistency and fairness of marking. The markers will mark the project report independently before meeting to discuss the report and agreeing on the mark for the project.

In the event of a disagreement between the first and second markers as to the mark falling within different degree classification boundaries, a third marker is asked to independently mark the project report and help determine the mark awarded.

Poster presentation (week 3rd May 2022, 9 pm)

A poster can be defined as a 'placard displayed in a public place' and is used to communicate ideas and messages visually. It has become common practice in academic and corporate events for authors to display posters showcasing their work to invite discussions, collaborations and business. Students will be required to produce a poster for display in a public area that presents some aspects of their project work to a general audience. While the actual public display will not be part of your submission during the pandemic it is expected that the poster produced would be correct in all details if you were to display it in public.

The poster presentation should be submitted electronically as a pdf file on the **3rd May by 9 pm**..

The poster should be produced following the submission of the project report. It is expected that students will be able to copy equations, figures and table with some changes to the formatting so that they are suitable to be included in the poster.

Formatting of the poster

The poster should be printed on A1 sized paper (593mm × 841mm) and may be in portrait or landscape orientation. The poster should adhere to the following formatting guidelines:

- The title of the poster should be displayed at the top and include the name of the student, the supervisor and include the university logo. It is common practice to include the contact details of the author somewhere on the poster, usually as a footnote towards the bottom.
- The text used on the poster should be clearly readable to a reader standing 3m from the poster. It is recommended a san-serif font of no less than 20 pt is used.
- Equations should be typeset and clearly readable to the reader. Note that equations may be typeset using a serif font.
- Care should be taken to ensure that any text and axes labels in tables and figures are large enough to be legible to a reader stood 3m from the poster.
- The structure of the poster is left to the student but it is good practice to have sections for the introduction, methodology, results and conclusions.
- Key sources should be cited using the Harvard method (see link on page 8 for the university's guide to Harvard referencing) and a list of references included on the poster.

Guidance for creating a poster and oral presentation will be provided on the Moodle area for this unit including examples of good practice and a Microsoft PowerPoint template that can be used to produce the poster.

Procedure for handing in work

To submit their poster, students are required to do the following:

- Submit a single PDF file containing the poster using the TurnItIn submission link on the Moodle area for this unit.

Marking procedure

The poster will be marked by the project supervisor and the second marker using the Poster Presentation Marking grid **(electronic submission)**

Category	Expectation
Visual impact (30%)	The poster is visually appealing and invites viewing. Excellent use of design elements. All document elements are clearly legible for a reader stood 3m from the poster.
Content (35%)	An appropriate amount of content is displayed on the poster. Explanations are easily understood by a general audience. Minimal use of equations and topic specific jargon.
Structure (25%)	The poster has a clear introduction, methodology, results and conclusions sections. The structure flows naturally.
Details (10%)	The poster includes a title, name of the student, name of the supervisor, the university logo, the student's contact details and reference list.

on page 16 to inform the mark awarded. Students will not receive a quantitative mark for their poster but may seek informal feedback from their project supervisor following the session.

Oral Presentation (Week of 3rd May 2022)

The oral presentation requires the students to deliver a 15-minute talk to an audience of their peers and academic staff about their project. The talks will take place during the week commencing the **3rd May 2021** (specific dates, times and locations to be confirmed). The project talks will be organised into a number of sessions where a small group of students (those with the same supervisor) will present their oral presentation to the other students in the group, the project supervisors and second markers.

This will be done online through the use of an MS teams link so that all students and the two supervisors are present during these presentations.

The format of the talk is left up to the student but it is expected that it will make use of the audio/visual facilities available where appropriate, e.g., use of electronic slides, multimedia, mathematical software, whiteboards etc. Given the amount of content produced during the course of a project, it is expected that students will identify certain aspects of their project which will be the focus their oral presentation rather than attempting to present their whole project in the 15 minutes allocated to the talk.

Project presentation talk & practice presentation

Guidance for creating a poster is provided on the project Moodle page. Students will be required to perform a practice presentation to their supervisor in term 2. The purpose of the practice presentation is to help students develop their presentation skills and avoid any significant mistakes that may adversely affect their mark in the oral presentation. It is expected that students may not have completed all of the work on their project at this time so the content of the practice presentation may include progress on the project to date and an indication of work yet to be done.

Procedure for handing in work

Students are required to be present at their allocated project talk session **at least 15 minutes** prior to the commencement of the session and remain for the duration until dismissed by the academic staff. Students are advised to always have a backup plan in the event of a systems failure (e.g., a hard copy of the slides).

Marking procedure

Following the conclusion of all of the project talks in the session, the academic staff will dismiss the students and discuss each presentation. The academics will use the Oral presentation marking grid on page 17 to inform the mark awarded for the oral presentation. Students will not receive a quantitative mark for their oral presentation but may seek informal feedback from their project supervisor following the session.

Project Talk Schedule

In addition to the support students will receive from their project supervisors, a series of talks that cover the general aspects of completing an academic project will take place mostly in term 1.

Some of these talks will be available as electronically submitted virtual lectures while some will be webinars to be attended by the students.

The talks will cover a variety of topics such as plagiarism, academic writing, literature reviews, referencing and citations. A full schedule will be posted on Moodle.

Marking Scheme

The mark for the project unit is based on the marks awarded for each project deliverable and calculated using the following weightings.

Project deliverables	Weighting
Project report (inc. TOR and the interim report)	80%
Poster presentation	10%
Oral presentation	10%

The marks awarded for each deliverable will be informed by the marking grids that are provided in the following pages. The deliverables are divided into a number of categories that are given a mark out of 10 based on the descriptors in the marking grid and a weighted sum is used to calculate a percentage mark. These marking grids are used to ensure fairness and consistency of marking. Students are advised to pay close attention to the grade requirements given in the marking grids to help improve their marks and to not incur penalties for trivial mistakes.

Students will receive a single mark for the project unit, which will be issued following the summer exam board that take place at the end of term 3. Note that the marks awarded for each project deliverable will not be issued to the students; however, students may request informal qualitative feedback from their supervisor.

Graduate Outcomes

The criterion for which the project is marked is designed to align with the university Graduate Outcomes (GOs). There are:

1. Apply skills of critical analysis to real world situations within a defined range of contexts.
2. Demonstrate a high degree of professionalism, e.g., initiative, creativity, motivation, professional practice and self-management;
3. Express ideas effectively and communicate information appropriately and accurately using a range of media including ICT;
4. Develop working relationships using teamwork and leadership skills, recognising and respecting different perspectives;
5. Manage their professional development reflecting on progress and taking appropriate action;
6. Find, evaluate, synthesise and use information from a variety of sources;
7. Articulate an awareness of the social and community contexts within the disciplinary record.

The marking is based on the University Standard Descriptors (USDs) for level 6 that can be accessed using the link below.

http://www.mmu.ac.uk/academic/casqe/regulations/docs/USD_level_06.pdf

Project report mark breakdown and expectations.

Category	Expectation
Student approach (10%) (GOs 2, 4, 5)	The student was present for all or nearly all project meetings and talks, led the discussion during project meetings and progress on the project was consistent. All project deliverables were submitted. The terms of reference and interim report were of a high standard.
Academic & mathematical rigour (20%) (GOs 1, 6)	Problems are evaluated and solved with original and/or insightful reference to theory and practice. Information is gathered from a variety of trusted sources. The level of mathematics presented is that normally expected of a level 6 student.
Explanations (20%) (GOs 3, 7)	Explanations are clear and succinct and make good use of more than one strategy. All mathematical expressions are clearly explained and all variables are defined. Good use of standard mathematical structures.
Results, discussion & conclusions (20%) (GOs 1, 3, 6, 7)	Results are clearly presented using appropriate tables, graphs and diagrams and evaluated thoroughly and critically challenging the limits of established knowledge. Conclusions provide insightful observations with reference to the report content, critically evaluate and reflect on the aims and objectives and suggest areas for further work suitable for a postgraduate research project.
Structure (10%) (GO 3)	The report follows a well thought out and planned structure. Report includes a complete preamble section, an introduction chapter, a conclusions chapter and a list of references. Chapters and sections contain an appropriate amount of content and follow a natural order.
Presentation (10%) (GO 3)	The report is professionally presented following all of the guidelines provided.
Referencing (5%) (GO 3, 6)	The report contains numerous citations where necessary using the Harvard method. The reference list contains full and complete citation information. Cross-referencing of document elements is used to good effect.
Written English (5%) (GO 3)	The report is written in excellent English with no spelling or grammar errors. Third person passive voice is used throughout with the exception of personal reflection.

Poster Presentation Marking grid (electronic submission)

Category	Expectation
Visual impact (30%)	The poster is visually appealing and invites viewing. Excellent use of design elements. All document elements are clearly legible for a reader stood 3m from the poster.
Content (35%)	An appropriate amount of content is displayed on the poster. Explanations are easily understood by a general audience. Minimal use of equations and topic specific jargon.
Structure (25%)	The poster has a clear introduction, methodology, results and conclusions sections. The structure flows naturally.
Details (10%)	The poster includes a title, name of the student, name of the supervisor, the university logo, the student's contact details and reference list.

Oral presentation marking grid (via MS teams)

Category	Expectation
Timing (20%)	The presentation finished with 1 minute or less remaining without being prompted or needing to change the tempo.
Quality of visual aids (20%)	The design of the visual aids is visually appealing and all document elements are clearly legible. Creative and effective use of the technology available to help the audience understand the content.
Explanations (20%)	The explanations are clear, concise and show an appreciation of the knowledge level of the audience. All equations, variables and topic specific phrases are defined. The explanations do not rely on the visual aids to impart information.
Structure (20%)	The student introduces themselves and the subject of the their talk at the beginning. The presentation has a good introduction that explains what is being presented, the motivation and the outline of the talk. The presentation concludes with a summary of the talk, the main conclusions and possible areas for further study.
Clarity of speech (20%)	The speech uses a good tempo, diction and an appropriate volume for the room. The student makes a good connection with the audience by facing them and making eye contact.

The oral presentation aligns with GOs 2, 3.